



**Ana Rita Giraldes
Simões**

**Convolvulaceae of the island of Timor with special
reference to East Timor**



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Dissertação apresentada à Universidade de Aveiro para cumprimento dos requisitos necessários à obtenção do grau de Mestre em Ecologia, Biodiversidade e Gestão de Ecossistemas, realizada sob a orientação científica da Prof.^a Doutora Helena Silva e do Prof. Doutor Paulo Silveira, ambos Professores do Departamento de Biologia da Universidade de Aveiro.

À Beatriz e à Sofia.

o júri

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resumo

A seguinte dissertação de Mestrado apresenta uma revisão taxonómica detalhada e actualizada das Convolvulaceae de Timor, com especial referência para a parte oriental da ilha. Este trabalho teve por base um conjunto de fontes bibliográficas, espécimes de herbário e exemplares colhidos em duas expedições botânicas conduzidas apenas na parte oriental da ilha (2004/2005), sob o projecto "Contribuição para os recursos florísticos de Timor Leste". Na totalidade, foram estudados 283 espécimes, abrangendo 15 géneros, 53 espécies e alguns *taxa* infraespecíficos, num total de 61 *taxa* diferentes, de entre os quais se destacam 6 *taxa* endémicos da ilha de Timor. É sugerida, neste estudo, uma nova espécie e que poderá igualmente ser um caso de endemismo. Dos 7 endemismos, apenas a possível nova espécie ocorre em Timor Leste. São, ainda, apresentados 3 novos registos de Convolvulaceae para Timor, assim como 10 actualizações de nomenclatura relativamente à Flora Malesiana.

abstract

The following dissertation presents an updated and thorough taxonomic review of Convolvulaceae from Timor, with special reference to the eastern part of the island. It has been based on the study of bibliographic sources, herbarium specimens and specimens collected in two botanical expeditions to the eastern part of the island only (2004-2005), under the project "Contribution to flora resources management in East Timor". Overall, 283 specimens were studied, comprising 15 genus, 53 species and a few other infraspecific *taxa*, in a total of 61 different *taxa*, among which 6 *taxa* are endemic to the island of Timor. A new species is suggested in this study, which might also be an endemism. Of the 7 suggested endemisms, only the possibly new species, still under study, occurs in East Timor. Also, 3 new records of Convolvulaceae to Timor are introduced in this study, as well as 10 nomenclatural updates in relation to Flora Malesiana.

Index of contents

1. Introduction	11
1.1. Geopolitical context of East Timor.....	11
1.1.1. Historical and Political context.....	11
1.1.2. Geography	13
1.1.3. Soil and Environmental Conditions.....	17
1.1.3.1. Climate.....	17
1.1.3.2. Hydrology.....	18
1.1.3.3. Geology.....	19
1.1.3.4. Geological Resources	20
1.2. Vegetation and protected areas	21
1.2.1. UNEP – WCMC Protected Areas	22
1.2.2. Local legislation on Protected Areas	25
1.3. Taxonomy of Convolvulaceae	26
1.3.1. Main characteristics	26
1.3.2. Retrospective on taxonomy and collection efforts.....	27
2. Objectives	29
3. Materials and Methods.....	29
4. Results and discussion	32
4.1. Taxonomic treatment	32
4.2. Distribution.....	81
4.3. Habit and Ecology	82
4.4. Ethnobotanical data	83
5. Conclusion	99
6. References	101
Anex I	104
Anex II	105
Anex III	107
Anex IV	108

Index of cited *taxa*

Argyreia	33, 34
<i>guichenotii</i> Choisy.....	35
<i>reinwardtiana</i> (Blume) Miq.....	34, 35 , 82
<i>setosa</i> Choisy	36
sp. A.....	34, 35 , 83, 84, 85, 99
<i>walshae</i> Ooststr.	34, 35 , 83
Calonyction	
<i>mollissimum</i> Zoll.....	49
<i>muticum</i> Decne.	63
<i>speciosum</i> Choisy.....	50
Convolvulus	26
<i>alsinoides</i> L.	41
<i>biflorus</i> L.....	51
<i>brasiliensis</i> L.....	59
<i>cairicus</i> L.	52
<i>hastatus</i> Desr.	79
<i>malabaricus</i> L.	42
<i>marginatus</i> Desr.	55
<i>obscurus</i> L.....	57
<i>ochraceus</i> Lindl.	57
<i>pes-caprae</i> L.	59
<i>parviflorus</i> Vahl.....	65
<i>purpureus</i> L.	61
<i>tiliifolius</i> Desr.	79
<i>tridentatus</i> L.....	80
<i>turpethum</i> L.	74
<i>umbellatus</i> L.	72
<i>vitifolius</i> Burm. f.....	72
Cressa	32, 36
<i>australis</i> R. Br.	37
<i>cretica</i> L.....	37
Cuscuta	26, 32, 37
<i>campestris</i> Yunck	38 , 83, 99
<i>cassytoides</i> Nees ex Engelm	38 , 98
<i>monogyna</i> Vahl	39
<i>reflexa</i> Roxb.	38
<i>timorensis</i> Decne.	38
Dinetus	32, 39
<i>racemosus</i> (Roxb.) Buch.-Ham. ex Sweet	39 , 84, 90
Erycibe	32, 40
<i>timorensis</i> Hallier f. ex Hoogl.	40 , 83
Evolvulus	32, 40 , 85
<i>alsinoides</i> (L.) L.	40, 41
<i>alsinoides</i> var. <i>decumbens</i> (R. Br.) Ooststr.....	40, 42
<i>alsinoides</i> var. <i>javanicus</i> (Blume) Ooststr.	40, 42
<i>decumbens</i> R. Br.....	42

<i>lanceaefolius</i> Span.	42
<i>pseudo-incanus</i> Span.	41
<i>pumilus</i> Span.	41
Hewittia	32, 42
<i>bicolor</i> (L. f.) Kuntze	42
<i>malabarica</i> (L.) Suresh.....	42
<i>scandens</i> (Milne) Mabberley.....	42
<i>sublobata</i> (L. f.) Kuntze	42
Ipomoea	26, 27, 33, 44
<i>aculeata</i> Blume.....	45, 49 , 84
<i>aculeata</i> var. <i>mollissima</i> (Zoll.) Hallier f. ex Ooststr.	49 , 86, 96, 97, 98
<i>alba</i> L.....	45, 50 , 83, 86, 92, 95
<i>angulata</i> Lam.....	54
<i>angustifolia</i> Jacq.	80
<i>aquatica</i> Forssk.....	26, 47, 50 , 83, 86, 92
<i>batatas</i> (L.) Lam.	27, 46, 47, 48, 51 , 83, 86, 92
<i>biflora</i> (L.) Pers.	47, 51
<i>bona-nox</i> L.	50
<i>cairica</i> (L.) Sweet	46, 52 , 86
<i>campanulata</i> L.....	63
<i>capillata</i> Span.	62
<i>carnea</i> Jacq. subsp. <i>fistulosa</i> (Mart. ex Choisy) D. F. Austin	48, 53
<i>chryseides</i> Ker. - Gawl.	70
<i>crassicaulis</i> (Benth.) B. L. Rob.....	53
<i>cymosa</i> Roem. & Schult.	72
<i>decaisnei</i> Ooststr.	48, 54 , 98
<i>digitata</i> auct. non L.....	56
<i>eriocarpa</i> R. Br.	47, 54
<i>filicaulis</i> Blume.....	80
<i>gracilis</i> R. Br.....	26
<i>grandiflora</i> (L. f.) Lam.....	79
<i>fistulosa</i> Mart ex Choisy	53
<i>hederacea</i> auct. non Jacq.....	56
<i>hederifolia</i> L.....	45, 54 , 83, 94
<i>hispida</i> (Vahl.) Roem. & Schult.	54
<i>illustris</i> Prain	64
<i>insuavis</i> Blume.....	57
<i>marginata</i> (Desr.) Verdc.	46, 55
<i>maritima</i> (Desr.) R. Br.....	59
<i>mauritiana</i> Jacq.	46, 56 , 87, 95
<i>nil</i> (L.) Roth.....	48, 56 , 83, 88
<i>obscura</i> (L.) Ker.-Gawl.....	48, 57 , 88
<i>ochracea</i> (Lindl.) G. Don.	47, 57 , 83
<i>ochroleuca</i> Span.....	57 , 83
<i>paniculata</i> R. Br.	56
<i>paniculata</i> Burm. f.	65
<i>pes-caprae</i> (L.) Sweet	26, 27, 47, 58, 59 , 83, 99
<i>pes-caprae</i> subsp. <i>brasiliensis</i> (L.) Ooststr.	58, 59 , 88, 96, 98

<i>pes-tigridis</i> L.	48, 58
<i>petaloidea</i> Choisy	64
<i>plebeia</i> R. Br.	51
<i>polymorpha</i> Roem. & Schult.	47, 60
<i>pumila</i> Span.	60
<i>pulchra</i> Blume	79
<i>purpurea</i> (L.) Roth.	48, 61
<i>quamoclit</i> L.	45, 61 , 83
<i>quinata</i> R. Br.	71
<i>reflexa</i> Span.	64
<i>reinwardtiana</i> Blume	35
<i>reniformis</i> Choisy	70
<i>repanda</i> Jacq.	61
<i>repens</i> Roth.	50
<i>reptans</i> Poir.	50
<i>riedeliana</i> Oliv.	74
<i>sepiaria</i> Koen. ex. Roxb.	55
<i>setosa</i> Blume	56
<i>sumatrana</i> (Miq.) Ooststr.	46, 61
<i>trichotosa</i> Blume	64
<i>trichosperma</i> Blume	45, 62
<i>tricolor</i> Cav.	47, 62 , 96, 97
<i>trichocalyx</i> Steud.	56
<i>triloba</i> L.	48, 63 , 83
<i>tuba</i> (Schtdl.) G. Don.	26, 63
<i>turpethum</i> R. Br.	74
<i>verrucosa</i> Blume	55
<i>vitifolia</i> (Burm. f.) Blume	72
<i>violacea</i> L.	45, 63
Jacquemontia	33, 27, 64
<i>paniculata</i> (Burm. f.) Hallier f.	64, 65 , 99
<i>paniculata</i> var. <i>tomentosa</i> (Warb.) Ooststr.	64, 65, 66
<i>zollingeri</i> Hallier f.	64, 66
<i>zollingeri</i> var. <i>jonkeri</i> Ooststr.	66 , 83
<i>Lettsomia</i>	
<i>sumatrana</i> Miq.	61
Merremia	33, 67
<i>dichotoma</i> Ooststr.	68, 69 , 82, 97
<i>emarginata</i> Hallier f.	68, 70 , 88, 97
<i>gemella</i> Hallier f.	68, 69
<i>hederacea</i> Hallier f.	68, 70 , 89, 93
<i>peltata</i> (L.) Merr.	64
<i>quinata</i> (R. Br.) Ooststr.	68, 71 , 99
<i>tridentata</i> (L.) Hallier f.	80
<i>tridentata</i> subsp. <i>angustifolia</i> Ooststr.	80
<i>tridentata</i> subsp. <i>hastata</i> (Desr.) Ooststr.	80
<i>umbellata</i> (L.) Hallier f.	71
<i>umbellata</i> subsp. <i>orientalis</i> (Hallier f.) Ooststr.	68, 72 , 89

<i>umbellata</i> var. <i>orientalis</i> Hallier f.	72
<i>vitifolia</i> (Burm. f.) Hallier f.	68, 72 , 89
Operculina	33, 73
<i>riedeliana</i> (Oliv.) Ooststr.	73, 74
<i>turpethum</i> (L.) Silva Manso	27, 73, 74 , 89, 96, 97
Polymeria	33, 75
<i>pusilla</i> R. Br.	75
<i>Pharbitis</i>	
<i>nil</i> (L.) Choisy	56
<i>variifolia</i> Decne.	54
Porana	27, 32, 76
<i>racemosa</i> Roxb.	39
<i>volubilis</i> Burm. f.	76 , 90, 92, 94, 97
<i>volubilis</i> var. <i>burmanniana</i> Blume	76
<i>Quamoclit</i>	
<i>vulgaris</i> Choisy	61
<i>Shutereia</i>	
<i>bicolor</i> Choisy	43
Stictocardia	33, 77
<i>campanulata</i> L.	63
<i>discolor</i> Ooststr.	78 , 82, 97
<i>neglecta</i> Ooststr.	78 , 96, 97
<i>tiliifolia</i> (Desr.) Hallier f.	64, 78 , 82, 97
Xenostegia	33, 78
<i>tridentata</i> (L.) D. F. Austin & Staples	79 , 90, 98

Index of figures

Fig. 1. The Malesian region in the context of Southeast Asia.....	13
Fig. 2. The Lesser Sunda Islands in the context of Southeast Asia.....	14
Fig. 3. The Lesser Sunda Islands in detail.	15
Fig. 4. The island of Timor, with special focus on EastTimor.....	16
Fig. 5. Relief map of the island of Timor, with special focus on the eastern part..	19
Fig. 6. UNEP-WCMC designated Protected Areas in the island of Timor, with special focus on the eastern part.....	23
Fig. 7. Collection efforts of the various botanists who have collected in the island of Timor.....	28
Fig. 8. Distribution of <i>Argyreia reinwardtiana</i> , <i>Argyreia walshae</i> and <i>Argyreia</i> sp. A in the island of Timor.	34
Fig. 9. Distribution of <i>Cressa australis</i> in the island of Timor.....	36
Fig. 10. Distribution of <i>Cuscuta campestris</i> and <i>Cuscuta cassytoides</i> in the island of Timor.	37
Fig. 11. Distribution of <i>Dinetus racemosus</i> in the island of Timor.....	39
Fig. 12. Distribution of <i>Evolvulus alsinoides</i> var. <i>alsinoides</i> and <i>E. alsinoides</i> var. <i>decumbens</i> in the island of Timor.....	41
Fig. 13. Distribution of <i>Hewittia malabarica</i> in the island of Timor.	43
Fig. 14. Distribution of genus <i>Ipomoea</i> in the island of Timor.....	44
Fig. 15. Distribution of <i>Ipomoea aculeata</i> var. <i>mollissima</i> , <i>I. alba</i> and <i>I. aquatica</i> in the island of Timor.....	49
Fig. 16. Distribution of <i>Ipomoea batatas</i> and <i>I. cairica</i> in the island of Timor.	51
Fig. 17. Distribution of <i>Ipomoea carnea</i> subsp. <i>fistulosa</i> , <i>I. decaisnei</i> and <i>I. hederifolia</i> in the island of Timor.....	53
Fig. 18. Distribution of <i>Ipomoea marginata</i> , <i>I. nil</i> and <i>I. obscura</i> in the island of Timor.....	55
Fig. 19. Distribution of <i>Ipomoea ochracea</i> and <i>I. pes-caprae</i> subsp. <i>brasiliensis</i> in the island of Timor.....	58
Fig. 20. Distribution of <i>Ipomoea pes-tigridis</i> , <i>I. polymorpha</i> and <i>I. quamoclit</i> for the island of Timor.....	60
Fig. 21. Distribution of <i>Ipomoea trichosperma</i> , <i>I. tricolor</i> , <i>I. triloba</i> and <i>I. violacea</i> in the island of Timor.....	62
Fig. 22. Distribution of <i>Jacquemontia paniculata</i> in the island of Timor.....	65
Fig. 23. Distribution of genus <i>Merremia</i> in the island of Timor.	67
Fig. 24. Distribution of <i>Merremia dichotoma</i> , <i>M. emarginata</i> , <i>M. gemella</i> and <i>M. hederacea</i> in the island of Timor.	69
Fig. 25. Distribution of <i>Merremia quinata</i> , <i>M. umbellata</i> subsp. <i>orientalis</i> and <i>M. vitifolia</i> in the island of Timor.	71
Fig. 26. Distribution of <i>Operculina tuperthum</i> in the island of Timor.....	73
Fig. 27. Distribution of <i>Polymeria pusilla</i> in the island of Timor.	75
Fig. 28. Distribution of <i>Porana volubilis</i> in the island of Timor.	76
Fig. 29 Distribution of <i>Stictocardia discolor</i> , <i>S. neglecta</i> and <i>S. tiliifolia</i> in the island of Timor.	77
Fig. 30. Distribution of <i>Xenostegia tridentata</i> in the island of Timor.....	79
Fig. 31. Distribution of Convolvulaceae in the island of Timor.....	81

1. Introduction

1.1. Geopolitical context of East Timor

1.1.1. Historical and Political context

There is little knowledge of the history of the island of Timor before the 16th century, when the Portuguese arrived to the territory, for the fact that no written records were produced in that time.

In 1511, the Portuguese started to actively interfere with the local commerce, mainly for the exploitation of sandal. However, by then, the Portuguese presence in the territory was limited to pirates, explorers and trademen. The island was at that time sect in various kingdoms, some of which would not tolerate the Portuguese political domination, particularly for the high taxes they would charge the native people. In the mid18th century, a few kingdoms rebelled against the Portuguese government, while the Dutch started to take over the Western part of the island. This caused a significant gradual loss of territory by the Portuguese, which were eventually left with the eastern part of the island plus a small kingdom on the Western part – Oekussi (Fac.Arq.-UTL *et al.*, 2002).

In 1910, the Portuguese monarchy fell and a republican regime was installed, causing some instability which the Dutch took advantage of to take control of yet more territories. The borders between the Western and Eastern parts of the island only stabilized in 1915, and so they remain to date, despite the political changes that occurred ever since (Fac.Arq.-UTL *et al.*, 2002).

In 1945, Indonesia proclaimed its independence from Holland but the Eastern part of the island of Timor was left out because it did not belong to Holland. Here stood a chance for independence for the East Timorese, who would not be very content with the Portuguese lack of economic investment in the region. Still, the Portuguese colonization had also poorly influenced the local culture, which was appreciated by the locals. Controversy rose from those days on, dividing the population in those who would prefer to be part of Indonesia, for economical interests, and those who would rather remain a Portuguese territory, for historical and cultural reasons (Fac.Arq.-UTL *et al.*, 2002).

In 1974, a people's revolution in Portugal put an end to a long period of dictatorship, and a democratic regime was installed. These new values and political ideologies stated, amongst other things, the decolonization of overseas colonies. This meant giving hand of African territories, as well as East Timor. Opinions were divided in East Timor, and a few political parties were formed, defending different strategies for the territory. The fight for power and control over a "no-man's land" began, costing the lives of many (Fac.Arq.-UTL *et al.*, 2002).

In 8th December 1975, with the support of the American government, Indonesia conducted a massive military invasion over East Timor. Indonesia and Portugal politically diverged and the situation worsened through time, until chances of dialogue to an agreement were virtually impossible. The political forces in East Timor gathered around an armed force – FALINTIL – that gained power in the rural areas, where the Indonesians had little control. They called themselves the National Resistance and acted mostly as a *guerrilla*. The occupation forces used a strategy of burning land to scare out the insurrectors, having caused a huge devastation of the vegetation. During this period, 150.000 people are thought to have died both in the killings and from starvation (Fac.Arq.-UTL *et al.*, 2002).

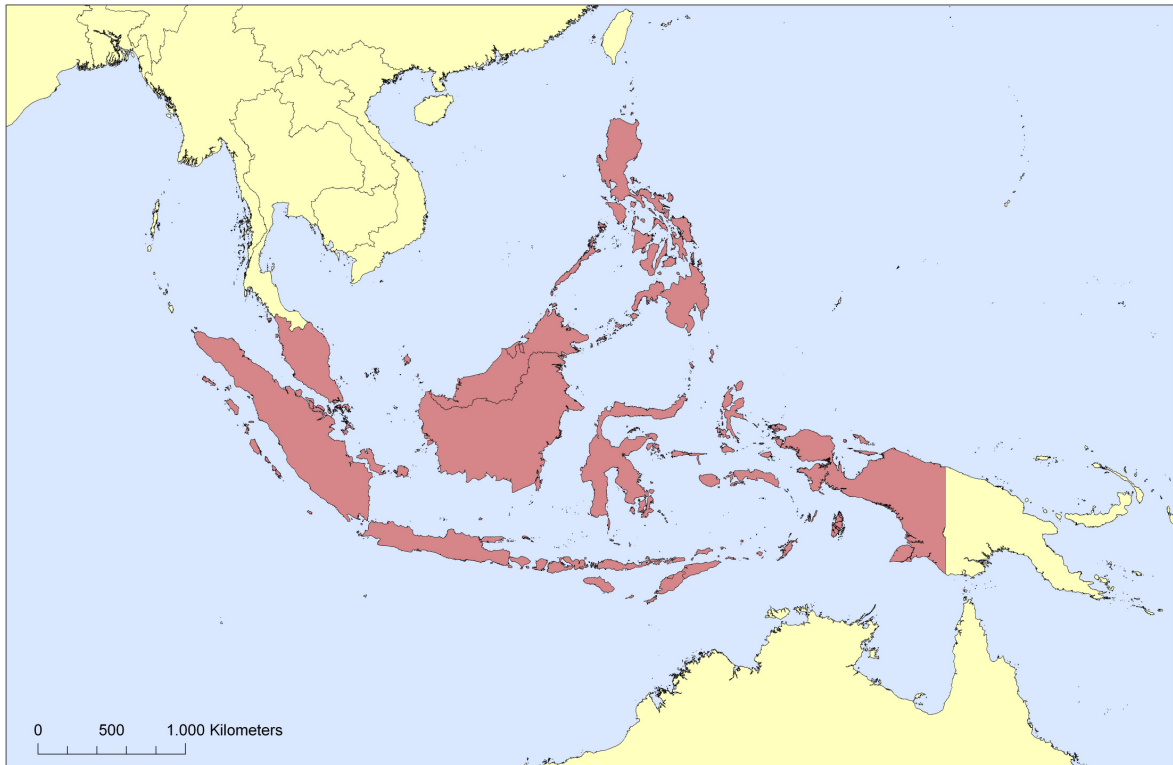
In 1991, at Santa Cruz cemetery, in Dili, a violent massacre was perpetrated by the Indonesian army, in a desperate attempt to control the masses. However, this had quite the opposite effect, as the impact on international media was the spread out of the Timorese cry for help. World wide, people and governments started to actively show their disapproval of the Indonesian's occupation of East Timor, and the greatest public support to the Timorese cause was shown in 1996 by the Nobel Prize being attributed to two significant personalities of the National Resistance (Fac.Arq.-UTL *et al.*, 2002).

In 1999, the UN conducted a referendum in East Timor, when 80% of the population voted for Independence. The Indonesian army was, therefore, forced to retrieve their troops, leaving a trail of destruction behind them (about half of the buildings in Dili and other major cities were burnt down or destroyed during that period) (Fac.Arq.-UTL *et al.*, 2002).

From 1999 to 2002, the territory was administrated by the United Nations, by a transitional government. To the relief of many, and sorrow for the immense number of casualties on account of it, Independence of East Timor was finally officially proclaimed in May 2002.

1.1.2. Geography

The island of Timor is located at the southern edge of Southeast Asia, and off the Northwest of Australia. It is part of the Malesian biogeographic region, which is one of the greatest diversity centres for tropical plants (Johns, 1995). It extends from the Malay Peninsula, through the Indonesian archipelago, to New Guinea, and comprises the countries Brunei Darussalam, East Timor, Indonesia, Malaysia, the Philippines, Papua New Guinea and Singapore.



Legend:

Malesia

Fig. 1. The Malesian region in the context of Southeast Asia.
(IUCN and UNEP, 2006)

This is a very unique region as it is composed of a great number of islands, plus the Malay Peninsula, standing right in between the Indian and Pacific Oceans (see fig. 1). In the history of this region, climate changes and continental drifts have alternately brought its territories together or apart, although they have kept more or less uninterruptedly connected to the Asian mainland, enough to allow exchanges in Asian and Malesian flora, originating an intimate connection between both (van Steenis, 1979).

Thus, even though the Malesian flora has had a significant endemic development, its composition on family and tribal level is very similar to that of Southeast Asia, both in the lowland and in the mountains (van Steenis, 1979).

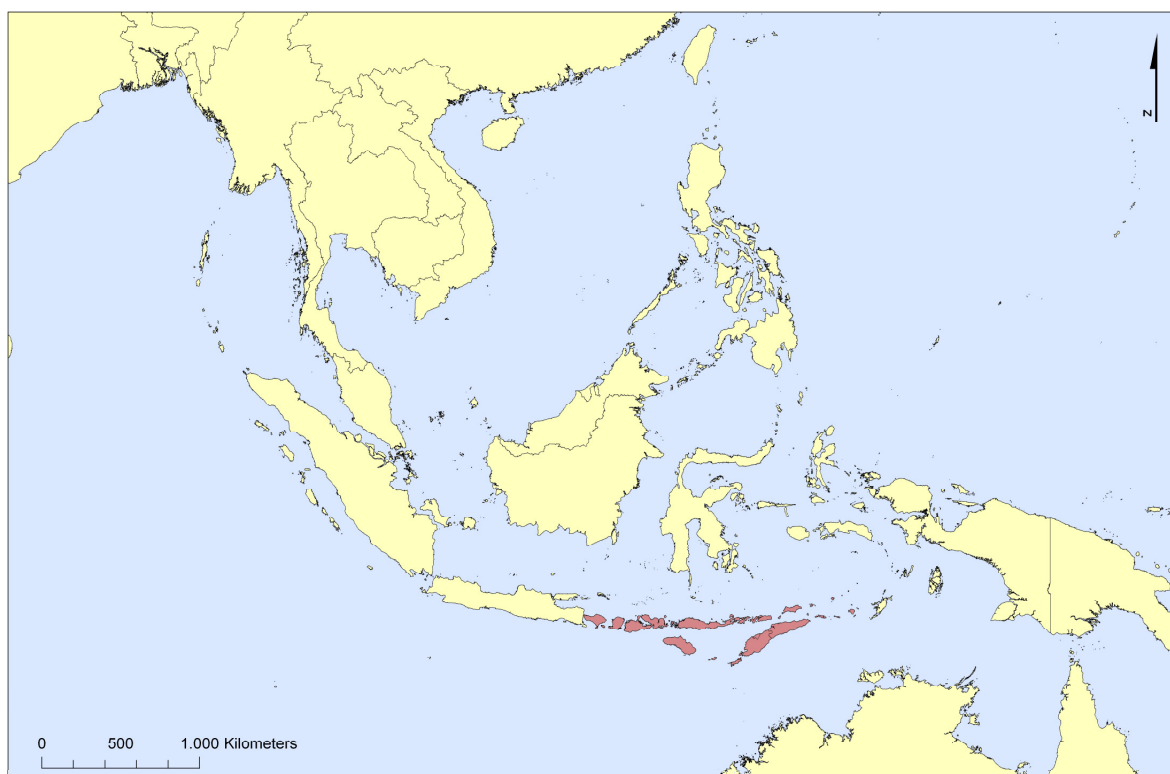
The Malesian region can be divided into three main phytogeographic regions (Johns, 1995):

Western Malesia: It includes the Malay Peninsula, Sumatra, Borneo and Palawan (Philippines). The island of Java may also be included in this region for its geographic position, but this is not clear because the flora of Java is not closely related to that of Sumatra or Borneo.

Central Malesia: It is delimited by the Philippines, Sulawesi, the Moluccas and the Lesser Sunda Islands. The flora of these areas is not well known, except for the Philippines. According to what is known of the Lesser Sunda Islands, they do not have very high diversity, compared to the other Malesian phytogeographic regions (De Vogel in Johns, 1995).

Eastern Malesia (or Papuasia): This region comprises the island of New Guinea (Irian Jaya and Papua New Guinea), and it shows a high degree of specific endemism, probably around 60-70%.

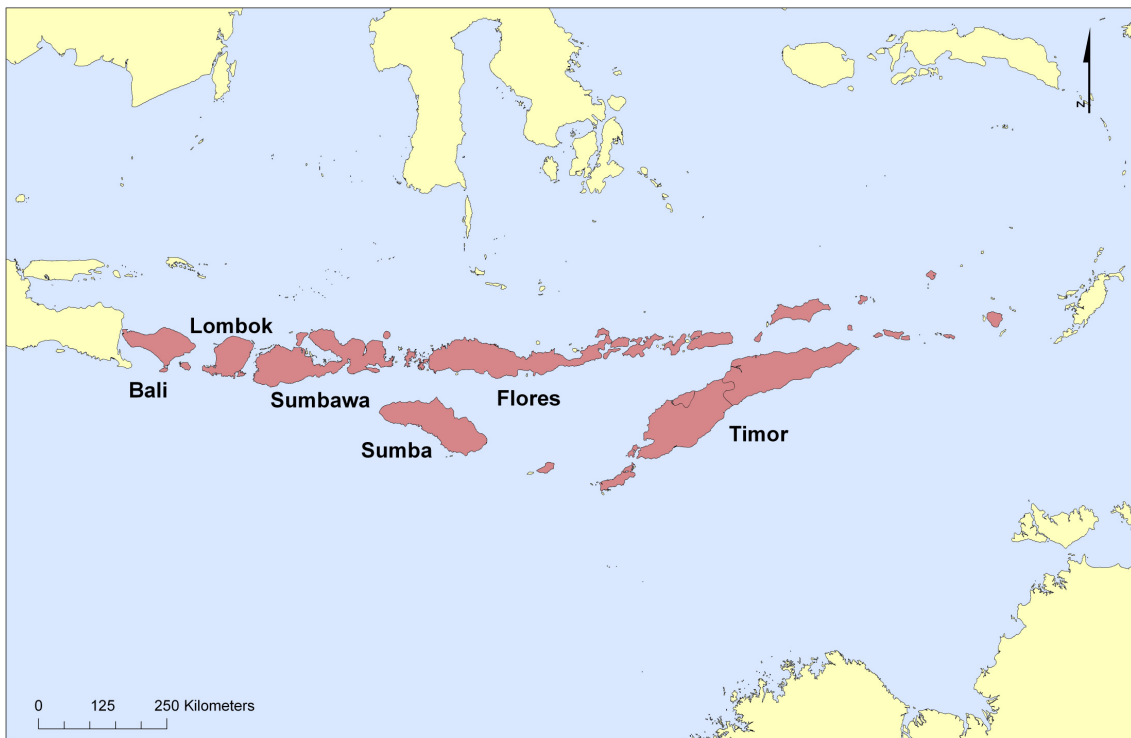
The island of Timor is included in the Lesser Sunda Islands (Central Malesia), which is a group unlike any other region in the Indonesian archipelago. It is formed by various volcanic and coral reef islands, located in some of the deepest seas in the world. However, they are not all volcanic islands. The Lesser Sunda Islands consist, in fact, of two geologically different island chains: the northern chain is of volcanic origin; Sumba and Timor are of non-volcanic origin (Monk *et al.*, 1997).



Legend:

■ Lesser Sunda Islands

Fig. 2. The Lesser Sunda Islands in the context of Southeast Asia. (IUCN and UNEP, 2006).



Legend:

■ Lesser Sunda Islands

Fig. 3. The Lesser Sunda Islands in detail. (IUCN and UNEP 2006).

For their small size, comparing to other islands of the Indonesian archipelago, these islands share very particular characteristics, namely:

- a higher proportion of their landmass can be affected by natural disasters (i.e. volcanic eruptions, earthquakes, landslips and cyclone damage);
- climates are more directly maritime;
- water catchment areas are smaller and erosion levels higher;
- coastal regions make up a higher percentage of land;
- their environments may be more specialised, with a higher proportion of endemic species in overall impoverished communities (Monk *et al.*, 1997).

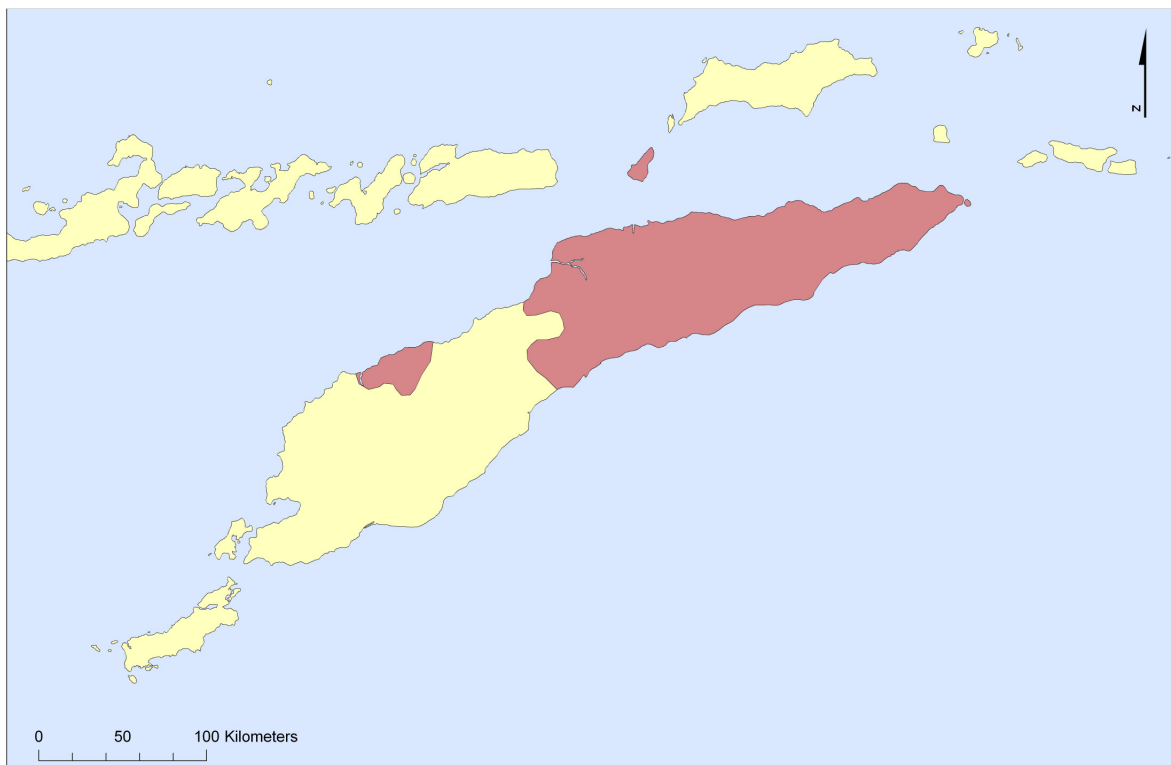
Much like the whole of the Malesian region, where the occurrence of seasonal or monsoon areas influences greatly the distribution of plants, in these islands the climate also has an impact in floral composition, particularly for the severe dry season that occurs from about May to October (van Steenis, 1979).

In plant-geography terms, these islands are overall remarkable for a few aspects:

- the extremely low number of endemic genera;
- the absence of some families and many genera which are well represented on other Malesian islands;
- the presence of many drought-indicating plants;

- the occurrence of a few species which are known from either south-east Asia or Australia but are otherwise absent or rare in other Malesian islands (van Steenis, 1979).

In the eastern end of the Lesser Sunda Islands, and to the northwest of Australia, we find the island of Timor, with a land area of approximately 24.498 km² (Monk *et al.*, 1997). It is now politically divided into two parts: the western part, which is included in the Indonesian Province of Nusa Tenggara Timur, and the eastern part that is, since 2002, internationally recognised as an independent country known as Timor Lorosae (= East Timor).



Legend:

- East Timor
- Indonesia

Fig. 4. The island of Timor, with special focus on EastTimor.
(IUCN and UNEP, 2006)

East Timor, as a country, includes not only the eastern part of the island but also a small territory on the northwestern coast – Oekussi - and two other islands off the coast of Timor Lorosae –Jaco and Ataúro. The capital city is Díli, located on the Northeastern coast of the island (Fac.Arq.-UTL *et al.*, 2002).

The territory is divided in 13 main districts: Liquiçá, Díli and Baucau, in the north coast; Covalima, Ainaro, Manufahi and Viqueque, in the south coast; Manatuto and Lautém, on both north and south coasts; Ermera and Aileu, in the

mountainous interior of the island; and Oecussi, which is surrounded by Indonesian Timor (Fac.Arq.-UTL *et al.*, 2002).

1.1.3. Soil and Environmental Conditions

1.1.3.1. Climate

East Timor has a monsoon climate, with two distinct seasons: the dry season, and the rain season, resulting from the wind blowing from different directions. The rain season, apart from the high levels of precipitation, shows greater values of temperature associated with wet winds blowing from the sea. The dry season tends to be drier, with winds blowing from the landside (Fac.Arq.-UTL *et al.*, 2002).

The average monthly temperature in Timor varies, according to the observed location, between 19°C and 30°C. However, in local terms, temperature variations are only of 2° C to 4° C. Despite the small variations in temperature, precipitation varies considerably in the territory, allowing the distinction between different areas of the territory and classify them according to the variation in precipitation (Fac.Arq.-UTL *et al.*, 2002).

Specifically in East Timor, 5 different types of climate can be found, based on a relationship between the number of dry and wet months (Q value):

1. Climate of Mountain and extreme east:

Q = 0,33 to 0,66

- It is the wettest climate in East Timor. The highest average monthly values of precipitation can go over 400 mm between December and February. From June to September there are 4 dry months, when precipitation values are below 60 mm. Average monthly values of temperature vary from 19°C to 21°C.

2. Climate of Plains and southern coast:

Q = 0,60 to 1,00

- It is considered a wet climate; however, the average monthly values never go over 260 mm, the greatest values occurring from December to March. There are 5 dry months, between June and November, in which the precipitation values reach up to 100 mm. Temperature varies from 22°C in July and August to 26°C in March.

3. Climate of Plains and Northern Coast:

Q = 1,00 to 1,67

- This is considered a dry climate, with average monthly values of precipitation under 200 mm almost the entire year long. There are only 5 wet months, with average monthly values of precipitation over 100mm. Temperature varies from 23°C to 26°C, showing little variation throughout the year.

4. Climate of Littoral, from the northern coast (Liquiçá):

Q= 1, 67 to 3,00

- It is also a dry climate. The highest values of precipitation do not go over 150 mm, and they are mostly lower than 100 mm. This means a low degree of humidity and in a high number of dry months (8). Average monthly temperatures are high throughout the whole year (27° C in July and 30°C in November).

5. Climate of Littoral, from the northern coast (Manatuto):

Q= 3,00 to 7,00

- It is the driest climate of East Timor, occurring in a handful of locations on the northern coast. Practically every month values of precipitation are recorded to be less than 100 mm and more than half of them are less than 60 mm. There are 10 dry months, which is considered a reasonably high number. Average temperatures are also quite high, varying little through the year, from 27°C to 28°C.

1.1.3.2. Hydrology

The largest part of the water courses in East Timor runs from the central part of the island, where the highest mountains occur. Due to the island's small land cover and accentuated relief, the water is quickly drained into the soil. Also, because of the high number of dry months, the courses are dry through most of the year. Therefore, the great majority of the water lines in Timor are generally small streams and not properly called rivers (Fac.Arq.-UTL *et al.*, 2002).

The few permanent water courses that exist are located in the southern coast, where the climate is wetter, with higher precipitation values and a larger number of wet months. The longest water course in Timor is Lacló, which is approximately 80 km long, baring one of the largest water basins in Timor (Fac.Arq.-UTL *et al.*, 2002).

During the rain season, intense tropical rain events, in addition to the territory's particular morphology, originate hydrographic basins and erosion phenomena that cause floodings and landslides all over the country. The water courses can drag down its streams a huge amount of soil materials, put down trees or destroy bridges and other buildings. In this period, it is also frequent to find waterfalls, which are due to the irregular morphology of the island. Most of them disappear in the dry season, but a few are permanent, such as Mota Bandeira's waterfall, between Ermera and Bobonaro (Fac.Arq.-UTL *et al.*, 2002).

1.1.3.3. Geology

- Geomorphology

Timor is an island of non-volcanic origin, possibly originated from the Australian continental margin (Audley-Charles in Monk *et al.*, 1997). It is believed to have been formed from sediments that were scraped off the Indo-Australian Plate's seabed by the time that it slid beneath the Eurasian plate (Hamilton in Monk *et al.*, 1997), and it is thought to have emerged above sea level 4 million years ago, when the Australian continental margin began subducting (Charlton in Monk *et al.*, 1997; Harris in Monk *et al.*, 1997). This phenomenon might as well explain a geological feature that is common to other nearby islands: the presence of complex sedimentary and metamorphic rocks (Monk *et al.*, 1997).

The oldest rocks known to occur in Timor are from 286 million years ago, located in Lolotoi, and are mostly composed of metamorphized sediments. The most common rocks of this formation are mica-slate, gneiss, amphibolite and phyllite (Fac.Arq.-UTL *et al.*, 2002).

Unlike the island of Timor, the island of Ataúro is of volcanic origin. The main types of rocks that can be found here are basalt, *andesite*, *riolite* and tuff (Fac.Arq.-UTL *et al.*, 2002).

- Relief

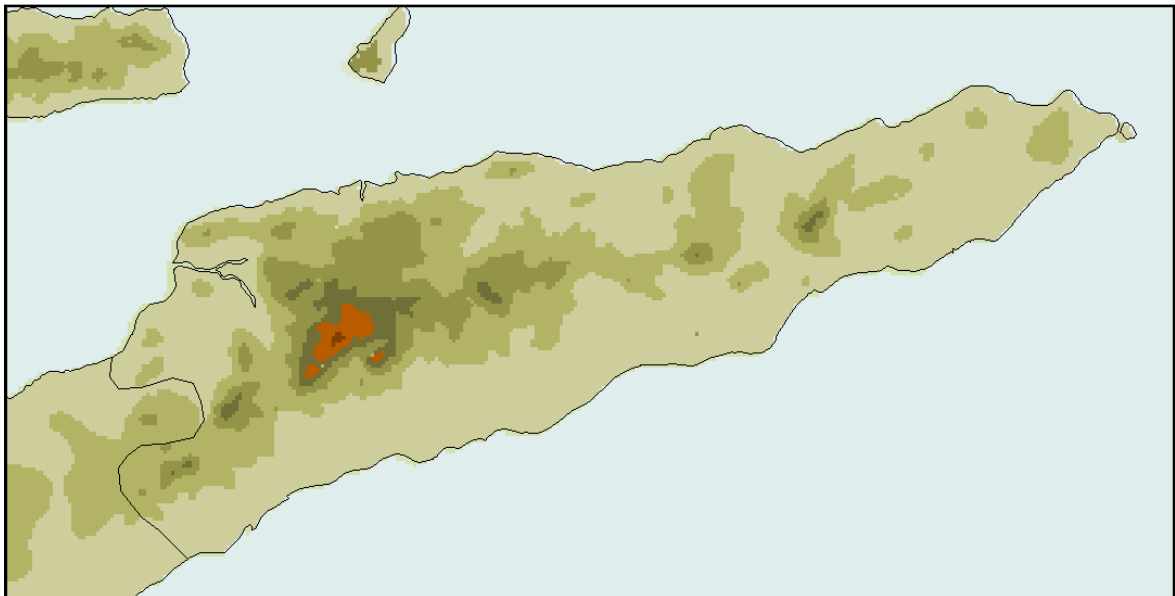


Fig. 5. Relief map of the island of Timor, with special focus on the eastern part.
Dark brown: highest values of altitude
Light green : lowest values of altitude.
(IUCN and UNEP, 2006)

In the centre of East Timor there is a mountain chain that dominates the whole of the island's morphology. It smoothly loses altitude as it spreads to the east. The highest peak is Tatamailau, which rises up to 2.963 m (Fac.Arq.-UTL *et al.*, 2002).

Geological relief is generally quite irregular in the island, and many sites are nearly impenetrable. Despite the difficulties in accessibility, mountain sites have very fertile soils due to geological and hydrological conditions. Therefore, and mostly against the odds, they are actually favourable to the fixation of high population densities (Fac.Arq.-UTL *et al.*, 2002).

1.1.3.4. Geological Resources

- Mineral Resources

In East Timor, there are a few minerals that can be extracted for industrial purposes (Fac.Arq.-UTL *et al.*, 2002):

- gold: by the water courses of Sue and southern Lacló, and in Clerac, Faluberliu (Manufahi district);
- chromium: there are some traces of it in mountain sites; in the subdistrict of Lacló there is a chromium mine;
- manganese: it is one of the most frequently found minerals in East Timor, but its exploitation was left for not being profitable;
- coal: there is evidence of the presence of coal in Viqueque and Baucau.

- Oil Resources

There are a few forms of oil resources occurring in East Timor: liquid exsudations; gaseous emanations; bituminous rocks; and mud volcanoes. Evidently, liquid exsudations are the ones that have attracted the population the most. Even during the Portuguese colonial period, native people already had ways of extracting oil to produce fuel. Most of the wells are located in the southern part of the country: mainly in Viqueque, but also in Covalima, Manatuto, Bobonaro, Baucau and Manufahi. The largest oil reserve is in the Timor Sea, south of the island. It is said to be one of the 20 largest oil deposits in the world, as its reserves are estimated to be of 400 million liquid oil barrels, and 4 trillion cubic feet of natural gas (Fac.Arq.-UTL *et al.*, 2002).

1.2. Vegetation and protected areas

The largest part of the soil in East Timor is covered by spontaneous and subspontaneous formations. Used soils consist mainly of cultivated fields, agroforested areas, exclusively forested areas, savannas, barren lands and sandy strands. Only 1% of the territory is occupied by urban areas, a large part being concentrated in Dili and its surroundings. Forested areas take up one third of the land cover, and so being the predominant type of soil use. Cultivated fields occupy one fourth of the total territory, and agroforested terrains cover almost the same area. One tenth of the land is covered with bushes, which are concentrated mostly around forested areas in the central mountain chain (Fac.Arq.-UTL *et al.*, 2002).

Most of the agriculture that is practiced is subsistence agriculture, and it is dominated by corn plantations. Nevertheless, areas of suitable soil on cleared and managed agricultural land are fragmented and the most part is used in rice cultivation. This is the most valuable crop, for rice is considered a luxury item (Wright, 2001).

In ancient times, there was a quite different scenario. In the beginning of the Portuguese presence on the territory, the main plantations were coffee, cacao and tobacco. There were other species that the Timorese would not grow but still use, such as cotton (to produce fibers that would be used in clothing), and sandal (Silva, 1910), which has played a major role in the history of East Timor. Since the 10th century, sandalwood has been traded by Chinese traders to Malaya and India but it was not until the 15th century that it attracted western traders to the territory. It is most likely one of the stimuli for the colonization of the territory (Husani in Rohadi *et al.*, 2000).

By 1910, the Portuguese had put up great production centers of coffee and cacao in several districts of the eastern part of the island, and also incentivated the growth of other products in smaller quantities, mainly for internal use (maize, rice, tobacco, beans, potatoes, cotton and coprah), but sandal was still the most important trade, from which the Portuguese administration would take great profit (Silva, 1910). The great interest in sandalwood has come from its wide range of applications. Sandalwood oil can be extracted from the heartwood and used to produce perfumes and cosmetics (BPEN in Rohadi *et al.*, 2000). The wood itself is used locally and on neighbouring islands for woodcarving and various forms of handicrafts, as well as for making joss (incense) sticks for ritual purposes (Rohadi *et al.*, 2000).

There are several species of sandalwood, but the species *Santalum album* is thought to be original from the Timor region, even though it can also be found in India. Sandal trees grow well in dry climate regions and, although preferring well-drained soils, they also adapt easily to rocky or stony soil with low fertility. It is known to regenerate either by seeds or by coppices (root or stump) (Sumarna in Rohadi *et al.*, 2000), but efforts to plant the trees have not been successful so the

current sandalwood production in the territory is based on natural regeneration (Sipayung; Husain in Rohadi *et al.*, 2000).

Seemingly, in 1942, the Portuguese authorities already showed great concern on the future of sandal extraction. The most appreciated product for trading was the sandal root, and that meant destroying the sandal trees to extract their roots, which compromised its natural regeneration. Throughout the centuries, an immense quantity of sandal trees was put down and, since their plantation was never very successful, the sandal resources decreased abruptly. As an alternative, the Portuguese invested more in cultivating coffee, which was highly profitable and easier to grow. Also, a Timorese variety of coffee, “Arabica”, was very appreciated in Northern Europe, which made it an important trading product (Magro, 1943).

Much time later, the exploitation of the remaining stands of sandal trees increased, as a consequence of a revived interest in sandalwood in the late 1990's. Curiously enough, shortly before the independence vote in East Timor, in August 1999, large amounts of sandalwood were exported. This resulted in an isolation of the sandal resources, which can now only be found in remote areas.

Recent studies (Rohadi *et al.*, 2000; Wright, 2001) have revealed efforts in searching for solutions for a successful recovery of sandal production in East Timor. It was found that small-scale community forest projects that invest in planning efforts with local communities to ensure their support and participation would be the most successful strategy (Wright, 2001). Also the government is advised to focus more on investment to establish and maintain new plantations, other than insisting on regulations to control the resource, which have shown to be ineffective (Rohadi *et al.*, 2000).

A parallel concern is a deficiency in effective cultivated areas, in East Timor, which is mainly due to two factors: the destructive action of the Indonesian military forces, in the early times of their occupation, and the migration of the population towards communication ways, abandoning the cultivated areas (Fac.Arq.-UTL *et al.*, 2002).

Given this context, it seems urgent to set up effective and productive plans of management of the natural resources in East Timor, side by side with consistent conservation strategies. This is not so easy to achieve, as the information on species richness and biodiversity levels of the territory is still, to date, quite scarce. Nevertheless, efforts have been made to establish protected areas and create local legislation on nature conservation.

1.2.1. UNEP – WCMC Protected Areas

The World Conservation Monitoring Centre, by the United Nations Environmental Programme (UNEP-WCMC) has build up a database that compiles dispersed information on protected areas from around the world: the World Database on Protected Areas (WDPA), which is managed in partnership with the

IUCN World Commission on Protected Areas (WCPA) and the World Database on Protected Areas Consortium.

According to WDPA 2006 (IUCN and UNEP, 2006), East Timor comprises a total of 16 designated Protected Areas (see fig. 6, tab. 1): 3 Reserves, 1 Game Reserve, 1 Marine Reserve and 10 other areas with unknown designation. Note that some areas had previously been recorded as Indonesian sites, even though they are partially (Tilomar) or fully (Lore) included in the boundaries of East Timor. This, and the fact that most protected areas still haven't been given a designation or IUCN category, suggests that there are many information gaps in terms of biodiversity assessment in East Timor, and that there is a lot to be done before effective conservation strategies can be established in the territory.

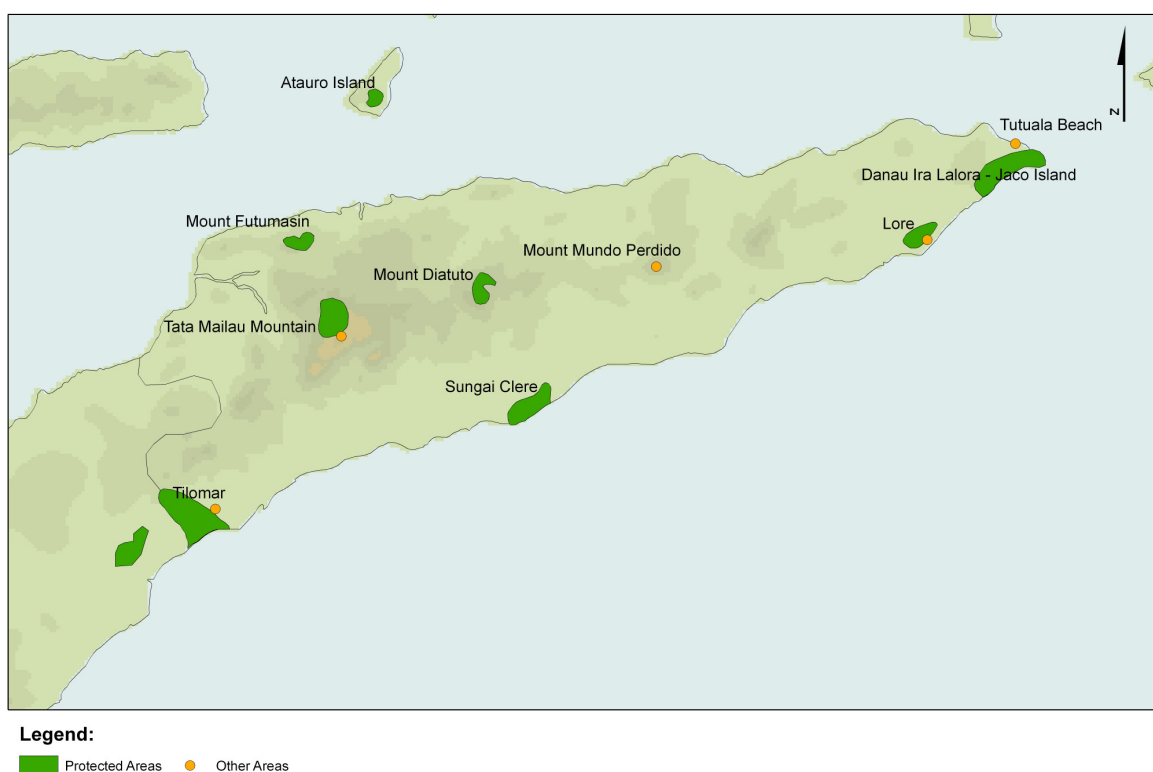


Fig. 6. UNEP-WCMC designated Protected Areas in the island of Timor, with special focus on the eastern part. (IUCN and UNEP, 2006)

Tab. 1. List of designated Protected Areas in Timor according to WDPA 2006.

Area Name	Designation	AREA (ha)	IUCN Category	Notes
Jako Island	Marine Reserve	unknown	II (*)	-
Sungai Clere	Game Reserve	30000	unset	-
Tilomar	Reserve	12800	unset	Previously recorded as an Indonesian site.
Lore	Reserve	11000	unset	Previously recorded as an Indonesian site.
Manucoco	Reserve	unknown	unset	-
Tutuala Beach	Designation Not Known	25000	unset	-
Tata Mailau Mountain	Designation Not Known	20000	unset	All elevations above 2000 m protected.
Monte Mundo Perdido	Designation Not Known	25000	unset	-
Cristo Rei Beach	Designation Not Known	unknown	unset	-
Sadoria Mountain	Designation Not Known	unknown	unset	-
Mount Fatumasin	Designation Not Known	unknown	unset	-
Riverlet Clere	Designation Not Known	unknown	Unset	-
Mount Matebian	Designation Not Known	unknown	unset	-
Malobu Mountain	Designation Not Known	unknown	unset	-
Mount Diatuto	Designation Not Known	unknown	unset	-
Monte Cablaque	Designation Not Known	unknown	unset	-

(*) According to the IUCN Protected Area Management Categories, Category II is a *National Park - protected area managed mainly for ecosystem protection and recreation*, which is, by definition: a natural area of land and/or sea designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

1.2.2. Local legislation on Protected Areas

In 2000, the sitting UNTAET (United Nations Transitional Administration in East Timor) administrator approved a set of laws that aims at protecting several wild areas in East Timor.

The following were considered to be protected:

- the totality of Jaco island, as well as rocks, reefs or other characteristics in its surroundings;
- Tutuala beach and the surrounding forest;
- Cristo Rei beach and its inner side;
- Mata Mailau's Mountain top, and all the elevations over this mountain that rise over 2000m, as well as their surrounding forest;
- Sadoria's Mountain, and all the elevations over this mountain that rise over 2000m, as well as their surrounding forest;
- Malobu's Mountain top, and all the elevations over this mountain that rise over 2000m, as well as their surrounding forest;
- Diatuto's Hill and surrounding forest;
- Fantumasin's Hill and surrounding forest;
- Ribeira Clere's sanctuary;
- Tilomar Reserve;
- Lore's Reseve;
- Mundo Perdido's Hill and surrounding forest;
- Matebian's Hill and all the elevations over this mountain that rise over 2000m, as well as their surrounding forest;
- Cablaque's Hill and surrounding forest;
- Manucoco's Reserve.

These areas are protected so that it is forbidden to:

- rise up any kind of temporary or permanent structures;
- bulid through them roads or other access ways for vehicles or other kinds of transportation;
- hunt, set traps, catch or disturb animals;
- collect plants or disturb their habitat;
- conduct agricultural activities or animal grazing;
- pollute the environment.

With given permission, it may be allowed to:

- collect non-forestry products;
- selectively take animals grazing;
- use animals or plants that are not endangered for religious and cultural cerimonies;
- hunt with traditional methods non-endangered animals;

- cut down trees in sites under 2000m of elevation, in areas that exclude Jaco island, as long as undertaken in a sustainable way and without the use of machinery;
- any other traditional activities that respect the legal protection of the designated areas.

Apart from the above listed areas, other objects of protection were designated, namely:

- endangered species;
- coral banks;
- marshes;
- mangrooves;
- historical, cultural and artistic areas.

1.3. Taxonomy of Convolvulaceae

1.3.1. Main characteristics

Convolvulaceae comprises about 58 genera and *ca* 1650 species and it is widely distributed in tropical, subtropical and temperate regions (Fang and Staples, 1995). The greater part of the species can be found in the tropics and subtropics of America and Asia. The larger genera *Cuscuta*, *Convolvulus* and *Ipomoea* are distributed nearly throughout the range of the family but *Convolvulus* more in temperate parts and *Ipomoea* more in the tropics and subtropics (van Ooststroom, 1953).

This family is commonly known as the “morning glory” family. Typical Convolvulaceae are annual or perennial vines, often with milky sap and a sympetalous corolla, usually large and showy (Stefanovic, 2002). Most of the species are found in localities where they are fully exposed to the sunlight, and often occur along edges of thickets and forests. In the primary forest, members of Convolvulaceae are hardly found (van Ooststroom, 1953). Many of the members of the family are successful climbers, this climbing capacity being exclusively due to the twining of the stem, which is always to the right (van Ooststroom, 1953).

Convolvulaceae are generally autotrophic, with exception being made to *Cuscuta*, a parasitic genus (van Ooststroom, 1953). The seeds of a number of species of this family are widely dispersed by seawater (i.e. *Ipomoea pes-caprae* (L.) Sweet, *I. gracilis* R. Br. and *I. tuba* (Schlechtend) Don.), thus being found along the coast or immediately behind it – some of them are confined to sandy beaches, very rarely occurring more inland (van Ooststroom, 1953).

Convolvulaceae are quite important for its uses: as food plants, applied in folk medicine or grown in gardens as ornamental plants. Among the species cultivated for food are *Ipomoea aquatica* Forsk. (“water-spinach”, grown as a vegetable) and

Ipomoea batatas (L.) Lamk. (“sweet-potato”, grown for its edible tubers). Plants used in folk medicine are e.g. *Operculina turpethum* and some species of *Ipomoea* and *Merremia*, in many cases for their purging properties. Ornamental plants are a few species of *Porana*, *Jacquemontia*, *Ipomoea*, *Mina* and *Turbina*. Considering other types of uses, *Ipomoea pes-caprae* is sometimes planted on sandy coasts as a sand-binder (van Ooststroom, 1953).

1.3.2. Retrospective on taxonomy and collection efforts

Due to the particular political and economic situation of the island of Timor, little botanical collections have been conducted recently, so most of the collections are relatively old and some have been poorly treated taxonomically. The most complete taxonomic approach of the Convolvulaceae from Timor was endorsed in the Flora Malesiana treatment, conducted by van Ooststroom, in 1953. Despite the posterior additions and emendations to this publication, many recently published works have brought new insights to the taxonomy of the family. Also, new collections have been conducted in Timor, adding up new local records of some *taxa*. This urged the need for a thorough taxonomic review of the Convolvulaceae from this island, with special reference to the eastern part, which is not so well studied.

The lack of information from this territory is mostly explained by the occasional inaccessibility for the irregular terrain or flooding of roads and paths in the rainy season (Cinatti, 1950), and also by its long history of social and political instability, more recently turned into armed conflicts (Fac.Arq.-UTL *et al.*, 2002). Even amongst the boldest explorers that would wander in the island of Timor, only a handful has effectively collected in the eastern part. A few collectors are known to have carried out botanical expeditions in East Timor. Among those, the following have contributed with specimens of Convolvulaceae (Cinatti, 1950):

1818 – Gaudichaut	1897 – Francisco Newton
1822 – Reinwardt	1908-10 – Alberto Osório de Castro
1828 – Zippelius	1928-29 – M.E. Walsh
1831 – Spanoghe	1933-37 – De Voogd
1840 – Hombron	1939 – Bloembergen
1830-80 – Teysmann (it is not clear when exactly he was in East Timor)	1946-47 – R. Cinatti
	1953-54 – van Steenis
1882-83 – Henry O. Forbes	

All collected information about previous collections of Convolvulaceae, whether from bibliographic references or preserved specimens, has been organized in a graphic in order to highlight the contrast in the collection effort of different collectors (see fig. 7; Anex I).

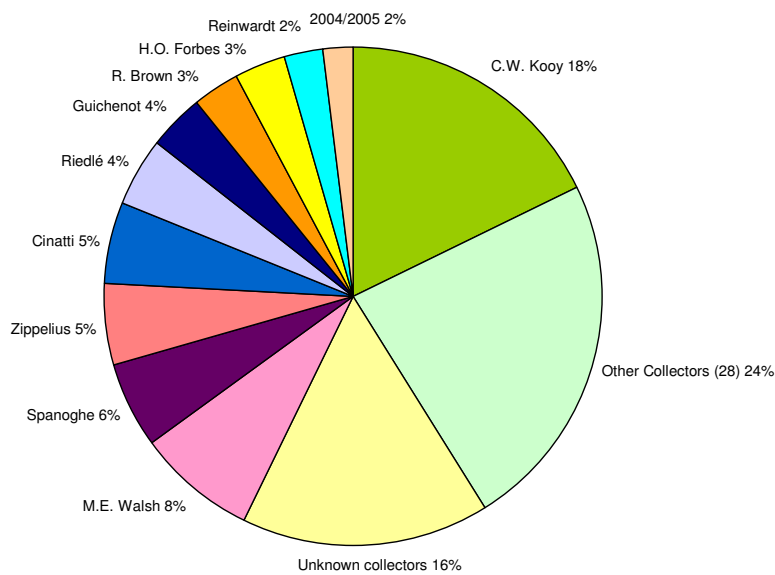


Fig. 7. Collection efforts of the various botanists who have collected in the island of Timor.

It can be concluded that, in terms of Convolvulaceae, the greatest collections in Timor have been accomplished by Kooy, Walsh and Spanoghe. Other major collections are those of Zippelius, Cinatti and Riedlé. Many botanists collected very few specimens of Convolvulaceae. However meaningless these small collection efforts might seem, each on its own, they end up having a big impact in the totality of the gathered information. To prove this, these small collections were grouped together and arranged as “Other collectors”. The pie chart above shows that these 28 small collections stand out for representing more specimens than the greatest studied collection (Kooy’s), which proves their importance.

In some specimens, it was not possible to identify the collector, and these were grouped as “Unknown collectors”. It is clear that they should not be neglected, as they represent a reasonable proportion of the whole analysed material, so leaving them out of this study would mean a great shortage in taxonomic information. The collections from the 2004/2005 expedition were grouped together, although they were conducted in 2004 by Paiva & Silveira and in 2005 by Paiva, Silveira & Sousa.

2. Objectives

The current study aims at:

- Presenting an updated and accurate taxonomic review of the family Convolvulaceae for the island of Timor;
- Introducing relevant new information that could be used for local ecosystem management and conservation plans in East Timor;
- Bringing up data that could be directly used by the population of East Timor.

For these purposes, this work presents:

- An up-to-date checklist of the Convolvulaceae that occur in Timor, with fully revised nomenclature and including new, locally oriented, identification keys;
- Distribution maps of the listed *taxa*;
- Notes on the habitat and ecology of the Timorese Convolvulaceae;
- A compilation of ethnobotanical information retrieved from the studied specimens and consulted literature.

3. Materials and Methods

This study was based on bibliographic sources, herbarium specimens from the totality of the island of Timor (AVE, BM, COI, L, LISC, K and P) and specimens collected in two botanical expeditions to the eastern part of the island only (2004-2005), under the project “Contribution to flora resources management in East Timor”, funded by FCT – Fundação para a Ciência e Tecnologia – and Fundação Oriente, for which ethnobotanical inquiries were also conducted. These lately collected specimens were included in the Herbarium of the Biology Department of Aveiro University (AVE).

The present taxonomic treatment revised 283 specimens (see Anex II) and various bibliographic records from Timor, in order to incorporate all the information into a comprehensive and updated work. Furthermore, the information was adapted to the context of the island, through the creation of identification keys oriented to the local *taxa*, as well as unique distribution maps for Timor.

For some *taxa*, only few specimens were available for study, and often these did not hold much morphological information. This diffculted the comparison between different specimens with the purpose of coming up with similarities and

differences between them. The lack of geographical information - or difficulty in interpreting the collectors' notes - was also an obstacle to the study of the distribution of the species. In many cases, bibliographic sources were used as a reference to help consolidate the specimens' information.

When there was conflict or disagreement between recent publications, an attempt was made to reach consensus with Flora Malesiana, for it being the most complete taxonomic work on Malesian Convolvulaceae, to date. In many cases, it is assumed that further studies would be required to sort out the nomenclature issues. How nomenclatural conflicts were handled is explained in additional notes under the taxonomic treatment of each *taxon*.

The *taxa* are presented in alphabetical order, and not according to their affinity, since some relationships between *taxa* have not yet been fully clarified.

Identification keys are proposed for genera and species known to occur in Timor, in order to simplify the identification of material from the island. The only available key is from Flora Malesiana, which covers Convolvulaceae from the whole Malesian region and so is much too complex for a small island as Timor. Note that, for this purpose, the keys are restricted to the characters of the *taxa* known to occur in the island. An attempt was made to give priority to characters that would be present in vegetative specimens, but this could not always be achieved. Therefore, it is advisable to use fertile specimens (with flowers and/or fruits).

Distribution maps were built for all *taxa*, based on geographic data extracted from specimens' labels or bibliographic references. The general procedure was to track the locality in a map of the island, and then search its geographic coordinates on free-access online geodatabases, such as Fuzzy Gazetteer, La Tierra and Index Mundi. The global positioning of the retrieved coordinates was confirmed using Google Earth software. The correct coordinates were exported to ArcMap and complemented with geopolitical information from WDPA 2006, to build the distribution maps. The maps were created on a presence/absence criterium, which means that different specimens from the same *taxon* which were collected in the same locality are represented only by one point, to prevent information redundancy.

Often, the only geographical data on the specimens was "Timor". These specimens, although included in the taxonomic treatment, were also left out of the distribution study for deficiency of information. Other discarded specimens were those which collection sites remained unknown, even though a locality was indicated: they could not be related to any geographic point in the island, based on the consulted maps or geodata. In fewer cases, when the locality could not be tracked, an attempt was made to speculate on the true collection site – by following the collector's expedition course, or searching for a locality with a similar name (assuming there could have been misspelling or different pronunciation by the collector).

Also note that the checklist is based mostly on information from specimens. However, some *taxa* were included considering bibliographic references only, and not having been analysed the corresponding specimens. In fewer cases, there was not solid evidence that a *taxon* would exist in the island, and therefore these were treated in the taxonomic study as “Doubtful records”.

In the ethnobotanical treatment, a local approach has been taken, being pointed out the use of the species that occur in the island of Timor only. The described uses are, however, not exclusively from Timor, as it is meant to show not only the plant’s current use in the island, but also its potential of usefulness. Vernacular names are restricted to the ones that are known to be used in the region.

4. Results and discussion

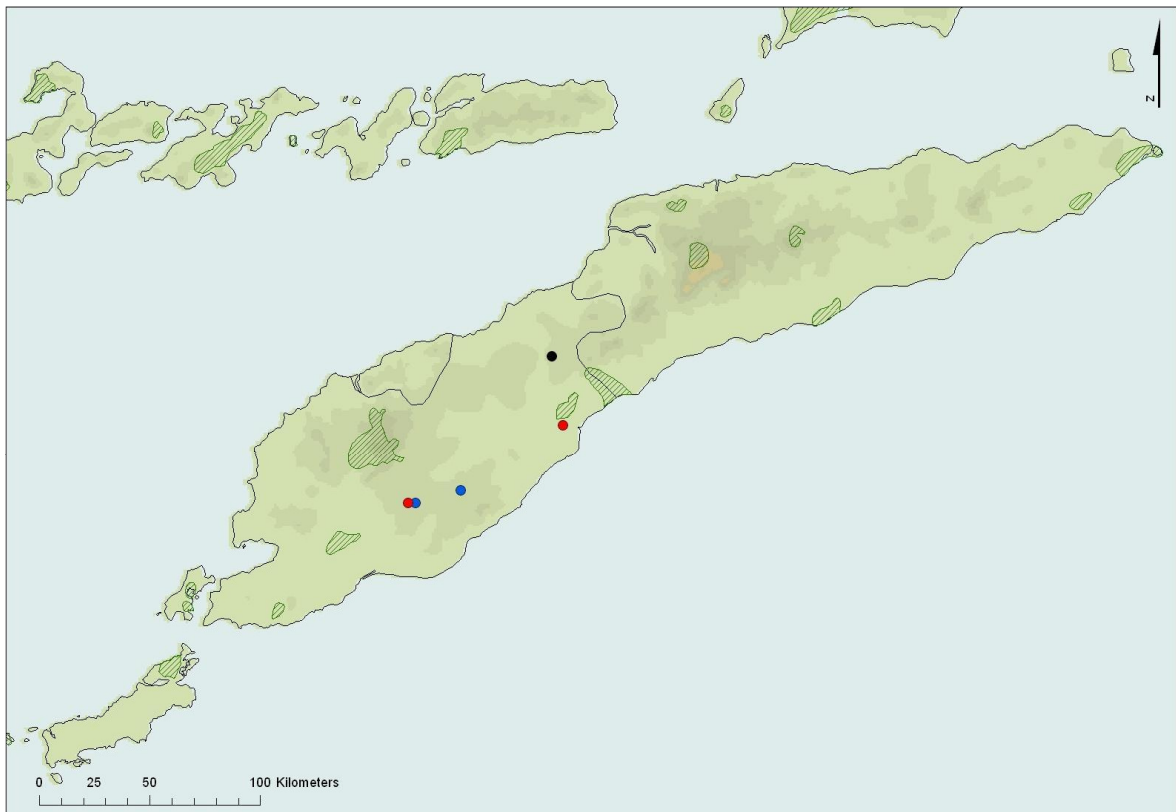
4.1. Taxonomic treatment

Identification key for genera of Convolvulaceae

- 1a. Herbaceous parasites leafless or with minute, scale-like, chlorotic leaves.
3. *Cuscuta*
- 1b. Non-parasitic plants with green leaves.....2
- 2a. Style absent 5. *Erycibe*
- 2b. Style(s) present.....3
- 3a. Styles 24
- 3b. Style 15
- 4a. Each style forked..... 6. *Evolvulus*
- 4b. Styles not forked 2. *Cressa*
- 5a. Flowers in racemose, paniculate or thyriform inflorescences (rarely flowers solitary)6
- 5b. Flowers in one- to few- or many- flowered axillary cymose inflorescences.7
- 6a. Leaf venation pedate, veins prominent, often alate abaxially. Calyx covering $\frac{1}{4}$ or less of corolla tube.....4. *Dinetus*
- 6b. Leaf venation pinnate. Calyx covering half or more of the corolla tube.
13. *Porana*
- 7a. Ovary unilocular, or imperfectly bilocular at top.....7. *Hewittia*
- 7b. Ovary bilocular or tetralocular8
- 8a. Stigma 19
- 8b. Stigmas 2 or 4.....12

9a. Leaves in the lower surface with many black minute glands. Calyx much enlarged in fruit, completely enclosing it.....	14. <i>Stictocardia</i>
9b. Leaves without minute black glands beneath. Calyx not much enlarged or not enlarged in fruit, not completely enclosing the fruit.	10
10a. Fruit a fleshy, leathery or mealy berry.	1. <i>Argyria</i>
10b. Fruit a capsule.	11
11a. Capsule circumscissile. Stems and petioles often winged.....	11. <i>Operculina</i>
11b. Capsule thin-walled, opening by 4 (rarely 6) valves or irregularly dehiscent. Stems and petioles not winged.	8. <i>Ipomoea</i>
12a. Stigmas 4.	12. <i>Polymeria</i>
12b. Stigmas 2	13
13a. Stigmas filiform.	9. <i>Jacquemontia</i>
13b. Stigmas globular.	14
14a. Pollen pantoporate. Anthers straight, not twisted, at dehiscence.	15. <i>Xenostegia</i>
14b. Pollen colpate or rugate. Anthers mostly spiraled when dehiscent.	10. <i>Merremia</i>

1. ARGYREIA Lour., Fl. Cochinch.: 134 (1790)



Legend:

- *Argyreia reinwardtiana* ● *Argyreia walshae* ● *Argyreia* sp. A ▨ Protected Areas

Fig. 8. Distribution of *Argyreia reinwardtiana*, *Argyreia walshae* and *Argyreia* sp. A in the island of Timor.

Identification key for the species of *Argyreia*

- 1a. 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; outside densely sericeous, sometimes less towards the apex. Corolla funnel-shaped, purplish pink, 3 - 4,5 cm long. 1. *A. reinwardtiana*
- 1b. Sepals subequal, 5 - 8 mm long; outside densely sericeous. Corolla tubular to funnel-shaped, whitish or yellowish, 2 - 2,75 cm long 2
- 2a. Leaves broadly ovate to ovate; length less than two times the width. Lower surface of leaves densely pubescent to tomentose with short curled hairs. Bracteoles caducous. 2. *A. walshae*
- 2b. Leaves elliptic-oblong; length two (or more times) the width. Lower surface of leaves sparsely to rather densely pilose with short appressed, straight hairs. Bracteoles 1-4 mm long. 3. *Argyreia* sp. A

1. *Argyrea reinwardtiana* (Blume) Miq., Fl. Ned. Ind. 2: 589 (1857); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885); Ooststr., Blumea 5: 360 (1943); Ooststr. in Steenis, Fl. Males., Ser 1, Spermat. 4(4): 497 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955) – Types: Timor, *Reinwardt* 1351 (L!, holotype); Nonbaun, *Teysmann* s.n., fr. (B); Indonesia (West Timor), Soë, ca 762 m, 15.iii.1929, *Walsh* 153 fl. (BM!, isotype).

Ipomoea reinwardtiana Blume, Bijdr. Fl. Ned. Ind. 13: 720 (1826) - *Argyrea guichenotii* Choisy, Mém. Soc. Phys. Genève 6: 423 (1833); Decne., Nouv. Ann. Mus. Hist. Nat. 3: 388 (1834); Span., Linnaea 15: 338 (1841); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885).

Distribution: Lesser Sunda Islands (Timor) (van Ooststroom, 1953).

Habit and ecology: Creeper; found between chalkrocks; collected at 200 m and ca 762 m.

Specimens: INDONESIA (West Timor): Tjemplong, 200 m, *Kooy* 523 (L!). TIMOR: *Guichenot* s.n. (P); *Leschenault de la Tour* s.n. (P); *Reinwardt* 12(?) (L!); *Reinwardt* s.n. (L!); 1829, *Reinwardt* s.n. (P!); s.c. s.n. (L!); s.c. s.n. (P!); *Spanoghe* s.n. (L!); *Spanoghe* s.n. (L!).

2. *Argyrea walshae* Ooststr., Blumea, 5: 361 (1943); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 499 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955) – Type: Indonesia (West Timor), Tobaki, ca 800 m, 10.vi.1929, *Walsh* 388 (L!, holotype; BM!, isotype).

Distribution: Lesser Sunda Islands (Timor) (van Ooststroom, 1953).

Habit and ecology: Not very common; collected at ca 800 m.

Specimens: TIMOR: *Jonker* 273 (U).

3. *Argyrea* sp. A

Habit and ecology: Thick liana, climber on shrubs; plant with milky sap; collected at 700 m.

Uses: The bark can be boiled and the boiling water is drunk for treating gonorrhoea.

Vernacular name: *mau halé* (Timor: unknown dialect).

Specimens: EAST TIMOR: Abis, 1.vi.1966, *Friedberg* 257a (LISC!). INDONESIA (West Timor): Nikiniki, 700 m, 1.iv.1974, *Kooy* 905 (L!); Supul, ca 750m, 25.iii.1969, *Kooy* 706 (L!).

Notes: The above listed specimens seem to present a unique set of morphological features. Comparing to the other two species present in Timor (see Anex III), it can be observed that the leaves are similar in shape to those of *A. reinwardtiana* - mostly elliptic-oblong - contrasting with those of *A. walshae*, which are ovate. The lower surface of the leaves is sparsely to rather densely pilose with short, appressed, straight hairs, as occurs in *A. reinwardtiana*, but not in *A. walshae*, where the lower surface is densely pubescent to tomentose with short curled hairs. Also, it can be noticed that the leaves of *Argyrea* sp. A are twice (or more times) as long as they are wide, which contrasts with *A. walshae*, in which they are less than two times longer than wide and with *A. reinwardtiana*, where they are roughly two times longer than wide. The sepals of both

species A and *A. walshae* are subequal, whereas in *A. reinwardtiana* the outer sepals are distinctly larger than the inner ones, with undulate margins. Also, sepals of *A. sp. A* are both entirely densely sericeous outside, while those of *A. reinwardtiana* are distinctly less sericeous towards the apex.

Doubtful records

Argyreia setosa Choisy, Mém. Soc. Phys. Genève 6: 425 (1833); Decne., Nouv. Ann. Mus. Hist. Nat 3: 388 (1834); Span., Linnaea 15: 338 (1836); Ooststr., Blumea 5: 383 (1943).

Spanoghe assumes the presence of this species in Timor, based on Decaisne's

publication. Still, Decaisne does not show evidence of this, instead he declares: *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*. Only five specimens of this taxon were found, in Genève's Herbarium, collected by Choisy. They seem to lack taxonomical characters that would allow an accurate identification and they also do not bare annotations of having been collected in Timor. Possibly being aware of this, van Oostroom has stated in *Flora Malesiana*: "it is very doubtful that [*Argyreia setosa*] occurs in the island of Timor". A thorough review of the specimens and access to Choisy's collection notes could clarify this.

2. CRESSA L., Sp. Pl.: 223 (1753)

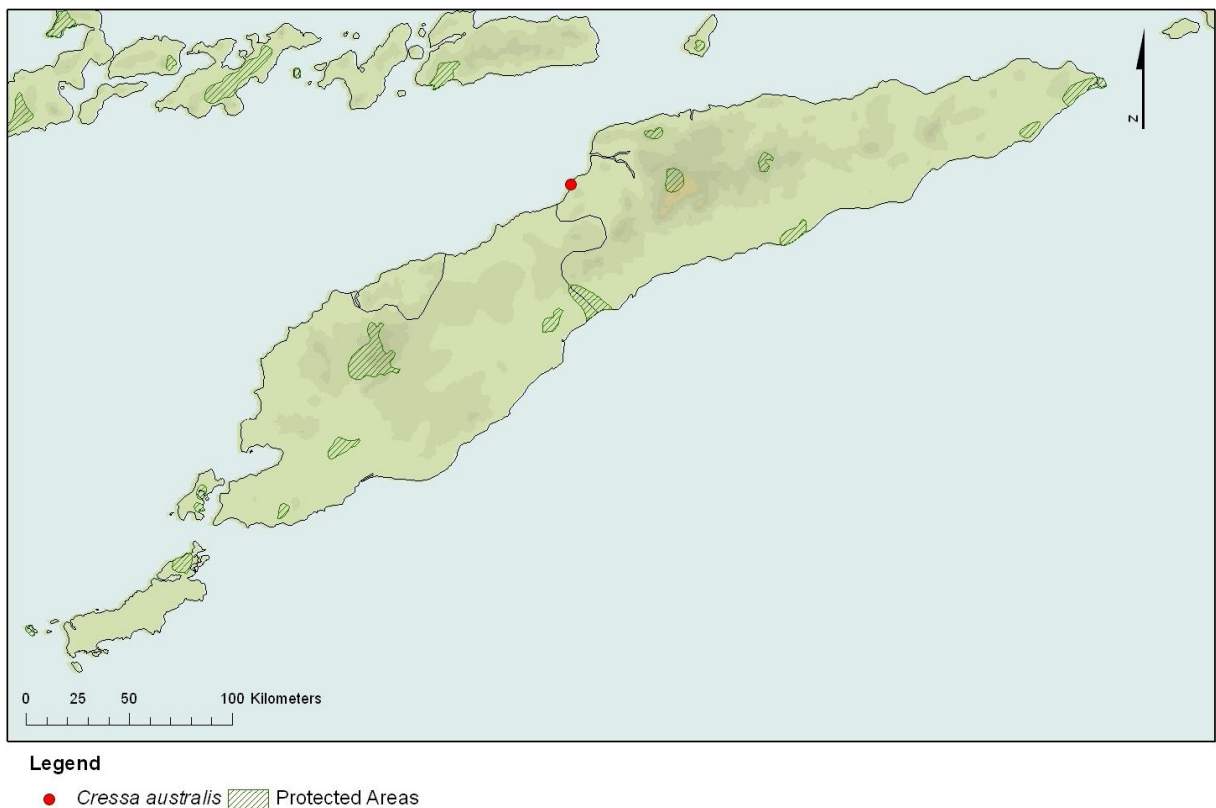


Fig. 9. Distribution of *Cressa australis* in the island of Timor.

1. **Cressa australis** R. Br., Prodr.: 490 (1810).

Cressa cretica L., Sp. Pl.: 223 (1753); Ooststr. in Steenis, Fl. Males., Ser 1, Spermat. 6(6): 937 (1972).

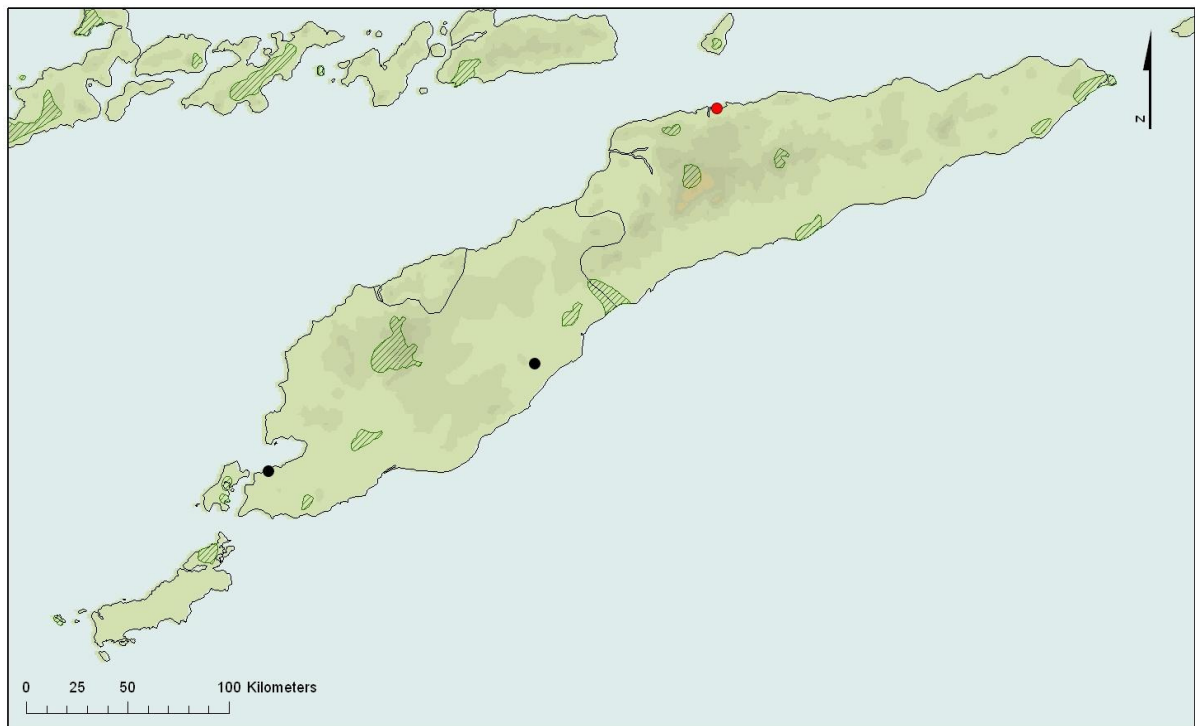
Distribution: East Timor, Australia (Western Australia, Northern Territory, Southern Australia, Queensland, New South Wales, Victoria) (Austin, 2000).

Habit and ecology: At 100 m from the sea in a pure stand in the shade of the mangrove tree *Avicennia marina*.

Specimens: EAST TIMOR: Batugadé, lagoon of Bé-Malai, 16.viii.1962, *Cinatti* 339 (L!, LISC!).

Notes: Only one collection is known from Timor.

3. **CUSCUTA** L., Sp. Pl.: 124 (1753)



Legend:

● *Cuscuta campestris* ● *Cuscuta cassyoides* ▨ Protected Areas

Fig. 10. Distribution of *Cuscuta campestris* and *Cuscuta cassyoides* in the island of Timor.

Identification key for the species of *Cuscuta*

- 1a. Stems thin, filliform. Styles 2, distinct. Ovary depressed-globose.
1. *C. campestris*
- 1b. Stems coarse up to 2mm or more in diam. Style 1, or nearly absent. Ovary ovate-conical..... 2
- 2a. Corolla scales represented by narrow-wings. Style longer than the depressed-globose stigma 2. *C. cassyoides*
- 2b. Corolla scales abundantly fimbriate. Style shorter than the elongate stigma.
3. *C. reflexa*

1. *Cuscuta campestris* Yunck., Mem. Torrey Bot. Club 18: 138 (1932).

Distribution: North American species, recently introduced in several countries of the Old World. (Liao *et al.*, 2005). *New record to Timor.*

Habit and ecology: Often on *Medicago sativa*, *Trifolium*, and *Satureja hortensis*, but also on a great number of other herbaceous plants (van Ooststroom, 1953).

Specimens: EAST TIMOR: Dili, 14.i.2004, Paiva & Silveira 19a (AVE!).

2. *Cuscuta cassyoides* Nees *ex* Engelm., Trans. Ac. Sc. St. Louis 1: 513 (1859); Ooststr. in Steenis, Fl. Males., Ser 1, Spermat. 5: 558 (1958).

Cuscuta timorensis Decne. *ex* Engelm., Trans. Acad. St. Louis 1: 514 (1859); Ooststr. in Steenis, Fl. Males, Ser 1, Spermat. 4(4): 393 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

Distribution: East Africa to South Africa and South Malesia: East Java (Asem Bagus) and Lesser Sunda Islands (Timor, Wetar) (van Ooststroom, 1953).

Habit and ecology: On *Ficus glomerata* Roxb. and other woody plants; apparently confined to regions with a very dry season (van Ooststroom, 1953). A specimen from Timor was found at 300 m.

Vernacular name: *non-atois* (Dawan).

Specimens: INDONESIA (West Timor): Fautbena, ca 300m, 7.vii.1967, Kooy 362 (L!); Kupang, Teijsmann s.n. (L!). TIMOR: Leschenault de la Tour, s.n. (P); s.c. s.n. (L!).

3. *Cuscuta reflexa* Roxb., Pl. Corom. 2: 3, t. 104 (1798); Decne., Nouv. Ann. Mus. Hist. Nat.: 393 (1834); Span., Linnaea 15: 341 (1841); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885); Ooststr. in Steenis, Flora Malesiana 4(4): 393 (1953).

Distribution: Afghanistan, Sri Lanka, Pakistan, India, Nepal, Thailand, Malaysia, Indonesia (Fang and Staples, 1995).

Habit and ecology: On shrubs.

Specimens: TIMOR: s.c. s.n. (K!); s.c. s.n. (P!).

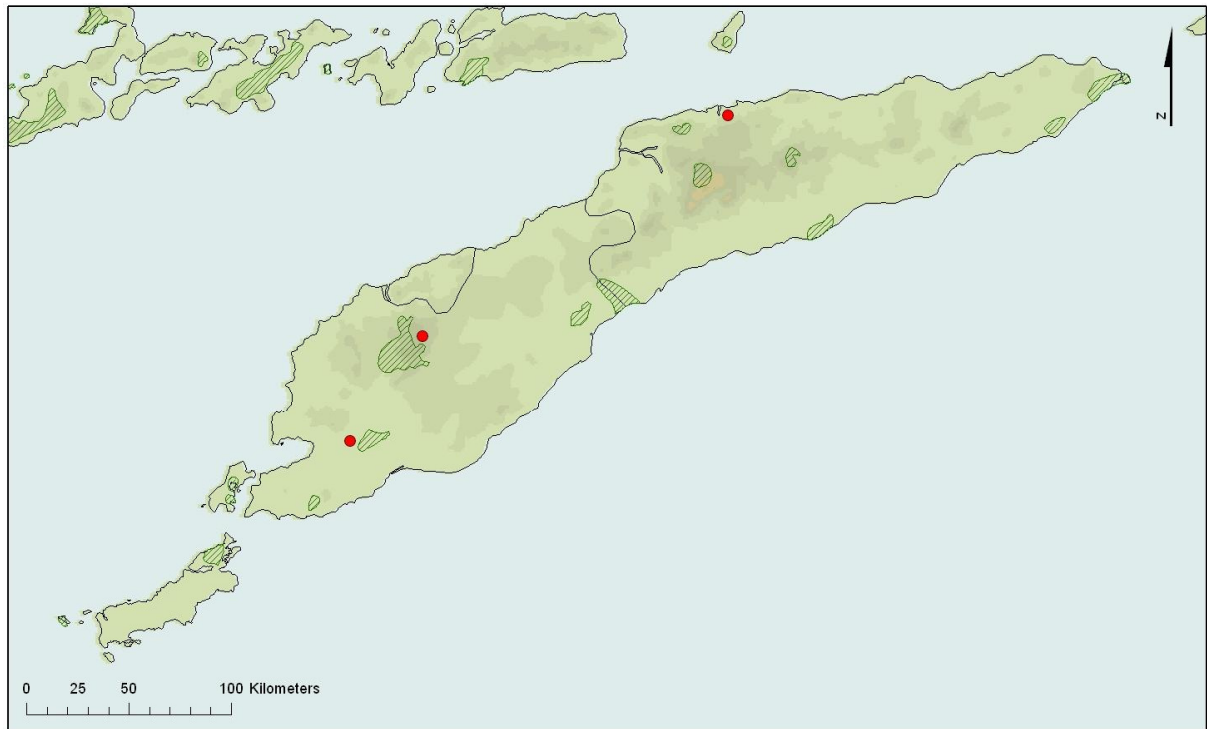
Doubtful records

Cuscuta monogyna Vahl, Symb. Bot. 2: 32 (1791).

Fawcett (1885) lists this species for Timor, but no specimens are indicated. No herbarium specimens or bibliographic references which would support this record have yet been found.

There are two specimens that remain to be identified at species level: Kooy 727 (L!) and Kooy 903 (L!).

4. DINETUS Buch.-Ham. ex Sweet, Brit. Flow. Gard. 2: t.127 (1825)



Legend:

● *Dinetus racemosus* ▨ Protected Areas

Fig. 11. Distribution of *Dinetus racemosus* in the island of Timor.

1. Dinetus racemosus (Roxb.)
Buch.-Ham. ex Sweet , Brit. Flow.
Gard. 2: t. 127 (1825).

Porana racemosa Roxb., (Hort. Bengal.
13, 1814, *nom. nud.*) Fl. Ind., ed. 1820. 2: 41
(1824); Fawc. in H.O. Forbes, Natur. Wand.
East. Archip.: 511 (1885); Ooststr. in Steenis,

Fl. Males., Ser 1, Spermat. 4(4): 403 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

Distribution: Pakistan throughout N. India, Nepal, Bhutan, China, Myanmar and Southeast Asia to Malesia (Staples, 2006).

Habit and ecology: In open sites in forests, thickets, scrub, on hillsides and along watercourses on diverse soil types at (50-)1000-2000(-3200) 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, and they are edible both in fresh and dry state (Staples, 2006).

Specimens: EAST TIMOR: Fatunaba, Forbes 4104 (BM!). INDONESIA (West Timor): Kashoi(?), ca 1235 m, 24.v.1929, Walsh 319 (BM!, L); Tjamplong, 6.v.1939, Voogd 1758 (L!).

5. ERYCIBE Roxb., Pl. Coromandel 2: 31, t.159 (1798)

1. **Erycibe timorensis** Hallier f. ex Hoogl., Blumea 7: 318 (1953); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 423 (1953) – Types: Timor, Spanoghe 43 (L!, holotype; P!, isotype); s.c. s.n. (L!, paratype); Zippelius s.n.(?) (L!, paratype);

Zippelius 26(?) (L!, paratype); Zippelius 43 (L, paratype).

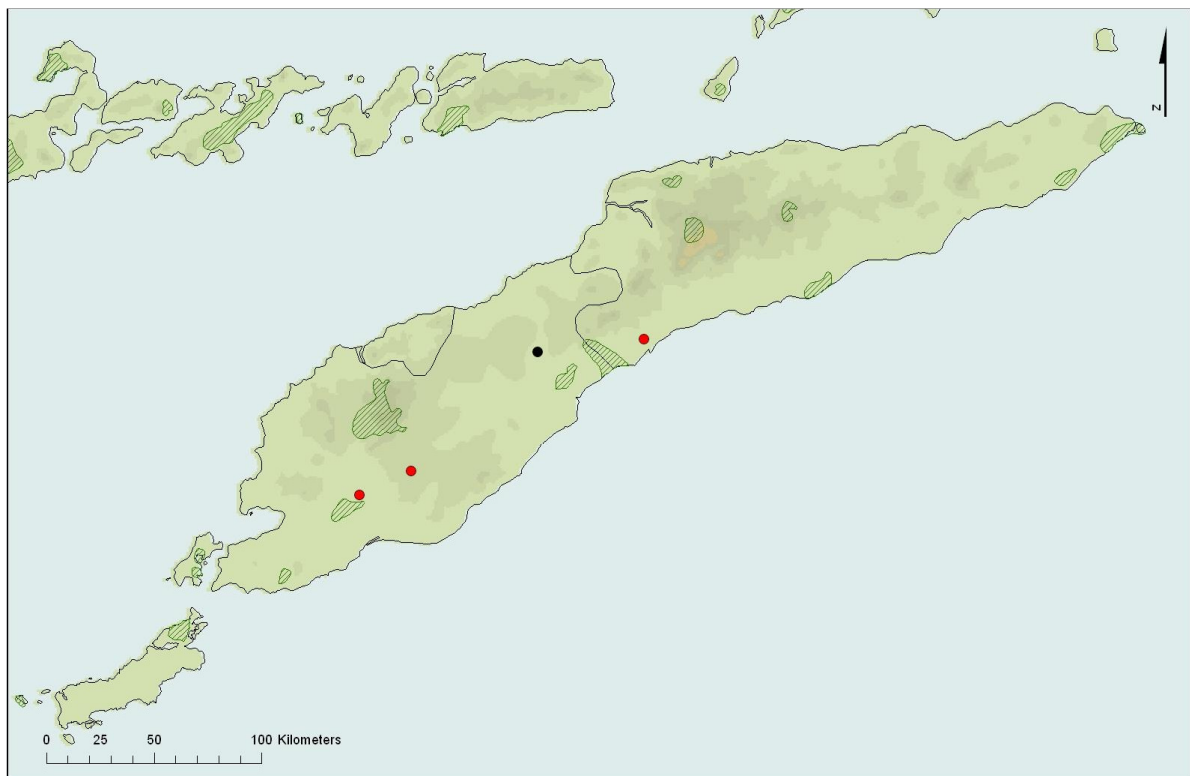
Distribution: Lesser Sunda Islands (Timor) (van Ooststroom, 1953).

Habit and ecology: In the mountains (van Ooststroom, 1953).

6. EVOLVULUS L., Sp. Pl. ed. 2: 391 (1762)

Identification key for the varieties of *Evolvulus alsinoides*

- 1a. Leaves oblong, elliptic or spatulate, ca 1,5 - 2,5 times as long as broad, obtuse or shallowly emarginated and mucronulate at the apex
var. *alsinoides*
- 1b. Leaves lanceolate to linear, 2,5 or more times as long as broad, acute or acuminate at the apex 2
- 2a. Stems 6 – 20 cm, rather stiff. Peduncles shorter than the leaves, 2 – 5 mm. Indumentum fulvous, afterwards greyish, more or less shining hairs. Sepals appressed-pilose var. *javanicus*
- 2b. Stem 30 – 45 cm, slender. Peduncles longer than the leaves, 15 – 30 mm. Indumentum not so shining. Sepals villose var. *decumbens*



Legend:

● *Evolvulus alsinoides* var. *alsinoides* ● *Evolvulus alsinoides* var. *decumbens* ▨ Protected Areas

Fig. 12. Distribution of *Evolvulus alsinoides* var. *alsinoides* and *E. alsinoides* var. *decumbens* in the island of Timor.

1. *Evolvulus alsinoides* (L.) L., Sp. Pl. ed. 2 (1762); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4 (4):395 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

Convolvulus alsinoides L., Sp. Pl. 1: 157 (1753).

var. *alsinoides*

Evolvulus pumilus Span., Compan. Bot. Mag. 1: 348 (1835); Span., Linnaea 15: 341 (1841). - *Evolvulus pseudo-incanus* Span., Linnaea 15: 341 (1841), *nom. nud.*

Distribution: Tropical E. Africa, Madagascar, India, Indo-China, S. China, in Malaysia: Lesser Sunda Islands (Timor), Philippines (Luzon) (van Ooststroom, 1953).

Habit and ecology: The Malesian varieties of the species can be found in dry grasslands, often on limestone, at low and medium altitudes (van Ooststroom, 1953). Timor specimens have been found in chalk rocks in full sunshine, at 500 and ca 762 m.

Uses: Used in Ayurvedic medicine (Indian subcontinent) as a remedy to a series of mental problems, such as epilepsy, insanity, nervous debility, and loss of memory (Anis *et al.*, Auddy *et al.*, Allimuth and Venilla in Austin, *under review*). In Africa, the plant is used to treat low spirits and depression (Bussman *et al.* in Austin, *under review*). In Malesia, it is only known to be used in the Philippines, for treating bowel problems (Quisumbing in Austin, *under review*).

Specimens: EAST TIMOR: Suai, 25.vii.1962, *Cinatti* 366 (L!, LISC). INDONESIA (West Timor): Enoana, ca 500 m, 22.iv.1967, *Kooy* 455 (L!); Soë, ca 762 m, 30.i.1929, *Walsh* 48 (BM!, L!). TIMOR: *Spanoghe* 33 (L!).

Notes: In Timor both typical specimens and transitions to var. *decumbens* are found (van Ooststroom, 1953).

var. ***decumbens*** (R. Br.) Ooststr., Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 14: 38 (1934); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 396 (1953).

Evolvulus decumbens R. Br., Prodr. Fl. Nov. Holland. 1: 489 (1810) - *Evolvulus lanceaefolius* Span., Linnaea 15: 341 (1841).

Distribution: S. China and Indo-China to Australia and the Pacific Islands, in Malesia: N. Sumatra, Malay Peninsula, Lesser Sunda Islands (Bali, Timor, Wetar), SW.-SE. Celebes, Moluccas, Philippines (Luzon,

Mindanao), New-Guinea (van Ooststroom, 1953).

Habit and ecology: A specimen from Timor was found at 300 m.

Specimens: INDONESIA (West Timor): Nurobo(?), ca 300 m, 21.i.1965, *Kooy* 152 (L!). TIMOR: *Spanoghe* 29 (L!); *Spanoghe* 30 (L!); *Spanoghe* 32 (L!).

var. ***javanicus*** (Blume) Ooststr., Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 14: 39 (1934); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 398 (1953).

Distribution: Malesia: Lesser Sunda Islands (Timor, Wetar), Moluccas (exact locality unknown) (van Ooststroom, 1953).

Notes: Although van Ooststroom reports this species to Timor, no specimens have been found in the consulted herbaria, for the island of Timor.

7. HEWITTIA Wight & Arn., Madr. Journ. Sc. Ser. 1, 5: 22 (1837)

1. Hewittia malabarica (L.) Suresh, D.H. Nicolson, C.R. Suresh & K.S. Manilal, Interpret. Van Rheede's Hort. Malab.: 88 (1988).

Convolvulus malabaricus L., Sp. Pl. ed. 1: 155 (1753) - *Shutereaia bicolor* Choisy, Mém. Soc. Phys. Genève 6: 486 (1833); Decne., Nouv. Ann. Mus. Hist. Nat.: 392 (1834); Span., Linnaea 15: 338 (1841) - *Hewittia bicolor* Wight & Arn., Madras. J. Lit. Sci. 5: 22 (1837); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885). - *Hewittia sublobata* (L. f.) Kuntze, Revis. Gen. Pl. 2: 441 (1891); Ooststr. in Steenis, Fl. Males., Ser. 1,

Spermat. 4(4): 438 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955). - *Hewittia scandens* (Milne) Mabberley, Taxon 29 (5-6):606 (1980).

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

Habit and 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 1400 m (van Oostroom, 1953). Specimens from Timor were found at 400 and ca 460 m.

Specimens: EAST TIMOR: Lospalos, ca 400m, 6.vii.1960, *Verdial* 15 (COI!, LISC!). INDONESIA (West Timor): Kupang, 1.vii.1803, *Brown* s.n. (BM!); Kiupukan, 500m, 6.vii.1965, *Kooy* 241 (L!); Noiltoko, ca 458 m, 29.v.1929, *Walsh* 389 (BM!). TIMOR: *Gaudichaut* 139 (P!); Kupang, *Hombron* s.n. (P!); s.c. s.n. (L!); s.c. s.n. (L!).

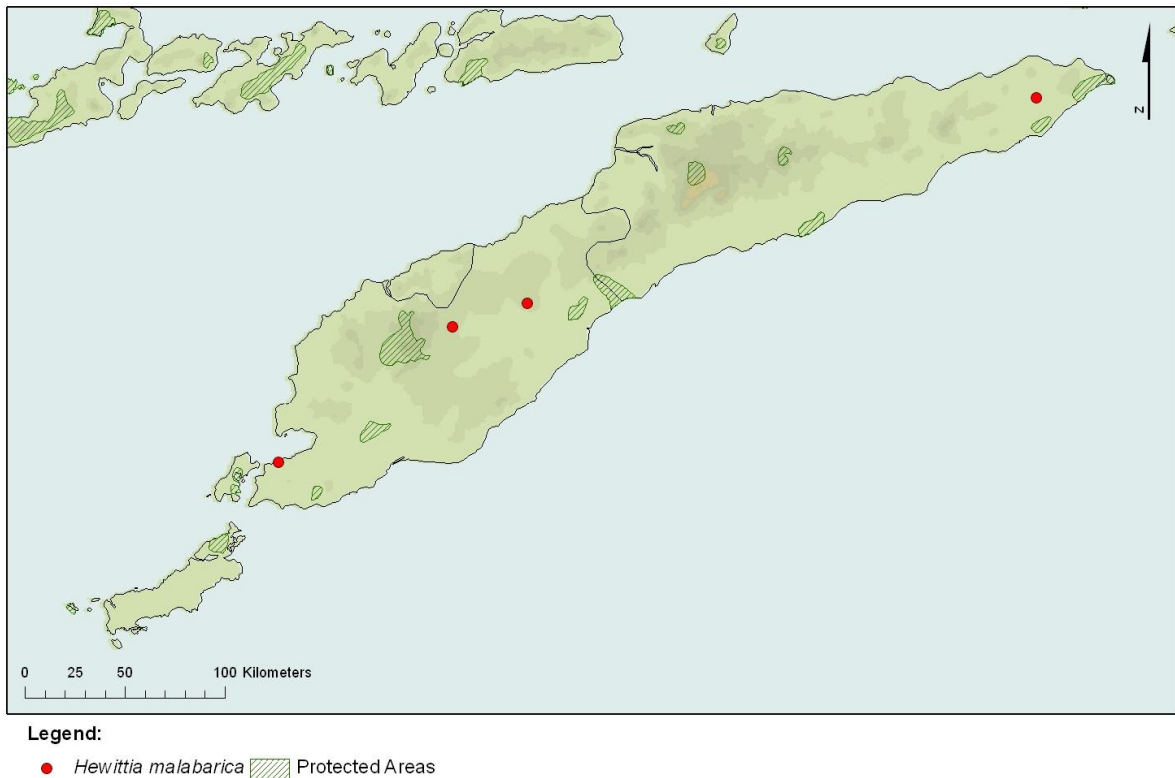


Fig. 13. Distribution of *Hewittia malabarica* in the island of Timor.

8. IPOMOEA L., Sp. Pl. 1: 159 (1753)

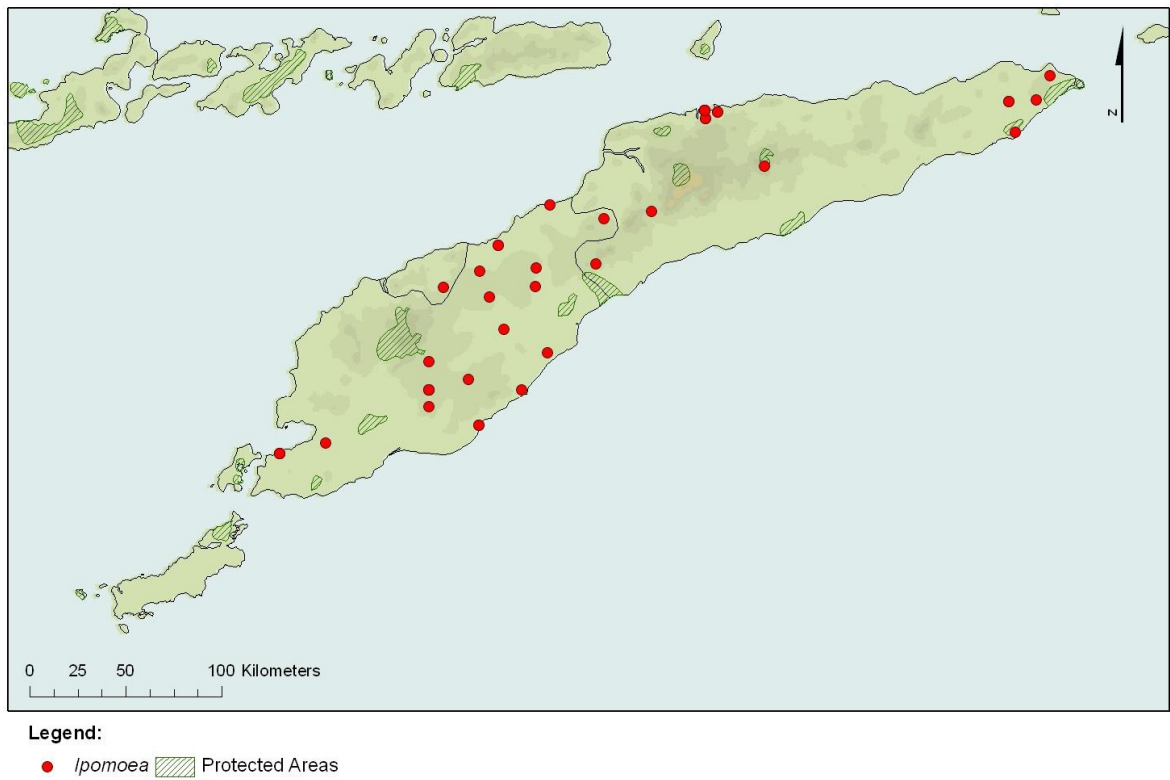


Fig. 14. Distribution of genus *Ipomoea* in the island of Timor.

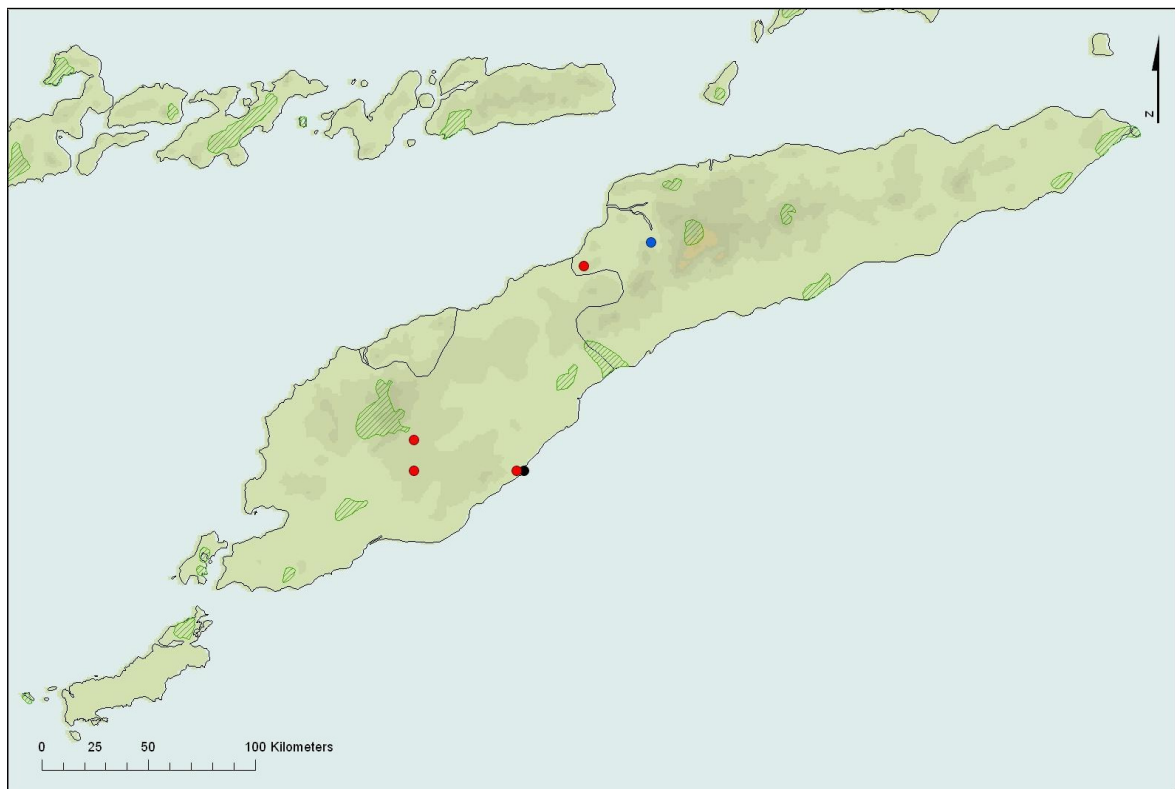
Identification key for the species of *Ipomoea*

- 1a. Sepals distinctly awned at or below the apex; awn straight or curved. Corolla salver-shaped with a long and narrow tube. Stamens and style exserted.2
- 1b. Sepals obtuse, acute or acuminate, whether or not mucronulate, but not distinctly awned at or below the apex. Corolla mostly funnel-shaped, or campanulate, or sometimes salver-shaped. Stamens and style mostly included, sometimes exserted. (When leaves pinnately cut, see *I. quamoclit*)4
- 2a. Corolla rather small, ca 3-4,5 cm long; scarlet, rarely pure white. Outer sepals 2-4,5 mm long (awn excluded), inner ones 3-6 mm (awn excluded).3
- 2b. Corolla larger, 7-12 cm long; white with greenish bands; tube not or slightly widened above; limb rotate. Outer sepals 5-12mm long (awn excluded), inner ones 7-15mm (awn excluded).2. *I. alba*
- 3a. Leaves pinnately parted into numerous linear or filiform segments, rarely less deeply pinnately cut. 20. *I. quamoclit*
- 3b. Leaves not pinantly cut; ovate to orbicular, cordate at the base; margin entire or lobed. 10. *I. hederifolia*
- 4a. Corolla 10 cm long or longer, salver-shaped with a long and narrow tube, white, or with greenish or reddish midpetaline bands. Sepals obtuse. Seeds hairy. Large twiners.5
- 4b. Corolla usually less than 10 cm long, funnel-shaped or campanulate, rarely salver-shaped, in the latter case not longer than ca 7 cm. Sepals obtuse, acute or acuminate. Seeds hairy or glabrous. Large to small twiners, or prostrate to erect plants.7
- 5a. Stamens inserted near the mouth of the corolla-tube. Sepals subequal or outer ones slightly longer than inner, all 12-18mm long..... 1. *I. aculeata*
- 5b. Stamens inserted near the base of the corolla-tube. Outer sepals slightly or much shorter than the inner ones.6
- 6a. Stems woody, terete or angular, often longitudinally wrinkled, smooth or rarely muricated. Outer sepals much shorter than inner ones. Leaves mostly 5(3-7) lobed, rarely entire. Corolla white, or with reddish midpetaline bands, 11-14 cm long. Stamens exserted..... 22. *I. trichosperma*
- 6b. Adult stems woody, terete, smooth or minutely verrucose; young branches green. Outer sepals mostly slightly shorter than inner ones. Leaves mostly entire. Corolla white with greenish bands, 9-12 cm long. Stamens included.
25. *I. violacea*

7a. Sepals entirely glabrous (sometimes muricated)	8
7b. Sepals hairy on the outer surface, or fimbriate at the margins	18
8a. Leaves palmately lobed to palmately compound	9
8b. Leaves not palmately cut	11
9a. Leaves palmately cut to the base. Pseudostipules (small leaves of the axillary shoot) often present. Sepals mucronulate, 4-6,5 mm long. Seeds densely short-tomentose and with long silky hairs along the edges.....	6. <i>I. cairica</i>
9b. Leaves palmately lobed to or mostly beyond the middle, not to the base. No pseudostipules.....	10
10a. Stems twining. Sepals not mucronulate. Seeds black, with long woolly-sericeous easily detaching hairs. Plants without subterranean tubers	12. <i>I. mauritiana</i>
10b. Stems prostrate, rooting at the nodes. Inner sepals distinctly mucronulate. Seeds glabrous. Subterranean tubers present. Cultivated for its edible tubers, occasionally run wild	4. <i>I. batatas</i>
11a. Large woody glabrous twiner, stems stout. Flowers in axillary panicles, the primary branches racemose, the ultimate partial inflorescences cymose. Leaves ovate, slightly cordate to truncate at the base; lateral nerves 11 - 14 on either side of the midrib. Corolla ca 2,5 - 3,5 cm long. Seeds with long silky hairs.	21. <i>I. sumatrana</i>
11b. Smaller, mostly herbaceous twiners with thinner stems, or prostrate plants, glabrous or hairy. Flowers in few- to several- flowered peduncled, axillary cymes, or solitary in the leaf-axils.	12
12a. Corolla salver-shaped, up to 3 - 3,5 cm long, pale lilac or white, with a purple centre. Peduncles stout, thickened towards the apex, often applanate. Outer sepals 4 - 6 mm long. Seeds short-tomentose, often with longer hairs along the edges.	11. <i>I. marginata</i>
12b. Corolla funnel-shaped.....	13
13a. Corolla up to 2,5 cm long, white or pale yellow, with a purple centre. Peduncles thin, filiform.....	14. <i>I. obscura</i>
13b. Corolla 3 cm or longer.....	14

- 14a. Plants of marshy places or aquatic, mostly with trailing and rooting, or floating, thick, soft, fistulose or spongy stems. Leaves with truncate, cordate to sagittate or hastate base. Often cultivated for food (edible stems and leaves)
3. *I. aquatica*
- 14b. Terrestrial plants with twining or trailing stems; not as in *I. aquatica*.....15
- 15a. Stems mostly twining.16
- 15b. Stems trailing and mostly rooting at the nodes, rarely twining17
- 16a. Corolla yellow, glabrous, except for the pubescent apical parts of the midpetaline bands. Seeds tomentose. Sepals 5-6,5 mm with attenuate, broadly rounded to truncate, slightly emarginate, mucronulate apex..
15. *I. ochracea*
- 16b. Corolla skyblue with a paler or white tube, glabrous. Seeds glabrous, puberulent or pilose along the edges only. Sepals 4,5-6mm long, without a distinct mucro.23. *I. tricolor*
- 17a. Leaves subcoriaceous or fleshy, mostly obtuse to broadly rounded, or emarginate at the apex. Stems 5 – 30 m long, containing a milky juice. Plants without subterranean tubers.....16. *I. pes-caprae*
- 17b. Leaves herbaceous, attenuate towards the acute or obtuse apex. Leaf-margin entire or angular (or lobed). Stems 1 – 5 m long, without milky juice. Subterranean tubers present. Cultivated for its edible tubers, occasionally run wild.4. *I. batatas*
- 18a. Flowers in the leaf-axils; peduncles very short, or absent. Length of corolla not exceeding 1,5 cm.....19
- 18b. Flowers not in the leaf-axils. Peduncles mostly longer, well-developped. Corolla 1,5 cm long, or mostly longer.....21
- 19a. Erect or ascending herb. Leaf-base acute, attenuate into the petiole. Corolla glabrous, ca 1,25 cm long..... 18. *I. polymorpha*
- 19b. Twining or prostrate herbs. Leaf-base cordate. Midpetaline bands outside at least pilose towards the apex.20
- 20a. Corolla pink or purple, ca 7-9 mm long. Pedicels none or very short, to 3 mm. Outer sepals linear-acuminate from an ovate base. Ovary and capsule hairy.
9. *I. eriocarpa*
- 20b. Corolla white, ca 9-13 mm long. Pedicels 5-7 mm. Outer sepals linear-acuminate from a broadly triangular, slightly cordate to truncate base. Ovary and capsule glabrous.....5. *I. biflora*

- 21a. Flowers aggregate at the end of the peduncle, involucrate by large bracts. Leaves palmately divided nearly to the base, rather densely hairy with patent appressed hairs. Corolla funnel-shaped, white. 17. *I. pes-tigridis*
- 21b. Flowers whether or not aggregate at the end of the peduncle, not distinctly involucrate.22
- 22a. Sepals 4 mm long or less.....14. *I. obscura*
- 22b. Sepals 5 mm or longer.....23
- 23a. Outer sepals orbicular, broadly rounded at the apex. Corolla with puberulent tube and midpetaline bands. Whole surface of seeds sericeo-villose.
7. *I. carnea*
- 23b. Outer sepals narrower, mostly acute, sometimes subobtuse. Corolla glabrous outside. Seed puberulent or glabrous, sometimes pilose at the hilum or at the edges only.24
- 24a. Sepals long-attenuate, or long and linear-acuminate at the apex, herbaceous.
25
- 24b. Sepals acute or subobtuse, not long-attenuate towards the apex, herbaceous, membranaceous or coriaceous.....26
- 25a. Stems and peduncles filiform. Sepals subequal, 8 - 15 mm long. Corolla up to 3 cm long. 8. *I. decaisnei*
- 25b. Stems and peduncles thicker. Sepals about equal in length, 17 - 25 mm long, afterwards to 28 mm. Corolla 5-6 cm long. 13. *I. nil*
- 26a. Sepals not mucronulate. Outer sepals herbaceous, oblong, acute, 10 - 15 mm long, patently hirsute in the basal portion. Corolla 5 - 6 cm long, mostly purple-blue, with reddish midpetaline bands, the tube paler to white
19. *I. purpurea*
- 26b. Sepals mucronulate.27
- 27a. Sepals glabrous or sparsely hairy on the back, the margins always distinctly fimbriate. Corolla funnel-shaped ca 1,75 -2 cm long, with short obtuse, mucronulate lobes. No subterranean tubers present.24. *I. triloba*
- 27b. Sepals wholly glabrous or pilose on the back and fimbriate. Corolla campanulate to funnel-shaped, ca 3 - 4,5 cm long, gradually attenuate towards the base. Subterranean tubers present.4. *I. batatas*



Legend:

● *Ipomoea aculeata* var. *mollissima* ● *Ipomoea alba* ● *Ipomoea aquatica* ▨ Protected Areas

Fig. 15. Distribution of *Ipomoea aculeata* var. *mollissima*, *I. alba* and *I. aquatica* in the island of Timor.

1. *Ipomoea aculeata* Blume, Bijdr. Fl. Ned. Ind. 13: 715 (1826); Kalkman, Acta Bot. Neerl.: 216 (1955).

var. ***mollissima*** (Zoll.) Hallier f. ex. Ooststr., Blumea 3: 574 (1940); Malm in Repert. Spec. Nov. Regni Veg. 34: 286 (1934); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 486 (1953).

Calonyction mollissimum Zoll., Syst. Verz. (Zollinger) 2: 128, 131 (1854).

Distribution: Africa, North America (Mexico), South America, Pacific Islands. In Malesia: M. and E. Java, Madura, Lesser Sunda Islands (Lombok, Sumbawa, Timor, Alor), Philippines (Luzon) and New Guinea (van Ooststroom, 1953).

Habit and 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, 1953).

Specimens: INDONESIA (West Timor): Fatoe Nasimètan, 900 m, 11.iii.1939, *Bloembergen* 3435 (L!); Kuakole, 700 m, 21.4.1971, *Kooy* 793 (L!); Supul, 750 m, 11.iv.1967, *Kooy* 293 (L!); *loc. cit.*, 750 m, 21.ii.1969, *Kooy* 642 (L!); Kot Olim, ca 45 m, 26.iv.1929, *Walsh* 250 (BM!).

Notes: It is possible that Kalkman (1955) referred to *I. aculeata* var. *mollissima*, as no specimens of *Ipomoea aculeata* Blume have been found. However, this could not be confirmed.

2. *Ipomoea alba* L., Sp. Pl.: 161 (1753); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 480 (1953).

Ipomoea bona-nox L., Sp. Pl. 2: 228 (1762); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885) - *Calonyction speciosum* Choisy, Mém. Soc. Phys. Genève 6: 441 (1834); Decne., Nouv. Ann. Mus. Hist. Nat.: 389 (1834); Span., Linnaea 15: 338 (1841).

Distribution: Circumtropical: originally in tropical America, in Malesia cultivated in gardens and run wild (van Ooststroom, 1953).

Habit and 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, 1953).

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

Specimens: EAST TIMOR: Kailakuk, ca 731 m, iv.1883, *Forbes* 3773 (BM!); TIMOR: *Despreaux* s.n. (P!).

3. *Ipomoea aquatica* Forssk., Fl. Aegypt.-Arab.: 44 (1775); Fawc. in H. O. Forbes, Natur. Wand. East. Archip.: 511 (1885); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 473

(1953); Kalkman in Acta Bot. Neerl.: 216 (1955).

Ipomoea repens Roth., Nov. Pl. Sp.:110 (1821) - *Ipomoea reptans* Poir., Encycl. (Lamarck) Suppl. 3: 460 (1813); Span., Linnaea 15: 339 (1841).

Distribution: Circumtropical, throughout Malesia (van Ooststroom, 1953).

Habitat and ecology: In moist, marshy or inundated localities, in shallow pools, ditches, wet rice-fields, forming dense masses; also along waysides, from sea-level to 1000 m; wild and cultivated; the species is easily propagated by cuttings (van Ooststroom, 1953).

Vernacular names: *batata aquatica* (Portuguese); *water spinach* (English) (Austin, 2007); *canco* (Tetum?); *kangkung* (Indonesian).

Uses: Used as a laxative, recommended for piles (Burkill, Read, Valkenburgh and Bunyapraphatsara 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, 1953); it is very popular as an addition to other foods at meals (Cornelius *et al.* in Austin, 2007). It is used for forage (Fang and Staples, 1995), but in limited quantities, for its laxative effect (Austin, 2007).

Specimens: EAST TIMOR: Dili, 10.i.2004, *Paiva & Silveira* 2 (AVE!).

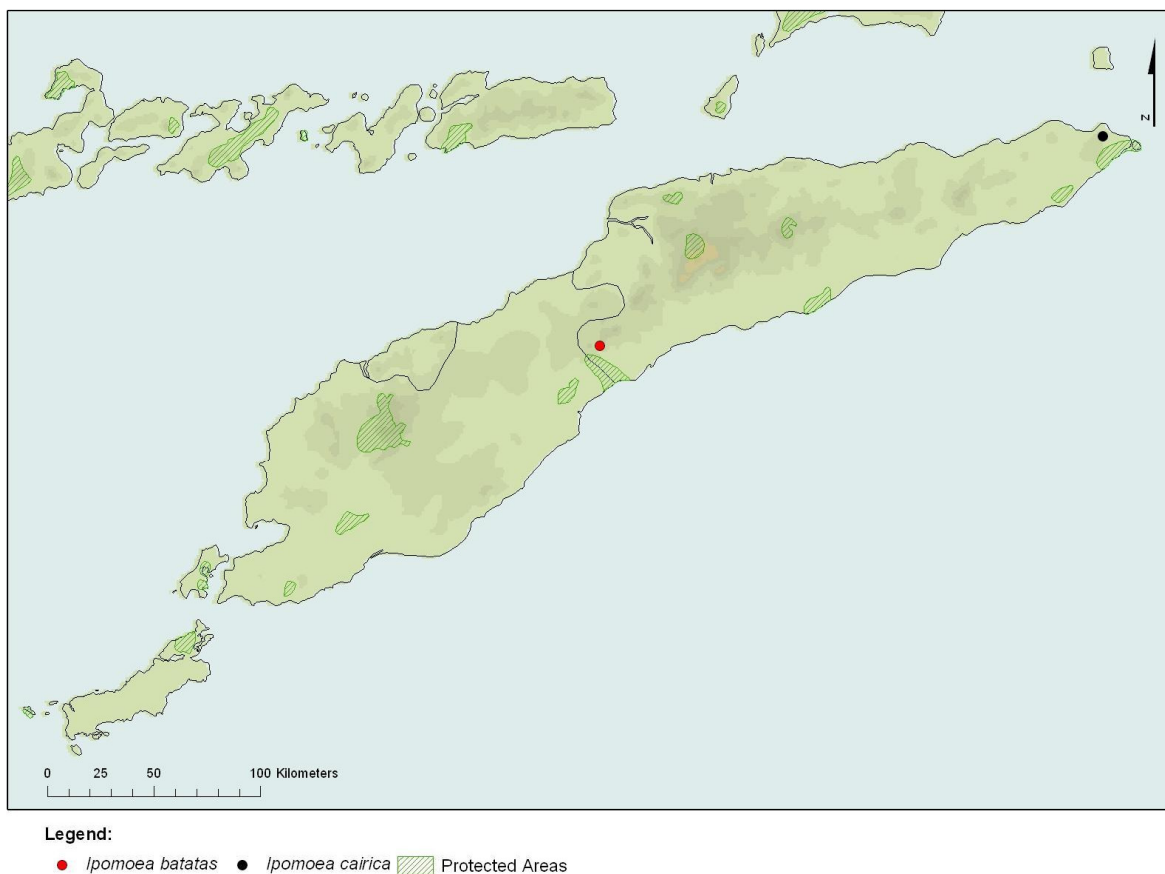


Fig. 16. Distribution of *Ipomoea batatas* and *I. cairica* in the island of Timor.

4. *Ipomoea batatas* (L.) Lam., Tabl. Encycl. 1: 465 (1792); Span., Linnaea 15: 340 (1841); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 469 (1953).

Distribution: Cultivated throughout the tropical and subtropical regions of both hemispheres (van Oostroom, 1953).

Habitat and ecology: Cultivated in gardens by the houses; occasionally wild, escaped from cultivation; at low and medium altitudes (van Oostroom, 1953).

Vernacular names: *sekal dila* (Timor: dialect unknown); *sweet potato* (English).

Uses: Used for poulticing (van Oostroom, 1953). Widely cultivated for its edible tubers, which are an

important source of starch (Fang and Staples, 1995); the young shoots are also eaten as a salad (van Oostroom, 1953). The stems and leaves can be used as livestock forage and the tubers are raw material for producing alcohol (Fang and Staples, 1995).

Specimens: EAST TIMOR: Weluli, 2.v.1966, *Friedberg* 49 (LISC!); *loc. cit.*, v.1966, *Friedberg* 67 (LISC!).

5. *Ipomoea biflora* (L.) Pers., Syn. Pl. 1: 183 (1805).

Convolvulus biflorus L., Sp. Pl. ed. 2 App. 1668 (1753) - *Ipomoea plebeia* R.Br., Prodr.: 484 (1810); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 463 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

Distribution: E. Africa, India, China, Myanmar, Vietnam, Japan (Ryuku Islands), N. Australia (Fang and

Staples, 1995). In Malesia: Java, Kangean, Lesser Sunda Islands (Lombok, Sumbawa, Timor), S. Celebes, Philippines (van Ooststroom, 1953).

Habit and ecology: In grasslands, dry thickets, in regions subject to a pronounced dry season, from sea-level to 600 m; rare (van Ooststroom, 1953).

Uses: The whole plant has several medicinal uses (Fang and Staples, 1995).

Specimens: TIMOR: *Hallier* 290 (L!); *Reinwardt* s.n. (L!) ; s.c. 1332(?) (L!); s.c. 36(?) (L!).

Notes: The examined specimens (all from Leiden) had been mostly identified as *Ipomoea plebeia* by van Ooststroom in 1940. Only one of the specimens had been identified as *Ipomoea biflora* by Staples in 2005. In *Flora Malesiana* (1953), van Ooststroom lists *Ipomoea plebeia*, but stating "Though *I. biflora* (L.) Pers., described from China, is the oldest name, I prefer that of R. Brown as the identity of the former seems doubtful to me." Later, in 2006, Staples published a "Typification of Linnean plant names in Convolvulaceae", in which he attempts to clarify this issue: although many authors have followed van Ooststroom in using *Ipomoea plebeia* instead of *Ipomoea biflora*, the latter has not formally been rejected, therefore the epithet *biflora* is still available for use; also, it has widely been used in Chinese-language taxonomic works, as well as in English-language floras for eastern Asia. *Ipomoea biflora* (L.) Pers. has

been used in this study, by accepting Staples's position: "Because the epithet is currently in use for a widespread, weedy Asian species, rejection [of *Ipomoea biflora*] would serve to destabilize the nomenclature throughout eastern Asia."

6. *Ipomoea cairica* (L.) Sweet, Hort. Brit. (Sweet): 287 (1827); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 478 (1953).

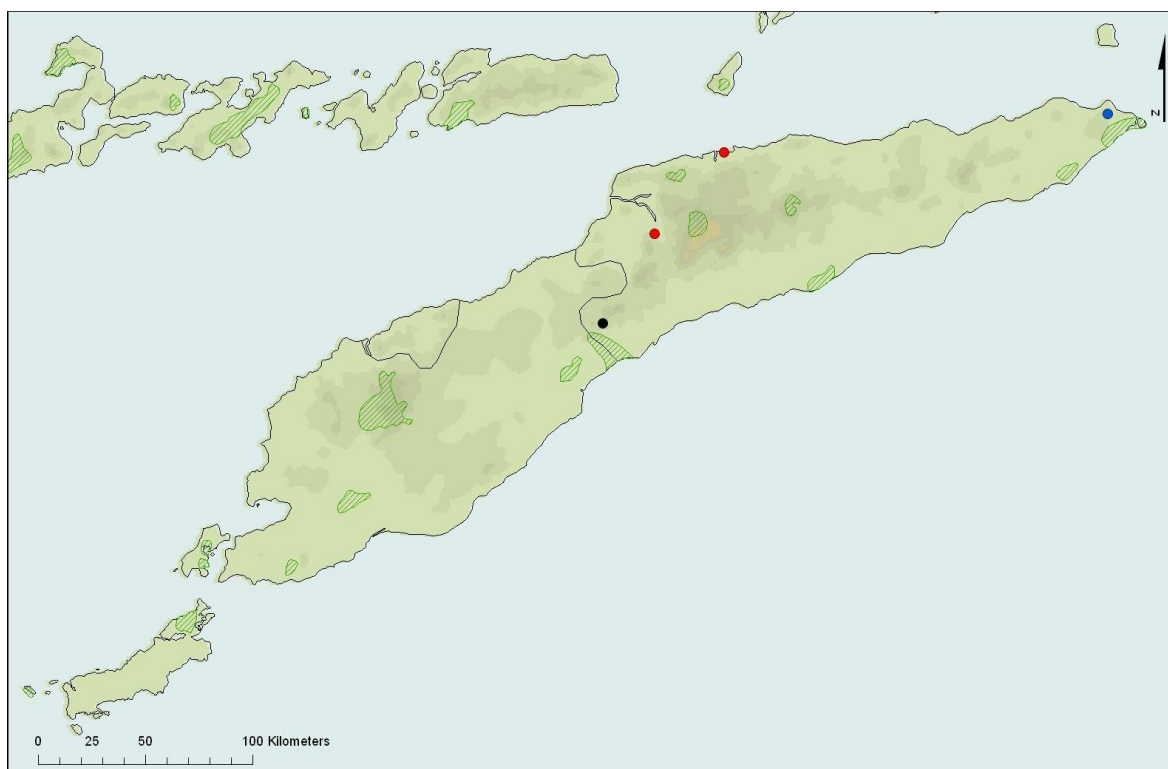
Convolvulus cairicus L., Syst. Nat. ed. 10 (2): 922 (1759).

Distribution: South America, Africa, SW. Asia, Sri Lanka, Pakistan, India, Nepal, China, Thailand, Myanmar, Vietnam, Malaysia, Indonesia, East Timor, Philippines, New Guinea, Pacific Islands, Japan (Ryukyu Islands) (Fang and Staples, 1995).

Habit and ecology: In thickets, roadsides, waste places, cultivated areas, sunny meadows in lowlands (Fang and Staples, 1995). A specimen from East Timor was found at 400 m.

Uses: The whole plant is used for treating external infections (Fang and Staples, 1995). Natural products with antiviral activity (namely anti-HIV) can be extracted from this plant (Mathée *et al.*, 1999).

Specimens: EAST TIMOR: Mehera, ca 400m, 18.xii.1955, *van Steenis* 18125 (BM!, L!).



Legend:

● *Ipomoea carnea* subsp. *fistulosa* ● *Ipomoea decaisnei* ● *Ipomoea hederifolia* ▨ Protected Areas

Fig. 17. Distribution of *Ipomoea carnea* subsp. *fistulosa*, *I. decaisnei* and *I. hederifolia* in the island of Timor.

7. *Ipomoea carnea* Jacq. subsp. *fistulosa* (Mart. ex Choisy) D.F. Austin, Taxon 26: 237 (1977).

Ipomoea fistulosa Mart. ex Choisy, Prodr. (DC.) 9: 349 (1845) – *Ipomoea crassicaulis* (Benth.) B. L. Rob.; Ooststroom in Steenis, Fl. Males. Ser. 1, Spermat. 4(4): 485 (1953).

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

Habit and 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).

Specimens: EAST TIMOR: Dili, 18.vi.1962, *Cinatti* 243 (L!, LISC!). INDONESIA (West Timor): Oenopu, 500m, 5.vii.1965, *Kooy* 257 (L!).

Notes: A wide discussion has come amongst botanists studying *Ipomoea fistulosa* and *Ipomoea carnea*, on whether they should be considered the same *taxon* or not. Austin (1977) has suggested they would both be included in the species *Ipomoea carnea*, as subspecies, being *Ipomoea fistulosa* taken as a synonym for *Ipomoea carnea* subsp. *fistulosa*. Later, Verma and Srivastava (1983) suggested that none of the characters used to distinguish both *Ipomoea carnea* and *Ipomoea fistulosa* are to be given any taxonomic importance since these species show a continuous range of variation with changes in the habitat conditions. However, these authors apparently have not seen ssp.

carnea in the field (it is American) and still they sustain that *Ipomoea carnea* should be the correct name for both taxa.

More recently, Fang and Staples (1995) have used the name *Ipomoea carnea* subsp. *fistulosa*, referring that the species originated from tropical America is cultivated in many parts of Asia and has become widely naturalized, but subsp. *fistulosa* is preferred in cultivation, so being more likely to be found in Asia than subsp. *carnea*. For all this, it seemed wiser to take up in this study the name *Ipomoea carnea* subsp. *fistulosa* for the specimens from Timor, irrespective of the identification by van Ooststroom as *Ipomoea fistulosa*.

8. *Ipomoea decaisnei* Ooststr., Blumea 3: 503 (1940); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 466 (1953); Kalkman, Acta Bot. Neerl.: (1955).

Pharbitis variifolia Decne., Nouv. Ann. Mus. Hist. Nat. Par. 3: 390 (1834); Span., Linnaea 15: 338 (1841).

Distribution: Malesia: E. Java, Madura, SW. and SE. Celebes (Buton Isl.), Lesser Sunda Islands (Lombok, Sumbawa, Timor) (van Ooststroom, 1953).

Habit and ecology: In thickets, hedges, waysides, apparently restricted to regions subject to a pronounced dry period, from sea-level to 750 m (van Ooststroom, 1953).

Vernacular name: *daun tapahaik* (Timor: unknown dialect).

Specimens: INDONESIA (West Timor): Noe kiu(?) , 26.v.1973, Kooy 936 (L!). TIMOR: *Spanoghe* s.n. (L!); s.c. s.n. (L!).

9. *Ipomoea eriocarpa* R. Br., Prodr.: 484 (1810); Ooststr. in Steenis, Fl.

Males., Ser. 1, Spermat. 4(4): 462 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

Ipomoea hispida (Vahl) Roem. & Schult., Syst. Veg. 4: 238 (1819).

Distribution: Africa, Sri Lanka, Pakistan, India, Nepal, China, Myanmar, Thailand, Cambodja, Laos, Vietnam, Malaysia, Indonesia, New Guinea, Philippines, N. Australia (Fang and Staples, 1995).

Habit and 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 1300 m (van Ooststroom, 1953).

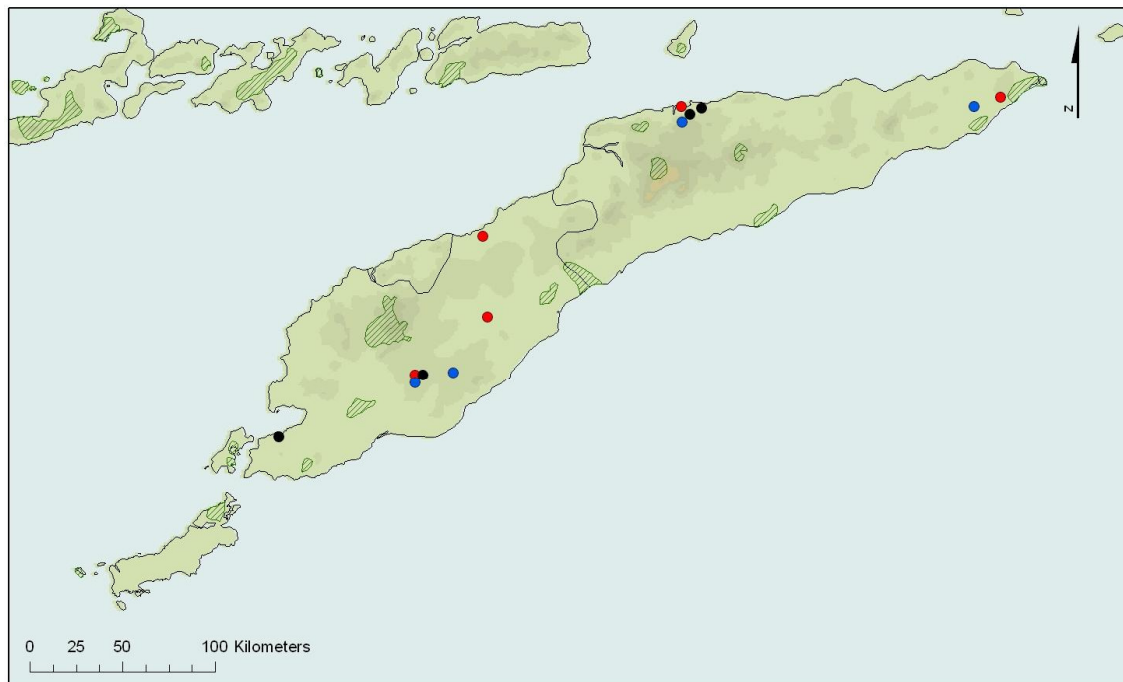
Specimens: TIMOR: *Spanoghe* 206 (L!)

Notes: The Leiden specimen was identified as *Ipomoea hispida* R. & Sch. by van Ooststroom in 1940, although this *taxon* has later been treated in Flora Malesiana as *Ipomoea eriocarpa* R. Br.

10. *Ipomoea hederifolia* L., Syst. Nat., ed. 10: 925 (1759); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 5: 563 (1958).

Ipomoea angulata Lam., Tabl. Encycl. 1: 464 (1791); Ooststroom in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 481 (1953).

Distribution: Native of tropical America, now circumtropical; in Malesia cultivated and run wild (van Ooststroom, 1953).



Legend:

● *Ipomoea marginata* ● *Ipomoea nil* ● *Ipomoea obscura* ▨ Protected Areas

Fig. 18. Distribution of *Ipomoea marginata*, *I. nil* and *I. obscura* in the island of Timor.

Habit and ecology: Run wild in waste places, fields, grasslands, thickets and thin forests; up to 1200 m (van Oostroom, 1953).

Uses: Cultivated in gardens for ornamental purposes (van Oostroom, 1953)

Specimens: INDONESIA (West Timor): Asoemane, ca 762 m, 25.vi.1929, Walsh 422 (BM!)

11. *Ipomoea marginata* (Desr.) Verdc., Kew Bull. 42 (3):658 (1987).

Convolvulus marginatus Desr., Encycl. 3 (2): 438 (1792) - *Ipomoea sepiaria* Koen. ex Roxb., Fl. Ind. ed. Carey & Wall. 2: 90 (1824); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 6 (6): 941 (1972) - *Ipomoea verrucosa* Blume, Bijdr. Fl. Ned. Ind. 13: 718 (1826); Span., Linnaea 15: 340 (1841).

Distribution: Africa, Sri Lanka, ?Pakistan, India, China, Myanmar, Thailand, Laos, Vietnam, Malaysia,

Indonesia, East Timor, New Guinea, N. Australia, Pacific Islands (Fang and Staples, 1995).

Habit and ecology: In coastal or saline soils, grasslands, fields and waste areas. (Fang and Staples, 1995). In Malesia not found on the beaches bordering the Indian Ocean, but apparently mostly confined to the clays of muddy seas (van Oostroom, 1953). In Timor, up to ca 760 m.

Specimens: EAST TIMOR: Caicoli, ca 2 m, 13.xii.1953, van Steenis 17895 (BM!, L!); Muapitine, ca 350 m, 19.xii.1953, van Steenis 18132 (BM!, L!). INDONESIA (West Timor): Lalian(?), 24.iv.1965, Kooy 108 (L!); Noemuti, ca 500m, 18.ii.1966, Kooy 398 (L!); Soë, ca 762m, Walsh 126 (BM!). TIMOR: Guichenot s.n. (P!); Spanoghe 89 (L!); Spanoghe s.n. (L!).

12. *Ipomoea mauritiana* Jacq. *Collectanea* 4: 216 (1791); Ooststr. in Steenis, *Fl. Males.*, Ser. 1, *Spermat.* 6 (6): 941 (1972).

Ipomoea digitata auct. non L., *Syst. Nat.* ed 10: 924 (1759); Fawc. in H.O. Forbes, *Natur. Wand. East. Archip.*: 511 (1885); Ooststroom in Steenis, *Fl. Males.*, Ser. 1, *Spermat.* 4 (4): 483 (1953); Kalkman in *Acta Bot. Neerl.*: 216 (1955) - *Ipomoea paniculata* R. Br., *Prodr.*: 486 (1810), auct. non Burm. *f.* (1768); Span., *Linnaea* 15: 340 (1841).

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

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

Vernacular name: *laluli* (Timor: unknown dialect) (van Ooststroom, 1953).

Uses: The leaves and roots are used externally for treating tuberculosis, as well as external and breast infections (Fang and Staples, 1995). The root is pounded and applied, for swellings (Malay Peninsula); moreover it is said to be cathartic (van Ooststroom, 1953). The plant is also cultivated for ornamental purposes.

Specimens: TIMOR: Spanoghe s.n. (L!).

Notes: *Ipomoea mauritiana* has often been misidentified as *Ipomoea digitata* L., a

different species that is endemic from the West Indies.

13. *Ipomoea nil* (L.) Roth., *Cat. Bot.* 1: 36 (1797); Ooststr. in Steenis, *Fl. Males.*, Ser. 1, *Spermat.* 4(4): 465 (1953); Kalkman, *Acta Bot. Neerl.*: 216 (1955).

Ipomoea hederacea auct. non Jacq., *Collectanea* 1: 124, pl. 36 (1787); Fawc. in H. O. Forbes, *Natur. Wand. East. Archip.*: 511 (1885) - *Ipomoea setosa* Blume, *Bijdr. Fl. Ned. Ind.* 13: 714 (1826); Span., *Linnaea* 15: 340 (1841) - *Pharbitis nil* (L.) Choisy, *Mém. Soc. Phys. Genève* 6: 439 (1833); Decne., *Nouv. Ann. Mus. Hist. Nat.*: 388 (1834); Span., *Linnaea* 15: 338 (1841) - *Ipomoea trichocalyx* Steud., *Nomencl. Bot.* ed. 2 (Steudel) 1: 819 (1840); Fawc. in H.O. Forbes, *Natur. Wand. East. Archip.*: 511 (1885).

Distribution: Probably native from Tropical Africa, now widely cultivated throughout the tropics (Acevedo-Rodríguez, 2003).

Habit and ecology: In waysides, hedges, thickets and grasslands, from sea-level to 1300 m (van Ooststroom, 1953).

Uses: The seeds are said to be purgative. The plant is cultivated in gardens for ornamental purposes (van Ooststroom, 1953).

Specimens: EAST TIMOR: Dili, 4.v.1962, *Cinatti* 171 (LISC!); Fatunaba, ca 518 m, iv. 1883, *Forbes* 3776 (BM!); *loc cit.*, ca 518 m, 1882/1883; *Forbes* 4105 (BM!); Kailakuk, ca 731 m, iv.1883, *Forbes* 4108 (BM!); Weluli, 22.vii.1966, *Friedberg* 412 (LISC!). INDONESIA (West Timor): Kupang, iv.1803, *Brown* s.n. (BM!); Soë, ca 762m, 1.iii.1929, *Walsh* 65 (BM!).

Notes: A few specimens from Timor had been identified as *Ipomoea hederacea* Jacq., a species whose differences and similarities to *I. nil* have long been debated. The two species can be told apart mainly for the shape of the sepals: in *I. hederacea* they constrict abruptly and then taper towards the tip, whereas in *I. nil* they taper gradually (Acevedo-Rodriguez, 2003; Hawthorne, 2006; Heine, 1963). This is not always easily observed, especially in herbarium specimens, and so there has been some confusion between the two species. Van Oostroom (1940) has approached this topic in Blumea, where he claimed that he had not seen *I. hederacea* in the Malesian region. In Flora Malesiana (van Oostroom, 1953) he claims that the authors who had reported it to this area must have, in fact, confused *I. nil* with the American *I. hederacea*. The Timor specimens which were identified as *I. hederacea* by Forbes were carefully reviewed for this study and it was agreed that they would actually belong to *I. nil*. Note that van Oostroom (1940) has not rejected that the true *I. hederacea* would actually exist in Malesia. Moreover, he suggests that it might occasionally be cultivated in gardens.

14. *Ipomoea obscura* (L.) Ker-Gawl., Bot. Reg. 3: t. 239 (1817); Decne., Nouv. Ann. Mus. Hist. Nat.: 392 (1834); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 471 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

Convolvulus obscurus L., Syst. Nat. ed. 2 (1): 220 (1762) - *Ipomoea insuavis* Blume, Bijdr. Fl. Ned. Ind. 13: 716 (1826).

Distribution: East tropical Africa, Mascarene Islands, tropical Asia, throughout Malesia to N. Australia and Fiji (van Oostroom, 1953).

Habit and ecology: In grasslands, thickets, hedges, thin forests, waysides, waste ground; occasionally on sandy soil near the sea; from sea-level to 1300 m (van Oostroom,

1953). Specimens from Timor were collected at 750 – 760 m.

Uses: Leaves, together with those of *Argyreia mollis*, are used against sores (Heyne in van Oostroom, 1953).

Specimens: EAST TIMOR: Fatunaba, ca. 518 m, 1882/1883, Forbes 4004 (BM!); Lospalos, ca 400 m, 6.vii.1960, Verdial 14 (LISC!). INDONESIA (West Timor): Nikiniki, ca 750 m, 6.vii.1965, Kooy 242 (L!); Soë, ca 762 m, 14.iii.1928, Walsh 11 (BM!). TIMOR: Guichenot s.n. (P); Riedlé s.n. (P); Riedlé s.n. (P); Spanoghe s.n. (L!); Spanoghe 54 (L!); s.c. s.n. (P); s.c. s.n. (P).

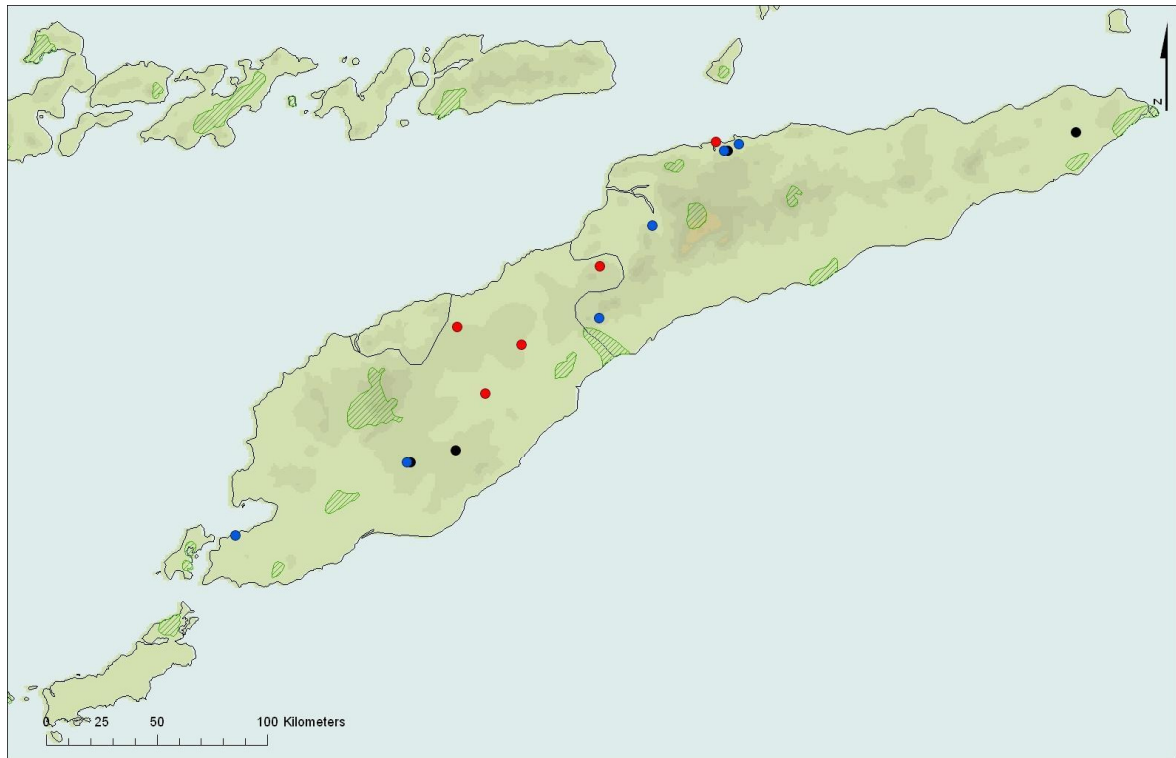
15. *Ipomoea ochracea* (Lindl.) G. Don., Gen. Hist. 4: 270 (1837); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 6(6): 941 (1972).

Convolvulus ochraceus Lindl., Bot. Reg. 64: t. 1060 (1826) - *Ipomoea ochroleuca* Span., Linnaea 15: 340 (1841); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 472 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

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

Habit and ecology: In Timor on rocks near the sea; according to M. E. Walsh restricted to that habitat (van Oostroom, 1958).

Specimens: INDONESIA (West Timor): Kupang, iv.1803, Brown s.n. (BM!); Kolbano, Walsh 266 (BM!). TIMOR: 1856, Flood s.n. (K!).



Legend:

● *Ipomoea marginata* ● *Ipomoea nil* ● *Ipomoea obscura* ▨ Protected areas

Fig. 19. Distribution of *Ipomoea ochracea* and *I. pes-caprae* subsp. *brasiliensis* in the island of Timor.

Notes: Although van Ooststroom has proposed two subspecies of *Ipomoea pes-caprae*: *I. pes-caprae* subsp. *pes-caprae* and *I. pes-caprae* subsp. *brasiliensis*, other authors (Fang and Staples, 1995) have discussed the taxonomic relevance of these variations, as they could be due to changes in growing conditions. Because the reviewed specimens from Timor were doubtless like *I. pes-caprae* subsp. *brasiliensis*, it seemed to make sense to keep the subspecies, although it is not discarded that they might, in fact, be synonymous.

Identification key for the subspecies of *I. pes-caprae*

1a. Leaves deeply 2-lobed, with rounded lobes; leaf-base cuneate to attenuate into the petiole. Outer sepals ca 9 mm long, inner ones ca 13 mm. Corolla ca 6½ cm longsubsp. *pes-caprae*

1b. Leaves emarginate or sometimes truncate at the apex; truncate, rounded, shortly attenuate to subcuneate or slightly cordate at the base. Outer sepals 5-8, inner ones 7-11 mm long. Corolla 3-5 cm long.subsp. *brasiliensis*

16. *Ipomoea pes-caprae* (L.) Sweet, Hort. Suburb. Lond.: 35 (1818); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885); Kalkman, Acta Bot. Neerl.: 216 (1955).

Convolvulus pes-caprae L., Sp. Pl. 1: 159 (1753) - *Ipomoea maritima* (Desr.) R. Br., Prodr.: 486 (1810); Span., Linnaea 15: 339 (1841).

subsp. **pes-caprae**

Distribution: Somaliland(?) tropical Asia, and Malesia: Malay Peninsula, W. Sumatra (Batu Islands), Krakatau (van Ooststroom, 1953).

Habit and ecology: Sandy beaches.

Notes: There is some uncertainty on whether this subspecies actually has been collected in Timor. All the revised specimens of this species seemed to agree more with van Ooststroom's description of subsp. *brasiliensis*. Records prior to the publication of the two subspecies, in 1940, (Spanoghe, 1834; Fawcett, 1885) might correspond to *Ipomoea pes-caprae* subsp. *brasiliensis*, but no specimens are listed so this could not be confirmed. As to Kalkman (1955), it is possible that he did not accept van Ooststroom's subspecies, but, since he cites R. Brown, he might also not have had access to specimens to judge for himself.

subsp. **brasiliensis** (L.) Ooststr., Blumea 3 (3): 533 (1940).

Convolvulus brasiliensis L., Sp. Pl. 1:159 (1753).

Distribution: Circumtropical, the most common subspecies throughout Malesia (van Ooststroom, 1953).

Habit and ecology: On and immediately behind seashores, occasionally in the interior, along waysides, ditches and canals, from

sea-level up to 600 m (van Ooststroom, 1953).

Vernacular name: *tai ilaça* (Timor: unknown dialect).

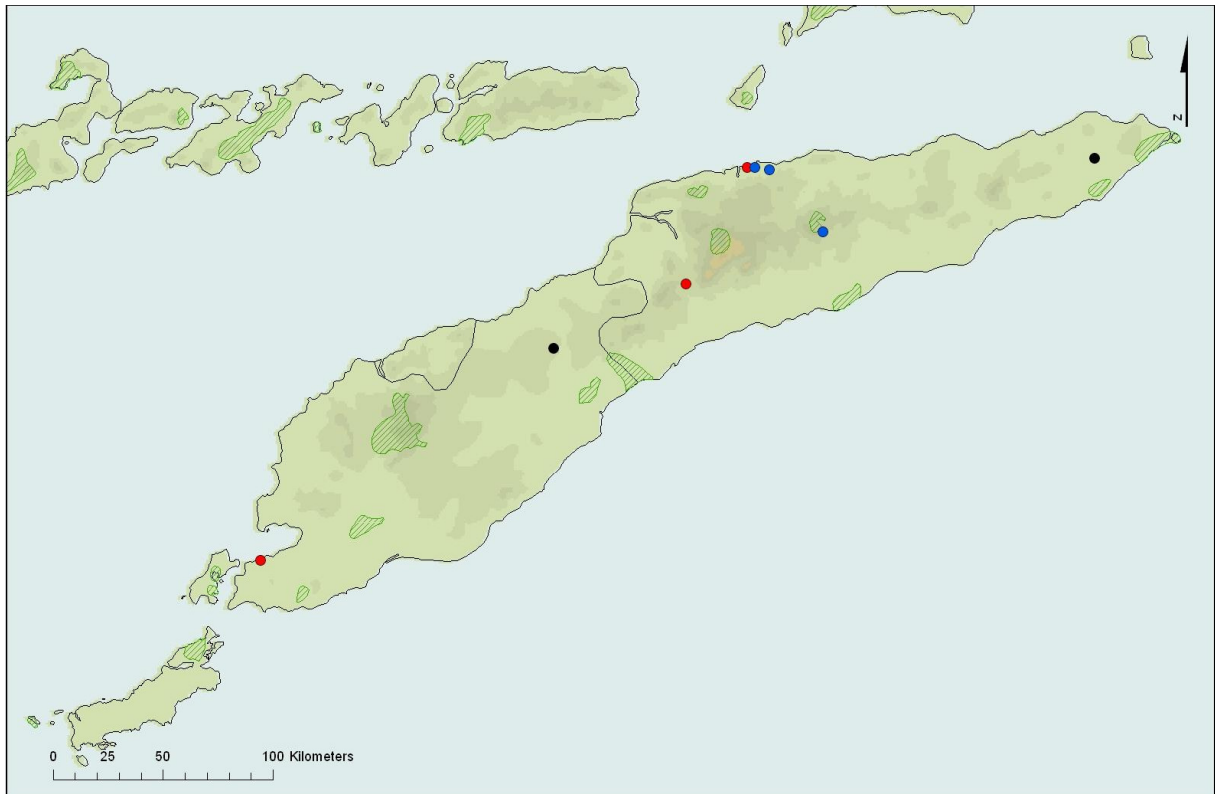
Uses: The seeds are said to be a good remedy for stomach-ache and cramp; in E. Malaysia the leaves are made into poultices, which are used to ripen boils and applied to swellings, wounds, ulcers and such. The juice of the stems is used in the Island of Nusa Kambangan (S. Java) as a medicine against bites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

Specimens: EAST TIMOR: Dili, 10.i.2004, *Paiva & Silveira* 9 (AVE!); Viqueque, 15.ii.2005, *Paiva, Silveira & Sousa*, 505 (AVE!); Loré, 28.vii.1967, *Silva* 6 (COI, LISC!). INDONESIA (West Timor): Atapupu, 3.iv.1981, *Kooy* 1310 (L!); Kupang, 19.viii.1967, *Kooy* 378 (L!); Kolbano, 29.iv.1929, *Walsh* 310 (L!); *loc. cit.*, 29.iv.1929, *Walsh* 364 (BM!). TIMOR: 1884, *Silva* s.n. (COI).

17. *Ipomoea pes-tigridis* L., Sp. Pl.:162 (1753); Span., Linnaea 15: 340 (1841); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 467 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

Distribution: East tropical Africa, Mascarene Islands, continental tropical Asia, throughout Malesia (van Ooststroom, 1953).

Habit and ecology: In grasslands, waste places, fields, thickets, occasionally in teak-forest, also on sandy soil near the sea; from



Legend:

● *Ipomoea pestigridis* ● *Ipomoea polymorpha* ● *Ipomoea quamoclit* ▨ Protected Areas

Fig. 20. Distribution of *Ipomoea pes-tigridis*, *I. polymorpha* and *I. quamoclit* for the island of Timor.

sea-level to 1000 m (van Ooststroom, 1953).

Specimens: EAST TIMOR: Bobonaro, 26.ii.1967, *Cinatti* 107 (LISC!); Dili, 9 m, 5.ii.2005, *Paiva, Silveira & Sousa*, 261 (AVE!). INDONESIA (West Timor): Kupang, 1.vii.1803, *Brown* s.n. (BM!).

18. *Ipomoea polymorpha* Roem. & Schult., Syst. Veg., 4: 254 (1819); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 464 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

Ipomoea pumila Span., Linnaea 15: 341 (1841); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885) – Type: s.c.(?) 45 (L!).

Distribution: Ethiopia, India(?), Indo-China, and Formosa to NE. Australia, in Malesia: E. Java, Madura, Lesser Sunda Islands (Sumba, Flores, Timor), Philippines (Luzon), NE. New Guinea and Thursday Island (van Ooststroom, 1953).

Habit and 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 ca 100 m (van Ooststroom, 1953).

Specimens: EAST TIMOR: Lospalos, 1962, *Cinatti* 29 (L!, LISC!). INDONESIA (West Timor): Fatukopa, 19.i.1967, *Kooy* 276 (L!). TIMOR:

1857, *de Vriese* s.n. (L!); 1857, *de Vriese* s.n. (L!); *Spanoghe* 72 (L!); *Zippelius* 73 (L!); *Zippelius* 168 (BM! L); *Zippelius* s.n. (L!); *Zippelius* s.n. (L!).

19. *Ipomoea purpurea* (L.) Roth, Bot. Abh. Beobacht.: 27 (1787); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 465 (1953).

Convolvulus purpureus L., Sp. Pl. ed. 2 (1): 219 (1762).

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

Habit and ecology: Waysides, hedges, fields; from sea level to 2800 m (Fang and Staples, 1995).

Specimens: TIMOR: s.c. s.n. (P)

20. *Ipomoea quamoclit* L., Sp. Pl. :159 (1753) ; Span., Linnaea 15: 339 (1841); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 482 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

Quamoclit vulgaris Choisy, Mém. Soc. Phys. Genève 6: 434 (1833).

Distribution: Circumtropical, in Malesia cultivated and run wild throughout the region (van Ooststroom, 1953).

Habit and ecology: Run wild in waste places, hedges, thickets, thin forests and along edges of cane and

rice-fields, up to 1200 m (van Ooststroom, 1953). It is quite common all around Timor, where it has been found in mountain slopes and along roads.

Specimens: EAST TIMOR: Fatu-ahi, 4.v.1962, *Cinatti* 168 (L!, LISC!); Samoro, ca 1.524 m, 1883, *Forbes* 3871 (L!, BM!). Dili, 300m, 28.iv.1938, *Jaag* 75 (L!, BM!); *loc. cit.*, 1884, *Silva* s.n. (COI).

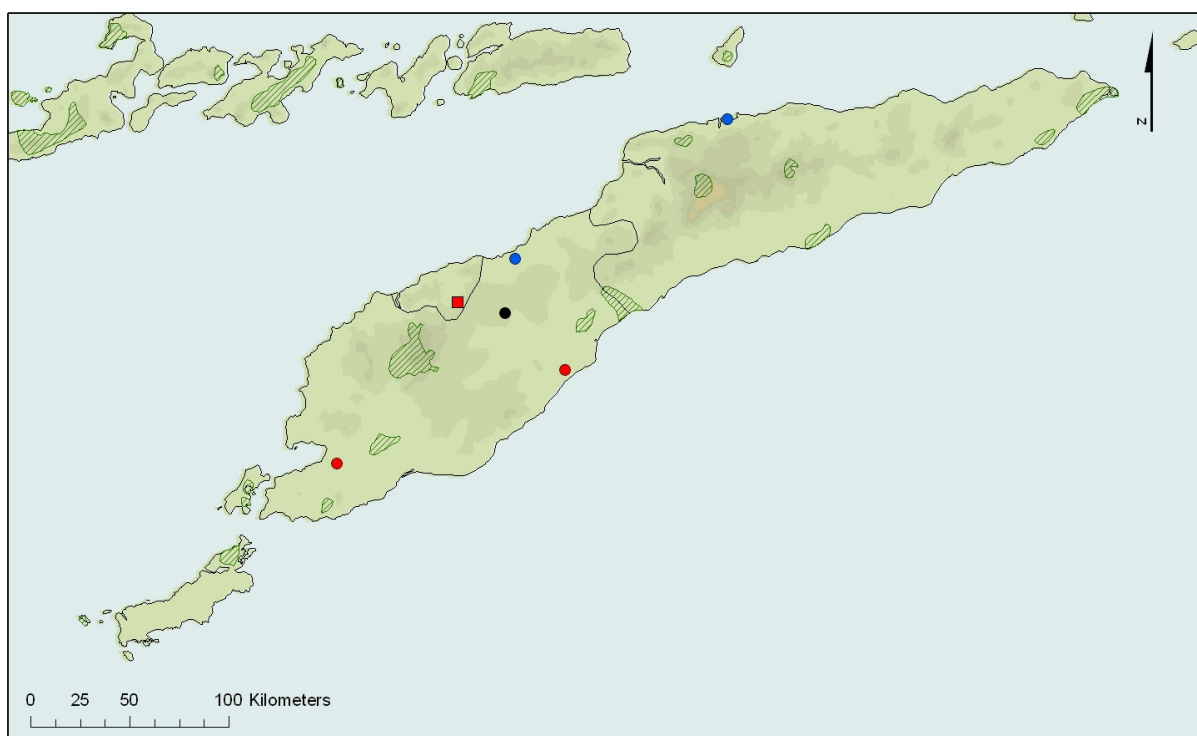
21. *Ipomoea sumatrana* (Miq.) Ooststr., Blumea 3(3): 571 (1940); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 486 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

Lettsomia sumatrana Miq., Fl. Ned. Ind., Eerste Bijv.: 560 (1890).

Distribution: Myanmar, China, Thailand, Laos, Malaysia, Indonesia (Fang and Staples, 1995).

Habit and ecology: In thickets, roadsides, forest margins, 100-900 m (Fang and Staples, 1995).

Notes: A specimen from Herb. Brit. Mus. - *Wiles & Smith* s.n. - has been examined and it is most likely to belong to *Ipomoea sumatrana*, even though the available data seem insufficient to acknowledge its true identification. Van Ooststroom has identified it as "*Ipomoea cf sumatrana*" in 1949, it being the most recent revision of this specimen, before the one undertaken for this study. Fawcett (1885) reported *Ipomoea repanda* Jacq. to Timor, mentioning a specimen by Wiles & Smith. It is very likely that he referred to this same specimen.



Legend:

● *Ipomoea trichosperma* ● *Ipomoea tricolor* ● *Ipomoea triloba* ■ *Ipomoea violacea* ▨ Protected Areas

Fig. 21. Distribution of *Ipomoea trichosperma*, *I. tricolor*, *I. triloba* and *I. violacea* in the island of Timor.

22. *Ipomoea trichosperma* Blume, Bijdr. Fl. Ned. Ind. 13: 710 (1826); Malm, Repert. Spec. Nov. Regni Veg. 34: 287 (1934); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 487 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

Ipomoea capillata Span., Linnaea 15: 340 (1841); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885).

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

Habit and ecology: In thickets, hedges and thin forests; near the beach and in the interior; from sea-level to 400 m (van Ooststroom, 1953).

Specimens: INDONESIA (West Timor): Kau, 21.v.1980, *Kooy* 1252 (L!); Oeoh(?), 27.vii.1981, *Kooy* 1330 (L!); Oesau, 2.xi.1960, *Sauveur* 76 (L!). TIMOR: *Spanoghe* s.n. (L!); s.c. s.n. (L!).

23. *Ipomoea tricolor* Cav., Icon. 3: 5, t. 208 (1795); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 478 (1953).

Distribution: Mexico, Central America, West Indies, tropical South America, elsewhere cultivated and perhaps occasionally escaped, in Malesia only known from the Malay Peninsula (as a garden escape), and Timor, where it is locally frequent in the N. Central portion of the island, at 400 m (van Ooststroom, 1953).

Habit and ecology: Small plant, found in roadsides and said to be very frequent in some localities of Timor.

Vernacular name: *non luli* (Timor: dialect unknown).

Specimens: INDONESIA (West Timor): Nusa (?), ca 700 m, 7.vii.1965, Kooy 244 (L!); Maobessi, ca 500 m, 7.vii.1965, Kooy 249 (L!); *loc. cit.*, 2.vi.1929, Walsh 399 (BM!, L!).

24. *Ipomoea triloba* L. Sp. Pl.: 161 (1753); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 468 (1953).

Distribution: Native of tropical America, now a circumtropical weed; throughout Malesia (van Ooststroom, 1953).

Habit and ecology: In grasslands, thickets, hedges, waste places, waysides, fields, also in savannah-forests and occasionally on sandy sea-shores, from sea-level to 750m (van Ooststroom, 1953).

Uses: It can be used as remedy.

Vernacular names: *batata-brava* (Portuguese), *fehuc-fuic* (Tetum), *naubia-talin* (Manbae).

Specimens: EAST TIMOR: Dili, 24.iv.1962, *Cinatti* 131 (L!, LISC!); *loc. cit.*, 5.ii.2005, 9 m, *Paiva, Silveira & Sousa* 260 (AVE!). INDONESIA (West Timor): Lahoan (?), ca 200 m, 26.iv.1965, *Kooy* 85 (L!).

25. *Ipomoea violacea* L., Sp. Pl. 1: 161 (1753).

Calonyction muticum Decne., Nouv. Ann. Mus. Hist. Nat. 3: 390 (1834); Span., Linnaea 15: 338 (1841) - *Ipomoea tuba* (Schtdl.) G. Don, Gen. Hist. 4:271 (1838); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4 (4): 487 (1953).

Distribution: North America, South America, Africa, Sri Lanka, Thailand, Malaysia, Indonesia, Philippines, New Guinea, North Australia, Pacific Islands, Japan (van Ooststroom, 1953).

Habit and ecology: Beaches, seaside thickets, edges of brackish rivers and lagoons, near sea level to 100m (Fang and Staples, 1995). A specimen from Timor was found at ca 275 m.

Specimens: INDONESIA (West Timor): Mamboea, ca 274 m, 22.vi.1929, *Walsh* 430 (BM!).

Doubful records

Ipomoea campanulata L., Sp. Pl. 1: 160 (1753); Decne., Nouv. Ann. Mus. Hist. Nat. 3: 391 (1834); Span., Linnaea 15: 338 (1841); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885).

There is a certain debate amongst taxonomists on the typification of this species, which has resulted in some nomenclatural conflicts (Austin, 1978; C. R. Gunn, 1972). C. R. Gunn (1972) assumed that the illustration that typifies *Ipomoea campanulata* L. – Rheede's *Adamboe* plate - would actually apply to the type of *Stictocardia campanulata* (L.) Merrill, and listed a specimen from Portuguese Timor

[Meyer s.n. (K)] among the most representative collections of this species. Later, Austin (1972) argued that the description given by Gunn matches *Stictocardia tiliifolia* (Desr.) Hallier f. In what concerns Flora Malesiana, van Ooststroom (1953) treated the type of *Ipomoea campanulata* L. as *Ipomoea illustris* Prain, which is quite different from *S. tiliifolia*, namely for the presence of black glandular dots on the leaf surface of all *Stictocardia* (Austin, 1978). No specimens were found that would confirm the presence of *Ipomoea campanulata* L. in Timor, namely the one from Kew, listed by Gunn (1972). Due to the existing debate, it remains to be confirmed if Decaisne, Spanoghe and Forbes were correctly reporting *Ipomoea campanulata* (alias *Ipomoea illustris*) to Timor, or if this would be yet another case of misidentification with *Stictocardia tiliifolia*.

Ipomoea petaloidea Choisy, in Mém. Soc. Phys. Genève 6.: 451 (1833); Decne., Nouv. Ann. Mus. Hist. Nat.: 64 (1834); Span., Linnaea 15 :339 (1841); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885).

This species is now more commonly known for other synonymous names, such as *Merremia peltata* (L.) Merr..The latter is reported to the Malesian region by van Ooststroom (1953), but not to Timor. No specimens have been found that confirmed the presence of *I. petaloidea* (or any of its synonyms) in Timor, and the fact that this is also not confirmed in Flora Malesiana turned this into a doubtful record.

Insufficiently known

Ipomoea reflexa Span., Linnaea 15: 341 (1841); *Ipomoea trichotoma* Blume, Bijdr. Fl. Ned. Ind. 13: 717 (1826), Span., Linnaea 15: 340 (1841).

Although Spanoghe reports these *taxa* to Timor, no other specimens or bibliographic references which would support these statements are known.

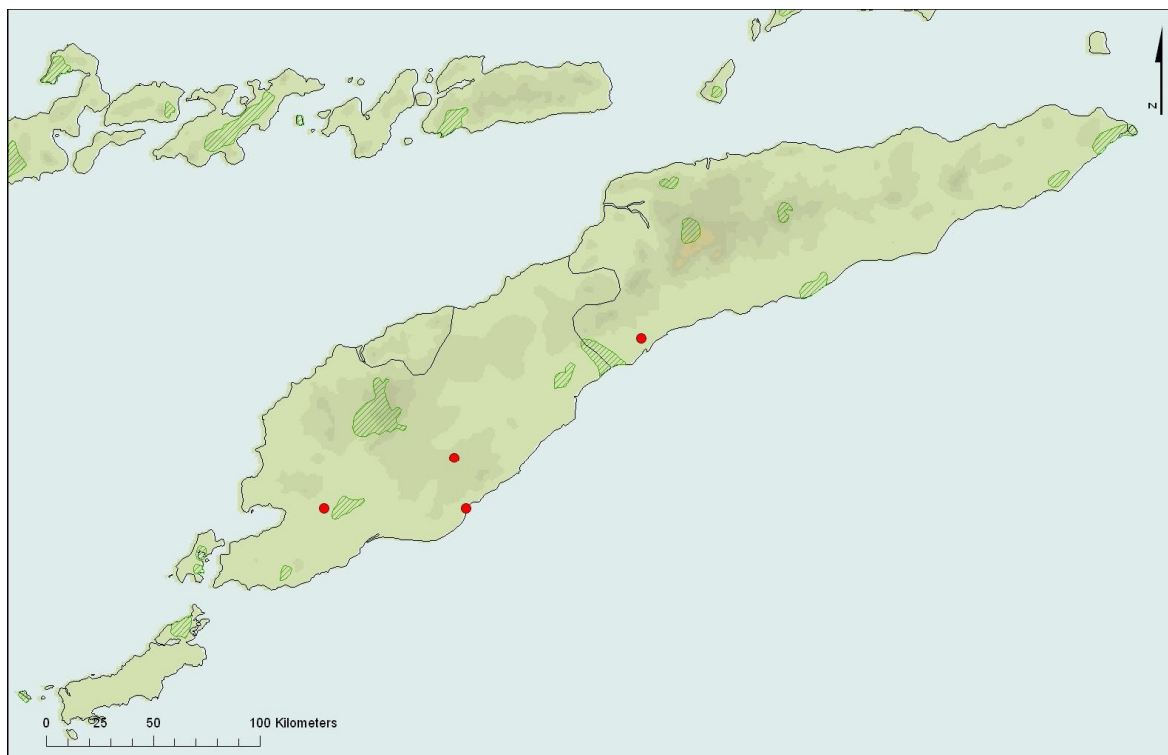
Two specimens remain to be identified at species level, Kooy 283 (L!) and Verdial 26 (LISC!) for lack of relevant taxonomical characters.

9. JACQUEMONTIA Choisy, Mém. Soc. Phys. Genève 6: 476 (1833)

Identification key for the species of *Jacquemontia*

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

Notes: It seems rather difficult to tell these two species apart, as there is a reasonably high level of variation in the shape of sepals of the examined specimens. The density of indumentum is also quite variable, and sometimes misleading in terms of specimen identification. Van Ooststroom (1953) discussed this topic in Flora Malesiana: “[*Jacquemontia zollingeri*] is closely related to *J. paniculata*; it might possibly be better to consider it merely as a variety of that species. Both show a great resemblance in habit as well as in the shape and size of leaves and inflorescences. The main difference is found in the shape of the sepals. Typical *J. zollingeri* has the same short and dense tomentum as *J. paniculata* var. *tomentosa*.” This issue could be better explained by carrying out studies on the indumentum types of both species, where there could be found differences.



Legend:

● *Jacquemontia paniculata* ▨ Protected Areas

Fig. 22. Distribution of *Jacquemontia paniculata* in the island of Timor.

1. *Jacquemontia paniculata* (Burm. f.) Hallier f. Bot. Jahrb. Syst. 16 (4-5): 541 (1893).

Ipomoea paniculata Burm. f., Fl. Indica 50, pl. 21, f. 3 (1768).

var. **paniculata**

Convolvulus parviflorus Vahl., Symb. Bot. (Vahl.) 3: 29 (1794); Decne., Nouv. Ann. Mus. Hist. Nat.: 392 (1834); Span., Linnaea 15: 341 (1841); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885).

Distribution: Tropical East Africa, Madagascar and adjacent islands to

SE Asia, tropical Australia, and New Caledonia; throughout Malesia (van Oostroom, 1953).

Habit and ecology: In thickets, secondary forests, teak-forests, grassy places, along fields, hedges, waysides; often on dry-soil; from sea-level to ca 600(-880) m (van Oostroom, 1953).

Specimens: EAST TIMOR: Suai, 25.vii.1962, *Cinatti* 369 (L!, LISC!). INDONESIA (West Timor): Kobaumene, 25.vi.1981, *Kooy* 1294 (L!); *loc. cit.*, 25.vi.1981, *Kooy*

Identification key for the varieties of *Jacquemontia paniculata*

1a. Leaves glabrous, or short-pilose and glabrescent above and beneath. Stems mostly glabrescent, young parts mostly hairy. Inflorescences cymes few to many-flowered) var. *paniculata*

1b. Leaves mostly densely tomentose, finally glabrescent. Whole plant covered with a dense yellowish brown tomentum. Inflorescences cymes few to several-flowered. var. *tomentosa*

Identification key for the varieties of *Jacquemontia zollingeri*

- 1a. Stems, leaves and inflorescences pubescent to tomentose. Peduncles 2-15 mm long. Corolla pale lilac.....var. *zollingeri*
- 1b. Stems and leaves sparsely pilose to glabrescent; inflorescences densely tomentose. Peduncles 2-5 mm long. Corolla white..... var. *jonkeri*

1295 (L!); Tjamplong, 6.v.1965, *Kooy* 71 (L!); Taimanam, ca 426 m, v.1875, *Naumman* s.n. (BD, named var. *inaequalis*, Engl.); vi.1884, *Riedel* s.n. (K!); Kolbano, 30.iv.1929, *Walsh* 376 (BM!, L!); Soë, 880 m, i.1929, *Walsh* 117 (B); Kupang, v.1875, *Zeije* s.n. (BD). TIMOR: *Baudin* s.n. (P); *Guichenot* s.n. (P); *Guichenot* s.n. (P); *Guichenot* s.n. (P); *Riedlé* s.n. (P!); *Riedlé* s.n. (P!) s.c. s.n. (L!); s.c. 13 (L!); *Teysmann* s.n. (B); a duplicate specimen from P, without collector's name (BD, L); a specimen from Kupang, cultivated in the Botanic Garden at Buitenzorg, B.X.1.R. (B).

var. **tomentosa** (Warb.) Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 432 (1953).

Distribution: N. Australia and Queensland, in Malesia: Lesser Sunda Islands (Sumba, Timor), E. New Guinea, Philippines (Apo Island in Mindoro Strait) (van Ooststroom, 1953).

Habit and ecology: In grass-fields, on rocks; from sea-level to ca 1200 m (van Ooststroom, 1953).

Specimens: TIMOR: *Zippelius* 191A (L!); *Zippelius* 192 (L!)

2. *Jacquemontia zollingeri* Hallier f., Bot. Jahrb. Syst. 16: 543 (1893); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 433 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

var. **zollingeri**

Distribution: Malesia: E. Java (Mt. Baluran in Besuki), Lesser Sunda Islands (Bali, Sumbawa, Timor) (van Ooststroom, 1953).

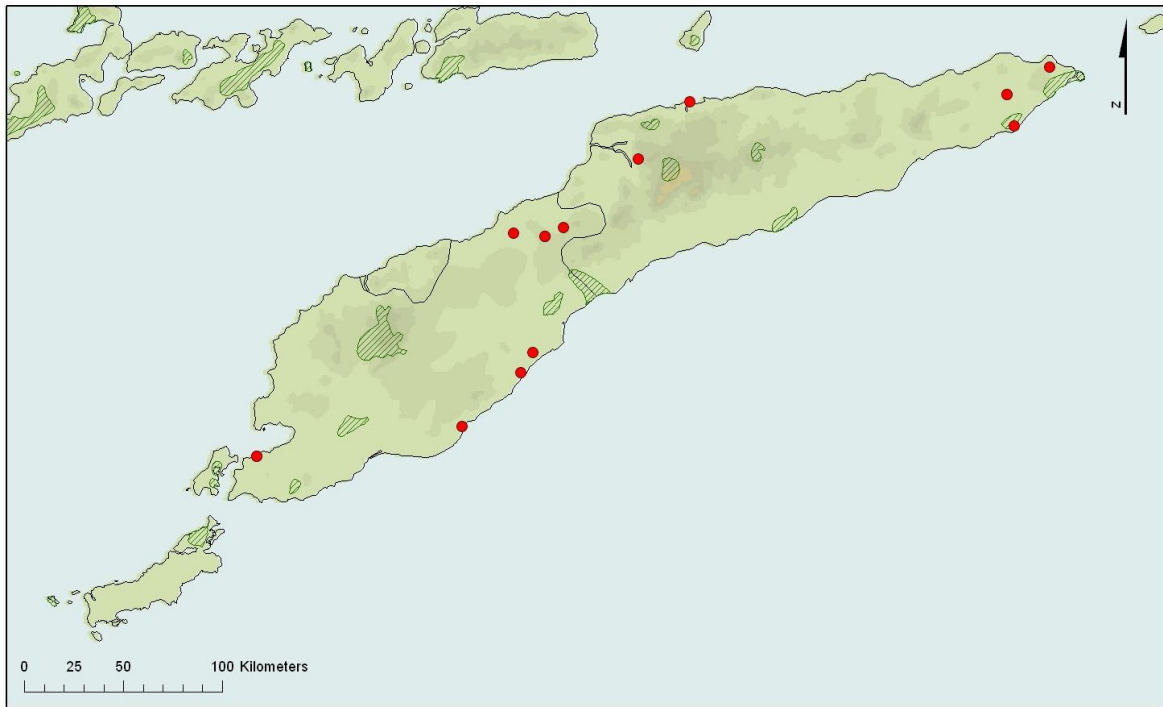
Habit and ecology: In thickets, from sea-level to ca 30 m (van Ooststroom, 1953).

Specimens: INDONESIA (West Timor): vi.1883, *Riedel* s.n. (K!). TIMOR: De Castro, s.n. (B); s.c. 14 (B).

var. **jonkeri** Ooststr., Blumea 3(3): 276 (1939); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 433 (1953) – Type: Timor, *Jonker* 285 (U).

Distribution: Malesia: Lesser Sunda Islands (Timor).

10.MERREMIA Dennst. ex Endl., Gen. Pl. 1: 1403 (1841), *nom. cons.*



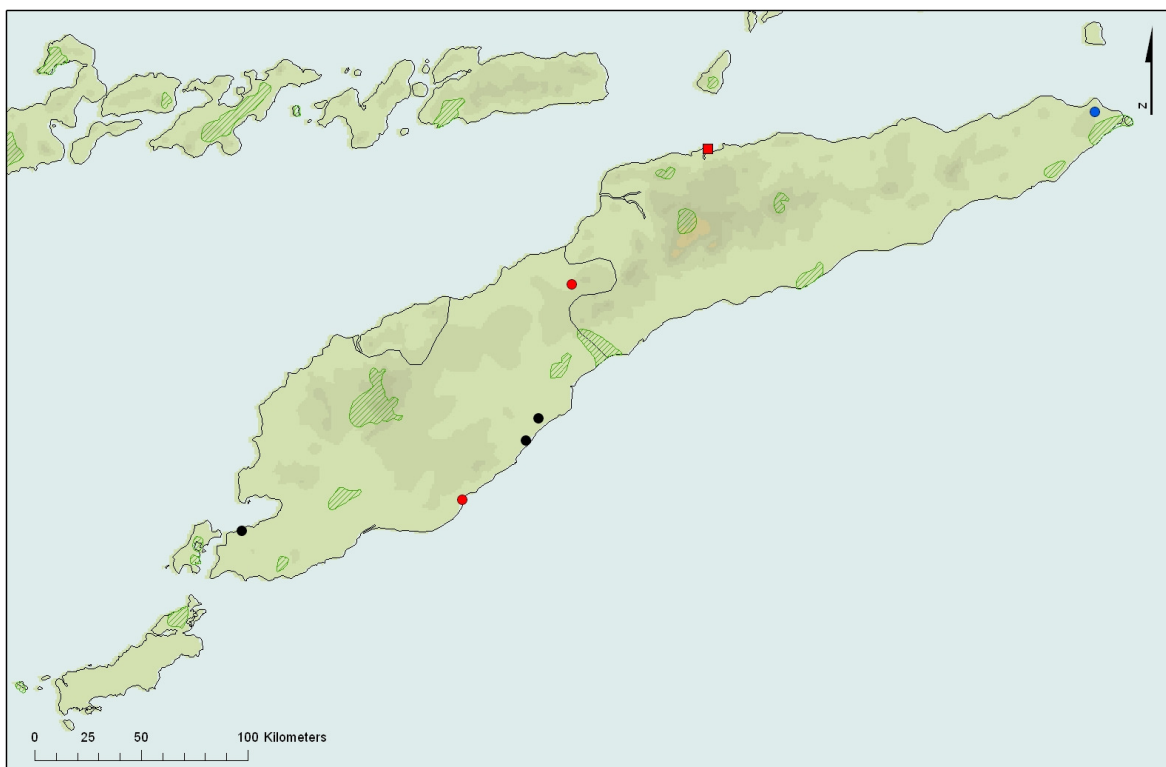
Legend:

● *Merremia* ▨ Protected Areas

Fig. 23. Distribution of genus *Merremia* in the island of Timor.

Identification key for the species of *Merremia*

- 1a. Leaves palmately compound, with 5 leaflets, or palmately 5-7 lobed. 2
- 1b. Leaves entire or crenate to shallowly or deeply 3-lobed 3
- 2a. Leaves with 5 leaflets, linear, lanceolate or narrowly oblong, entire. Sepals 7,5-13mm long, without glandular pellucid dot. Corolla white or pale pink.
5. *M. quinata*
- 2b. Leaves orbicular in outline, 5-7 broad triangular to lanceolate lobes. Sepals 12-20mm long, with glandular pellucid dots. Corolla bright yellow, with distinctly 5-nerved midpetaline bands..... 7. *M. vitifolia*
- 3a. Peduncles very short or nearly absent. Sepals all more or less hairy on the back and long ciliate at the margins 2. *M. emarginata*
- 3b. Peduncles longer, 1-10 cm long (rarely up to 16cm). Sepals glabrous or occasionally slightly pilose on the back and along the margins. 4
- 4a. Corolla with midpetaline bands pilose only at their top, 20-30 (-35)mm long. Stems terete or slightly striate. Seeds densely hairy with long soft patent hairs 6. *M. umbellata* subsp. *orientalis*
- 4b. Corolla entirely glabrous outside, up to 20mm long. Stems slender, smooth or minutely tuberculate..... 5
- 5a. Bracts persistent. Corolla white. Sepals unequal. 1. *M. dichotoma*
- 5b. Bracts caducous. Corolla yellow. Sepals slightly unequal..... 6
- 6a. Corolla up to 12mm long. Sepals with a mucro directed outwards.
4. *M. hederacea*
- 6b. Corolla 15-20mm long. Sepals not or slightly nmucronulate, in which case mucro not directed outwards. 3. *M. gemella*



Legend:

● *Merremia dichotoma* ● *Merremia emarginata* ● *Merremia gemella* ■ *Merremia hederacea* ▨ Protected Areas

Fig. 24. Distribution of *Merremia dichotoma*, *M. emarginata*, *M. gemella* and *M. hederacea* in the island of Timor.

1. *Merremia dichotoma* Ooststr. in Blumea, 3: 311 (1939); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 443 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955) – Type: Indonesia, Kolbano, 30.iv.1929, *Walsh 375* (BM!, isotype)

Distribution: Malesia: Lesser Sunda Islands (Timor) (van Ooststroom, 1953).

Habit and ecology: Climber. The specimens were collected one by the seaside and the other in a mountain site.

Vernacular name: *knâtan* (Timor: dialect unknown) (van Ooststroom, 1953).

Specimens: TIMOR: Sanbèt (?) Mountain, 21.iv.1971, *Kooy 794* (L!).

Notes: Kooy's specimen is doubtless a *Merremia dichotoma*, according to van Ooststroom's description of the taxon. However, Kooy's collection notes indicate that the corolla of the specimen is yellow. This does not match van Ooststroom's description of *Merremia dichotoma*, where he characterises the corolla as being white. 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 specimen. Here it is assumed that the true colour of the

corolla was most likely yellow, like in Kooy's collection.

2. *Merremia emarginata* Hallier f., Bot. Jahrb. Syst. 16: 552 (1893); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 444 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

Ipomoea reniformis Choisy, Mém. Soc. Phys. Genève 6: 446 (1833); Decne., Nouv. Ann. Mus. Hist. Nat.: 396 (1834); Span., Linnaea 15: 338 (1841); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885).

Distribution: Tropical Africa, tropical Asia, in Malesia: Java, SE. Borneo, Celebes (Donggala, Pasui), Lesser Sunda Islands (Timor, Sumbawa), and Philippines (Luzon) (van Ooststroom, 1953).

Habit and 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, 1953).

Uses: In the Philippines the leaves and tops in decoction are sometimes used as a diuretic and in Java for coughs (van Ooststroom, 1953).

Vernacular name: *naof luken* (Dawan).

Specimens: INDONESIA (West Timor): Kupang, iv.1803, *Brown* s.n. (BM!); Noekiu(?), 1972, *Kooy*, 738; Wêoë(?), 18.vi.1981, *Kooy*, 1320 (L!). TIMOR: *Brown* s.n. (BM!); *Riedlé* s.n. (P!); s.c. 11 (L!); s.c. s.n. (L!); s.c. s.n. (P!); s.c. s.n. (P); *Zippelius* s.n. (?) (L!); *Zippelius* s.n. (L!); *Zippelius* s.n. (L!); *Zippelius* 196 (L!).

3. *Merremia gemella* Hallier f., Bot. Jahrb. Syst. 16: 552 (1893); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 441 (1953).

Distribution: SE. Asia to tropical Australia, throughout Malesia.

Habit and 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, 1953). The specimen from East Timor was collected at 400 m.

Specimens: EAST TIMOR. Mehara, 400 m, 18.xii.1953, *van Steenis* 18107 (BM!, L!).

Notes: Only one collection is known from Timor.

4. *Merremia hederacea* Hallier f., Bot. Jahrb. 18: 118 (1894); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 441-442 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955).

Ipomoea chryseides Ker.-Gawl., Bot. Reg. t.270 (1818); Decne., Nouv. Ann. Mus. Hist. Nat.: 392 (1834); Span., Linnaea 15: 339 (1841); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885).

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, 1953).

Habit and ecology: In thickets, in open grasslands, and on sand-banks, from sea-level to 50 m (van Ooststroom, 1953).

Uses: Used for treating acute tonsillitis (Fang and 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, 1953).

Vernacular name: *ai-talic* (Tetum).

Specimens: EAST TIMOR: Bedik, 24.viii.1962, *Cinatti* 273 (L!, LISC); *loc. cit.*, 26.viii.1962, *Cinatti* 332 (L!, LISC). TIMOR: s.c. s.n. (L!); s.c. s.n. (L!); s.c. s.n. (P).

5. *Merremia quinata* (R. Br.) Ooststr., in Steenis, *Fl. Malesiana*, Ser. I, *Spermat.* 4(4): 447 (1953).

Ipomoea quinata R. Br., *Prodr. Fl. Nov. Holl.* 486 (1810).

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

Habit and ecology: In open mountain slopes (Fang and Staples, 1995).

Specimens: INDONESIA (West Timor): Eno-ana, 600 m, 1973, *Kooy* 295 (L!); Oekiu, 9.iii.1974, *Kooy* 896 (L!)

6. *Merremia umbellata* (L.) Hallier *f.*, *Bot. Jahrb. Syst.* 16: 552 (1893); Kalkman, *Acta Bot. Neerl.*: 216 (1955).

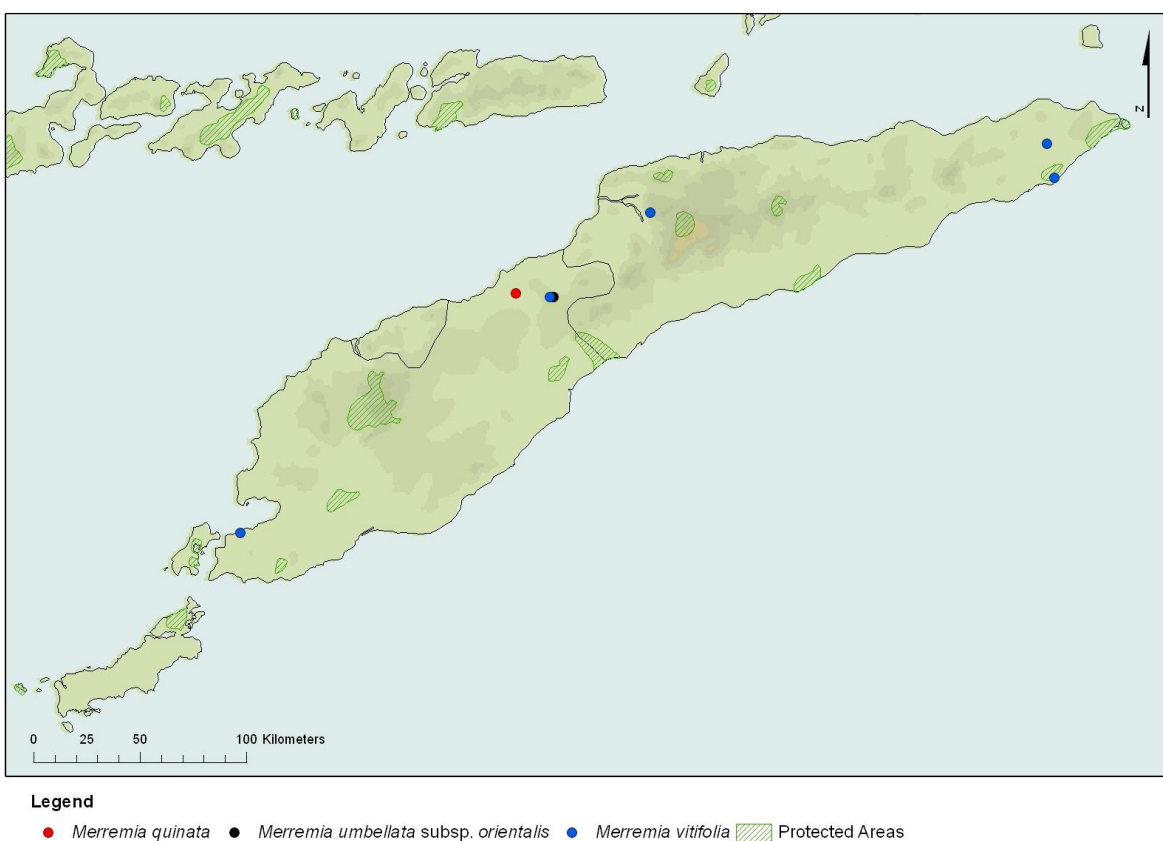


Fig. 25. Distribution of *Merremia quinata*, *M. umbellata* subsp. *orientalis* and *M. vitifolia* in the island of Timor.

Convolvulus umbellatus L., Sp. Pl. 1: 155 (1753) - *Ipomoea cymosa* Roem. & Schult. Syst. Veg. 6: 241 (1820); Decne., Nouv. Ann. Mus. Hist. Nat.: 392 (1834); Span., Linnaea 15: 339 (1841); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885).

subsp. **orientalis** (Hallier f.) Ooststr., Fl. Males., Ser. I, Spermat. 4(4): 449 (1953).

Merremia umbellata var. *orientalis* Hallier f., Verslag Staat 's Lands Plantentuin Buitenzorg: 132 (1895).

Distribution: Tropical East Africa, Seychelles, Sri Lanka, India, Nepal, China, ?Bangladesh, Myanmar, Cambodia, Laos, Vietnam, Malaysia, Indonesia, New Guinea, Philippines and N. Australia; (Fang and Staples, 1995; van Ooststroom, 1953;).

Habit and ecology: In thickets, along edges of forests, in grasslands, along fields, along waysides, from sea-level to ca 1100 m (van Ooststroom, 1953).

Uses: Used in China (Guangxi) for treating infections (Fang and 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, 1953)

Specimens: INDONESIA (West Timor): Nenuk, 200m, 25.vii.1973, Kooy 982 (L!); s.c. s.n. (L!); s.c. 199 (L!). TIMOR: s.c. s.n. (L!); *Zippelius* 199 (L!); s.c. s.n. (P).

Notes: The specimens studied by van Ooststroom for Flora Malesiana (1953) all belonged to subsp. *orientalis*, exception made to a specimen from West Java. As to subsp. *umbellata*, it is known to occur in America from Mexico to Paraguay, in the

West Indies and in tropical W. Africa (Fang and Staples, 1995; van Ooststroom, 1953). Decaisne (1835), Spanoghe (1841), Fawcett (Forbes, 1885) and Kalkman (1955) reported *M. umbellata* (L.) Hallier f. to Timor, but it is likely that they referred to *M. umbellata* subsp. *orientalis* Ooststr., given the distribution of the subspecies. However, this could not be confirmed.

7. Merremia vitifolia (Burm. f.) Hallier f., Bot. Jahrb. Syst. 16: 552 (1893); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 448 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955);

Convolvulus vitifolius Burm. f., Fl. Indica 45-46, pl. 18, f. 1. (1768) - *Ipomoea vitifolia* (Burm. f.) Blume, Bijdr. Fl. Ned. Ind. 13: 709 (1825); Decne., Nouv. Ann. Mus. Hist. Nat.: 391 (1834); Span., Linnaea 15: 339 (1841); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885).

Distribution: India, Sri Lanka, Nepal, Myanmar, Thailand, Laos, Vietnam, Indonesia, Malaysia; throughout Malesia (Fang and Staples 1995; van Ooststroom, 1953).

Habit and 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 ca 900 m (van Ooststroom, 1953). Not very frequent in Timor.

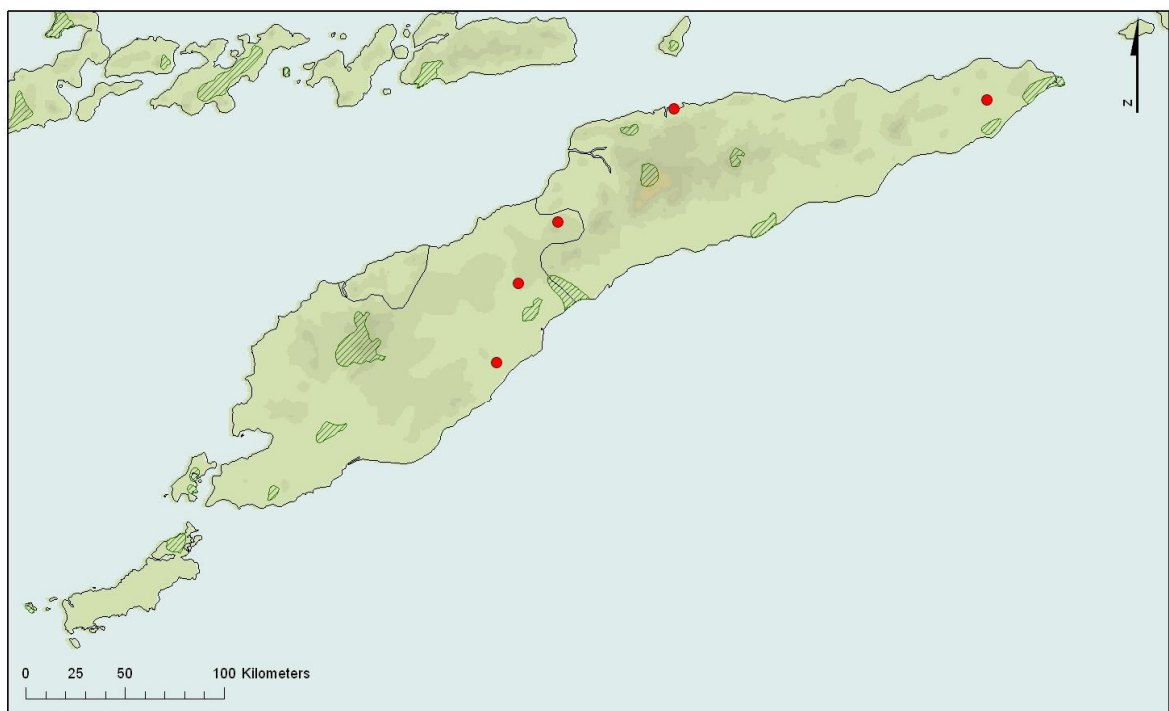
Uses: Used for treating bladder infections, stomach aches (Fang and Staples, 1995), for poulticing and for treating high fever, for which an infusion of the plant is drunk (Burkill in van Ooststroom, 1953).

Vernacular names: *tcha-tchumaco* (Timor: unknown dialect).

Specimens: EAST TIMOR: Loré, 30.ix.1962, *Cinatti* 295 (L!, LISC!); Lospalos, 11.x.1961, *Verdial* 74 (LISC!); Hatolia, ca 731 m, *Walsh* 478 (BM!). INDONESIA (West Timor): Kupang, 1841, *Jacquinot* s.n. (P!); *loc. cit.*, *Jacquinot* s.n. (P!); *loc. cit.*, 1841, *Le Guillou* s.n. (P!); *loc. cit.*,

2.xi.1960, *Sauveur* 121 (L!); Nenuk, 200m, 9.vi.1967, *Kooy* 277 (L!); *loc. cit.*, 200m, 25.vii.1973, *Kooy* 981 (L!); vi.1884, *Riedel* s.n. (K!). TIMOR: *Guichenot* s.n. (P); *Riedlé* s.n. (P); *Spanoghe* 91 (L!); *Spanoghe* s.n. (L!); s.c. s.n. (L!); s.c. s.n. (P).

11. OPERCULINA Silva Manso, Enum. Subst. Bras. 16: 49 (1836)



Legend:
 ● *Operculina turpethum* ▨ Protected Areas

Fig. 26. Distribution of *Operculina turpethum* in the island of Timor.

Identification key for the species of *Operculina*

- 1a. Stems terete. Corolla with midpetaline bands densely sericeous-pilose outside; pale yellow or rarely white. Seeds with 2 pillose-papillose edges. Leaves often reddish brown when dry. 1. *O. riedeliana*
- 1b. Stems narrowly 3-5 winged, sulcate or angular. Corolla glabrous or with minute yellowish glands outside; white or white with yellowish base. Seeds glabrous. 2. *O. turpethum*

1. Operculina riedeliana (Oliv.) Ooststr., *Blumea* 3: 366 (1939); Ooststr. in Steenis, *Fl. Males.*, Ser. 1, *Spermat.* 4(4): 457 (1953); Kalkman, *Acta Bot. Neerl.*: (1955).

Ipomoea riedeliana Oliv., in Hook., *Icones III*, 5: t. 1424, 1883.

Distribution: Andaman Islands, extreme southern Thailand, throughout Malesia and New Guinea (Staples, 2007).

Habit and ecology: In thickets, edges of secondary forests and hedges; at low altitudes (van Ooststroom, 1953).

Specimens: TIMOR: *Leschenault de la Tour* s.n. (P!); s.c. 208 (L!); *Zippelius?* 45/46 (L, named *Convolvulus platypetalus* Zipp.)

2. Operculina turpethum (L.) Silva Manso, *Enum. Subst. Bras.* 16: 49 (1836); Ooststr. in Steenis, *Fl. Males.*, Ser. 1, *Spermat.* 4(4): 456 (1953); Kalkman, *Acta Bot. Neerl.*: 216 (1955).

Convolvulus turpethum L., *Sp. Pl.* 1: 155 (1753) - *Ipomoea turpethum* R. Br., *Prodr.*: 485 (1810); Decne., *Nouv. Ann. Mus. Hist. Nat.*: 390 (1834) ; Span., *Linnaea* 15: 338 (1841).

Distribution: Tropical E. Africa, Mascarenes, Seychelles; S. and SE. Asia to tropical Australia and Polynesia; throughout Malesia (van Ooststroom, 1953). Introduced and naturalized in the West Indies (Staples and Austin in Staples, 2007).

Habit and 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 ca 1300 m (van Ooststroom, 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, 1982). Also, the stems are used for tying purposes, in the Philippines (van Ooststroom, 1953).

Vernacular name: *lak-laku* (Dawan); *non-loli*. (Timor: unknown dialect); *tali anduk* (Tetum).

Specimens: EAST TIMOR: Benamauc, 19.iv.1962, *Cinatti* 165 (L!, LISC!), [cf] Lospalos, ca 400 m, 9.vii.1962, *Verdial* 21 (LISC!). INDONESIA (West Timor): Lahurus, 700 m, 14.ix.1968, *Kooy* 481 (L!); Mota Maro, 300 m, 26.iv.1965, *Kooy* 110 (L!); *loc. cit.*, 300 m, 5.vii.1965, *Kooy* 260 (L!); Oetuba, 500 m, 5.vii.1965, *Kooy* 263 (L!); vi.1883, *Riedel* s.n. (K!); ?Kaslios, ca 1.234 m, 25.v.1929, *Walsh* 414 (BM!). TIMOR: s.c. 84 (L!); s.c. s.n. (L!); *Riedlé* s.n. (P!); *Riedlé* s.n. (P!); *Riedlé* s.n. (P!).

12. POLYMERIA R. Br., Prod.: 488 (1810)

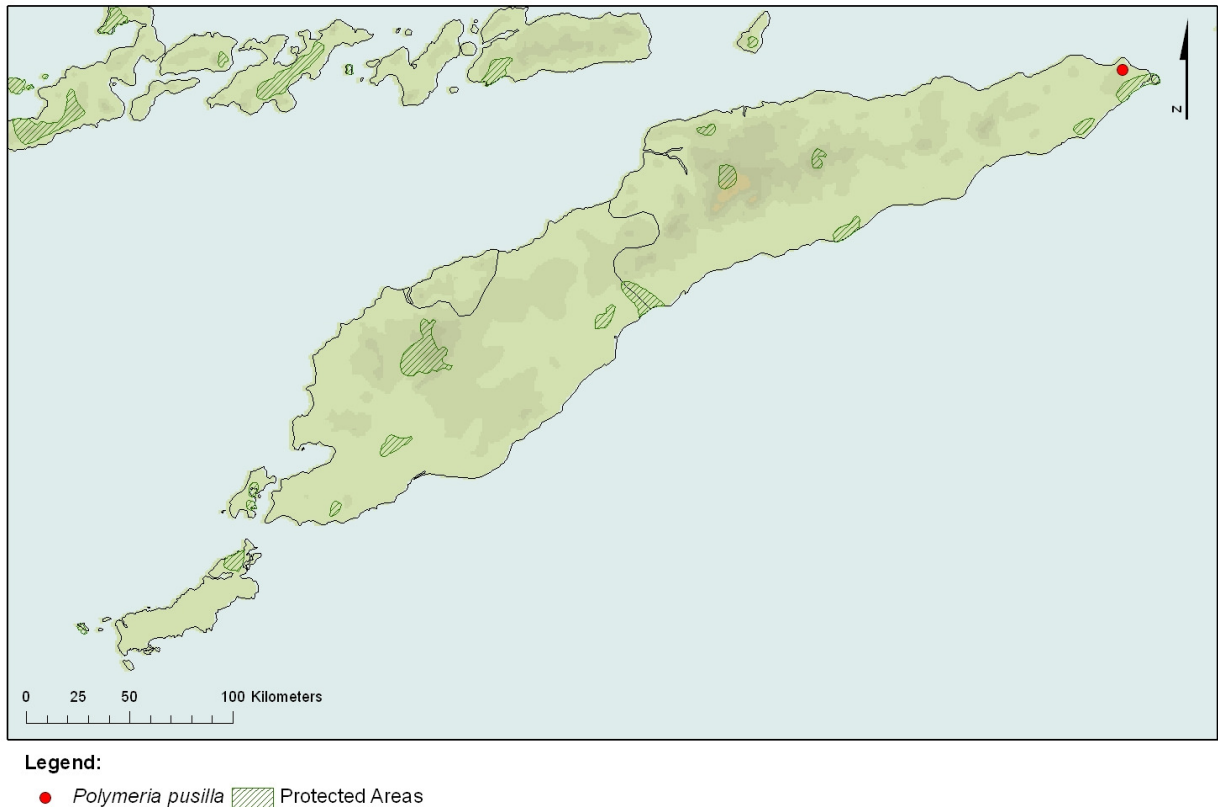


Fig. 27. Distribution of *Polymeria pusilla* in the island of Timor.

1. *Polymeria pusilla* R. Br., Prodr.: 488 (1810); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 5: 559 (1958).

Distribution: Australia (Queensland), New Caledonia; in Malesia: Timor (van Ooststroom, 1958).

Habit and ecology: Creeping together with *Goodenia koningsbergeri* (Backer) Backer ex Bold. between tufts of *Schoenus*

falcatus R. Br., *Themeda australis* (R. Br.) Stapf, *Fimbristylis marianna* Gaud., and specimens of *Pimelea* sp., *Alysicarpus bupleurifolius* DC., *Eriosema chinense* Vogel. In Timor, in pyrogenous grassland on the Fuiloro plateau, at 400 m. (van Ooststroom, 1958).

Specimens: EAST TIMOR: Mehara, 400 m, 18.xii.1953, van Steenis 18124 (L!).

13. PORANA Burm. f., Fl. Ind.: 51, t.21, f.1 (1768)

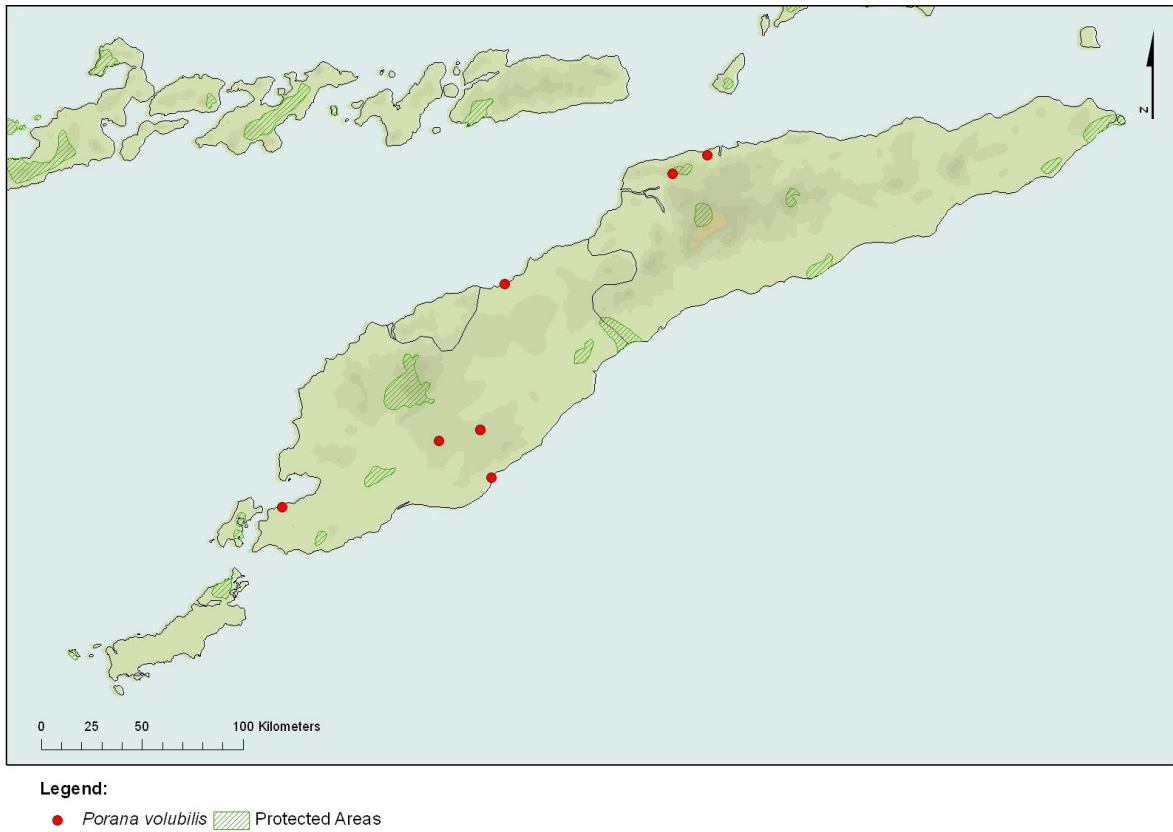


Fig. 28. Distribution of *Porana volubilis* in the island of Timor.

1. *Porana volubilis* Burm. f., Fl. Ind. 51, t.21, f. 1(1768); Decne., Nouv. Ann. Mus. Hist. Nat. 3: 333- 501 (1834); Span., Linnaea 15: 341 (1841); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 402 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955) - Types: *Zippelius* 91 (L!, lectotype); s.c. 201 (L!, syntype).

Porana volubilis Burm. f. var. *burmanniana* Blume, Bijdr. Fl. Ned. Ind.: 723 (1825).

Distribution: Probably native in Thailand, Laos, Cambodia, Vietnam,

Malaysia, Indonesia, (Staples, 2006; van Ooststroom, 1953); seemingly introduced and naturalized in southern India, Myanmar, and the Philippines (Staples, 2006). Also in East Timor.

Habit and ecology: Thickets, edges of forests, teak forests, from sea level to ca 200 m, sometimes higher. In Timor, up to 750 m (van Ooststroom, 1953).

Vernacular name: *cidani* (Tetum); *nuit* (or *nüif*) (Timor: unknown dialect).

Uses: A decoction of the plant is used in stimulating the afterbirth (van Oostroom, 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 Oostroom, 1953); the flowers are appreciated for their delicate fragrance (Staples, 2006).

Specimens: EAST TIMOR: Liquiçá, *Francisco Newton* s.n. (K!); Turleu, 16.v.1962, *Cinatti* 194 (L!, LISC). INDONESIA (West Timor): Kupang, iv.1803, *Brown* s.n. (BM!); *loc.cit.*,

1841, *Le Guillou* s.n. (P!); *loc. cit.*, *Teysmann* 441 (L!); Nikiniki, ca 685 m, 10.v.1929, *Walsh* 303 (BM!); *loc. cit.*, 17.vi.1981, *Kooy* 1318; *loc. cit.*, 29.v.1982, *Kooy* 1337 (L!); Kolbano, 30.iv.1929, *Walsh* 441 (BM!); Kampung, 13.vii.1968, *Schmutz* 2365 (L!); Benlutu, 14.iii.1974, *Kooy* 884 (L!). TIMOR: *E.Cosson* s.n. (K!, P); *Guichenot* s.n. (P); ?Fallas, 750m, 27.ii.1970, *Kooy* 734 (L!); *Osório de Castro* s.n. (LISU!); *Osório de Castro* s.n. (LISU!); *Riedlé* s.n. (P); *Riedlé* s.n. (P); iv.1821, s.c. 1313 (L!); s.c. s.n. (P!); s.c. s.n. (L!, P); s.c. s.n. (P); s.c. sn. (P); *Zippelius* s.n.(L!).

14. STICTOCARDIA Hallier f., Bot. Jahrb. Syst 18: 159 (1894)

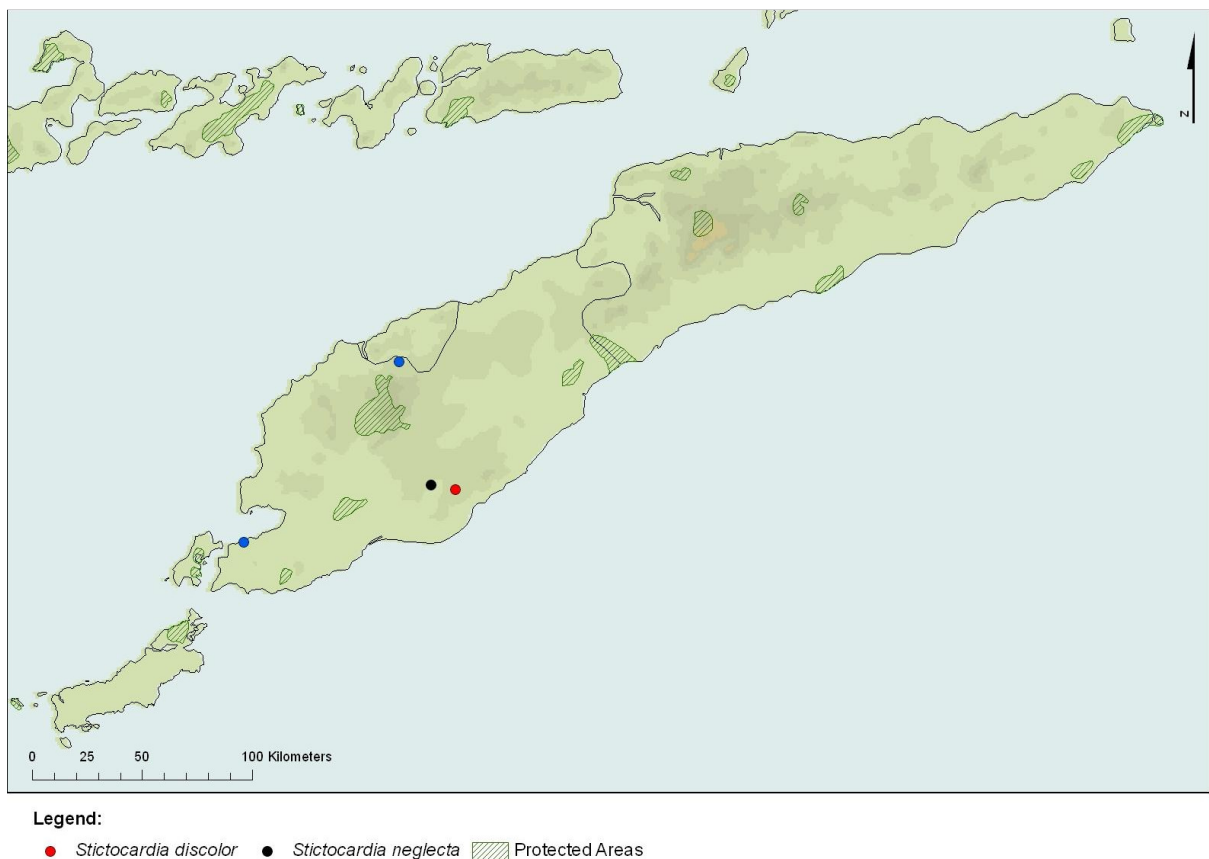


Fig. 29 Distribution of *Stictocardia discolor*, *S. neglecta* and *S. tiliifolia* in the island of Timor.

Identification key for the species of *Stictocardia*

- 1a. Large woody twiner. Sepals in anthesis 12 mm or mostly longer. Corolla 8-10 cm long. Leaves up to 20 cm wide.3. *S. tiliifolia*
- 1b. Stems thin, or not so large. Sepals in anthesis less than 12mm long. Corolla smaller than 8 cm long. Leaves up to 7,5 cm wide.2
- 2a. 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..... 1. *S. discolor*
- 2b. Stems leaves and inflorescences densely pubescent to tomentose. Leaves attenuate to slightly acuminate towards the apex. Sepals not ciliate.
2. *S. neglecta*

1. *Stictocardia discolor* Ooststr., Blumea 5: 350 (1943); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 493 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955) – Type: Timor, Reinwardt 1350 (L!).

Distribution: Malesia: Lesser Sunda Islands (Timor) (van Ooststroom, 1953).

Habit and ecology: A specimen was found in the shade.

Vernacular name: *lak-laku mè* (Dawan).

Specimens: INDONESIA (West Timor): Bone, 750 m, 7.v.1967, Kooy 292 (L!). TIMOR: Reinw. s.n. (L!); s.c. 296 (L!).

2. *Stictocardia neglecta* Ooststr. in Blumea 5: 348 (1943); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 491 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955) – Types: Indonesia (West Timor), Ofu, ca 305 (900?) m, 2.v.1929, Walsh 373 (BM!, B, *typus*

florum); Indonesia (West Timor), Kupang, Teysmann s.n. (B, *typus fructuum*).

Distribution: Malesia: SW. Celebes, Lesser Sunda Islands (Timor, Wetar) (van Ooststroom, 1953).

Habit and ecology: Creeper. In thickets up to ca 900 m (van Ooststroom, 1953). According to M. E. Walsh, there are many plants and everywhere in Timor.

Vernacular name: *lololi; non laku; non loli* (Timor: unknown dialect); *sekal zon* (Bunaq).

Specimens: EAST TIMOR: Oeolo; 700 m, 30.vi.1968, Schmutz 2294 (L!). INDONESIA (West Timor): Lamaknen, ?600 m, 16.v.1966, Friedberg 144[0?] (L!); Ofu, ca 540 , v.1929, Walsh 107 (BD). TIMOR: Jonker 290 (U); Teysmann s.n. (B); Zippelius 198 (L!).

3. *Stictocardia tiliifolia* (Desr.) Hallier f., Bot. Jahrb. Syst. 18: 159

(1893) ('*tiliaefolia*'); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 491 (1953).

Convolvulus tiliifolius Desr., Encycl. (Lamarck) 3 (2): 544 (1792) - *Ipomoea grandiflora* (L. f.) Lam., Tabl. Encycl. 1: 467 (1791); Fawc. in H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885) - *Ipomoea pulchra* Blume, Bijdr. Fl. Ned. Ind. 13: 716 (1826); Span., Linnaea 15 340 (1841).

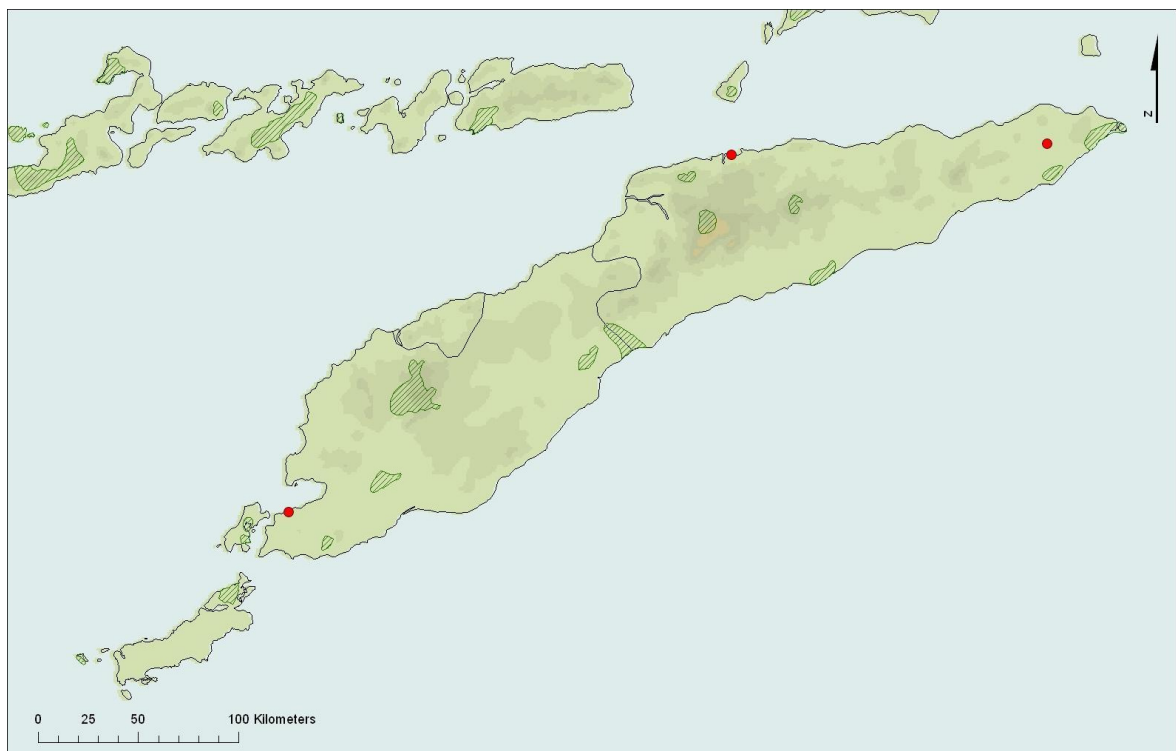
Distribution: Circumtropical, throughout Malesia (van Oostroom, 1953).

Habit and ecology: On and behind seashore, sometimes also in the interior; in thickets, hedges and secondary forests; up to ca 900 m (van Oostroom, 1953).

Vernacular name: *faif foro* (Timor: unknown dialect).

Specimens: INDONESIA (West Timor): Kupang, 1841, *Hombron* s.n. (P!); Ken Kou, 100-200 m, 23.viii.1980, *Kooy* 1395 (L!); Kumlol (?), viii.1962, *Sauveur* 117 (L!).

15. XENOSTEGIA D.F. Austin & Staples, Brittonia 32: 533 (1980)



Legend:

● *Xenostegia tridentata* ▨ Protected Areas

Fig. 30. Distribution of *Xenostegia tridentata* in the island of Timor.

Notes: In Flora Malesiana's earliest publication of Convolvulaceae (1953), van Ooststroom proposed three subspecies for the species *Merremia tridentata* (L.) Hallier f.: *M. tridentata* subsp. *tridentata*, *M. tridentata* subsp. *angustifolia* (Jacq.) Ooststr. and *M. tridentata* subsp. *hastata* Ooststr. He separated subsp. *tridentata* and subsp. *hastata* based on the shape of the leaves and sepals: in the former, leaves and outer sepals have obtuse to emarginate apices, whereas in the latter all sepals and leaves have attenuate-acuminate apices; he does not give a description of subsp. *angustifolia* but according to the basynonym's diagnose by Jacquin, this *taxon* should be intermediate to the previous two, having obtuse to mucronulate leaf apices, and acuminate sepals. These characteristics are not very obvious, as they seem to intergrade into each other, difficulting the separation of the three subspecies. To make things worse, there does not seem to be a consensus between authors in the recognition of such division in subspecies. In an attempt to solve conflicts regarding this species, Austin and Staples (1980), have published a new genus – *Xenostegia* – to which *M. tridentata* was transferred, but they showed reluctance in transferring the subspecies, at least “until more data have been obtained”. Nevertheless, some authors still have preferred to continue using *M. tridentata* and its subspecies (Gonçalves, 1987), while others stepped ahead and transferred themselves the subspecies into *X. tridentata*, without clarifying their delimitation (Meeuse, 1996; Parmar, 1994). Because of the apparent intergradation between distinctive characteristics, it is likely that the separation in the various subspecies and variations would not have taxonomic relevance, but this would only be more surely concluded after a more thorough study based on pollen morphology analysis and anatomical characters, for a more accurate comparison.

Given the lack of conditions for pursuing such study, as it would mean comparing many specimens from the whole distribution spectrum of the species, a more conservative approach has been taken: no subspecies have been recognized in this work, until more elaborate studies have been conducted on this matter. However, it is to be noted that the studied specimens from Timor all seem to fit better the description of *Merremia tridentata* subsp. *hastata*, which also agrees with van Ooststroom's notes on the distribution of the subspecies. As to the other subspecies, the author does not report subsp. *tridentata* to Timor, and no distribution notes are indicated for subsp. *angustifolia*. Still, it should also be noted that synonymous names of subsp. *angustifolia* (*Ipomoea angustifolia* Jacq., *Ipomoea filicaulis* Blume) have been reported to Timor by different authors (Decaisne, 1834; Fawcett, 1885; Spanoghe, 1841). Since it is not clear whether the subspecies should be accepted or not, some of the synonyms are preceded by a question mark.

15. *Xenostegia tridentata* (L.) D.F. Austin & Staples, Brittonia 32: 533 (1980).

Convolvulus tridentatus L., Sp. Pl.: 157 (1753) - ?*Ipomoea angustifolia* Jacq., Coll. 2: 367 (1788); Fawc., H.O. Forbes, Natur. Wand. East. Archip.: 511 (1885) - ?*Ipomoea filicaulis* Blume, Bjd. Fl. Ned. Ind. 13: 721 (1826); Decne., Nouv. Ann. Mus. Hist. Nat.: 390 (1834); Span., Linnaea 15: 338 (1841) - *Merremia tridentata* (L.) Hallier f., Bot. Jahrb. Syst. 16: 552 (1893); Ooststr. in Steenis, Fl. Males., Ser. 1, Spermat. 4(4): 445 (1953); Kalkman, Acta Bot. Neerl.: 216 (1955) - ?*Merremia tridentata* (L.) Hallier f. subsp. *angustifolia* Ooststr., Blumea 3: 323 (1939) - ?*Merremia tridentata* (L.) Hallier f. subsp. *hastata* (Desr.) Ooststr., Blumea 3: 317 (1939).

Distribution: ?Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, New Guinea, Philippines, Singapore, Sri Lanka, Thailand, Vietnam; Africa, N. Australia (Fang and Staples, 1995). Also in East Timor.

Habit and ecology: Winding in grass; in sandy places near the coast (van Ooststroom, 1953).

Specimens: EAST TIMOR: Saluki, ca 1.036 m, iv.1883, *Forbes* 3754, (BM!). Dili, 300m, 28.iv.1938, *O'Jaag* 89 (L!); Fuiloro, 350 m, 21.xii.1953, *van Steenis* 18216 (BM!, L!). INDONESIA (West Timor): Kupang, iv.1803, *Brown* s.n. (BM!). TIMOR:

Gaudichaud s.n. (BD); *Guichenot* s.n. (P); *Guichenot* s.n. (P); *Reinwardt* 1300 (L); *Riedlé* s.n. (P); *Roti*, *Spanoghe* s.n. (L); s.c. s.n. (P!).

Uses: The leaf (of *Merremia tridentata* subsp. *hastata*) is made into poultice and applied to the head in cases of jungle-fever, in Peninsula of Malaysia (van Oostroom, 1953).

4.2. Distribution

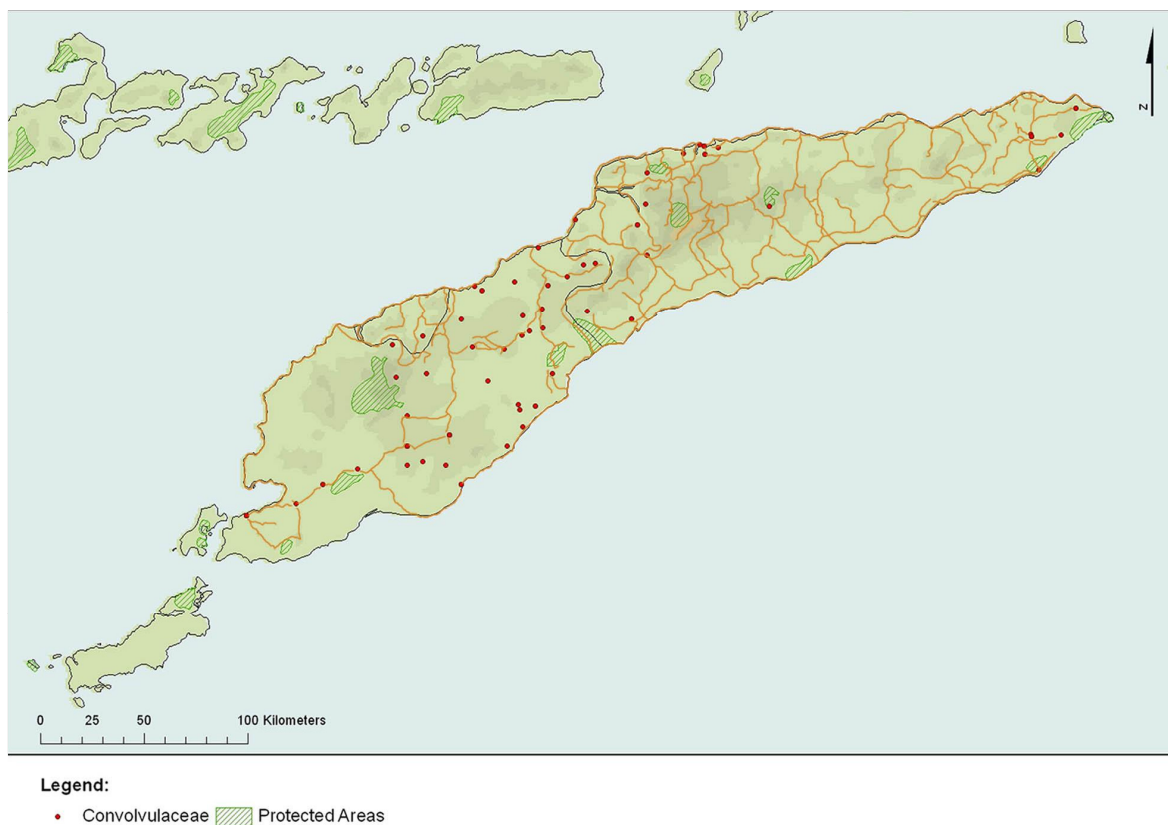


Fig. 31. Distribution of Convolvulaceae in the island of Timor.

Analysing the distribution of Convolvulaceae in Timor, the first thing that becomes clear is how there seem to be more collection events in the Western part of the island than on the Eastern part (see Anex IV). This should mostly be due to a greater collection effort that has been made in the Indonesian part of the island, although this is not easy to prove. More collections should be made in the island, especially in the Eastern part, to allow a better comprehension of the real distribution of the family throughout the territory.

Note that a relevant part of the collections has been made on the coast, often on seashore. This relates to the fact that the seeds of a certain number of species of Convolvulaceae are widely dispersed by seawater, so they are very likely to be found along the coast or immediately behind it (van Oostroom, 1953).

Comparing the collection events with the distribution of the main roads in the island, it is evident that many collections have been made along the roads. This could be explained by collecting conditions or by the family's distribution itself. On one hand, the rather difficult terrain conditions in Timor might have restrained the collectors from going deeper into the vegetation, and limited them to collecting only along the waysides. On the other hand, several species of Convolvulaceae seem to have a certain preference for open, somewhat disturbed areas, and they are expected to occur along waysides and roads. The available data do not allow a definite conclusion on which factor explains this tendency better. More collections in the interior, less accessible areas could elucidate on whether or not Convolvulaceae can actually abundantly be found far from the roadsides. Also, a comparison with the distribution of several families in the territory could clarify if this tendency occurs in Convolvulaceae only, for ecological reasons, or if other families would also show this characteristic, in which case the phenomena would mostly be explained by biased collections.

In what concerns world wide distribution, the great part of the species of Convolvulaceae is distributed in the tropics and subtropics of Americas and Asia. A few species occurring in Timor are known to be circumtropical: *Cuscuta campestris*, *Ipomoea alba*, *I. aquatica*, *I. batatas*, *I. hederifolia*, *I. nil*, *I. pes-caprae*, *I. quamoclit*, *I. triloba* and *Stictocardia tiliifolia*. However, 6 taxa are, to the best of our knowledge, restricted to the island: *Argyreia reinwardtiana*, *A. walshae*, *A. sp. A*, *Erycibe timorensis*, *Merremia dichotoma* and *Stictocardia discolor*. *Jacquemontia zollingeri* var. *jonkeri* is, apparently, also restricted to Timor but the taxonomic relevance of this variety is, to certain extent, debatable, so it is not clear that it should be a case of endemism. Another important remark is that no taxa of Convolvulaceae were found to exist in East Timor only.

A bibliographic reference (Monk *et al.*, 1997) lists *Ipomoea ochroleuca* (alias, *I. ochracea*) as an endemism from Timor. However, van Ooststroom (1953) refers a much wider distribution for this species: Tropical Africa, Lesser Sunda Islands (Timor, Alor), North Borneo and New Caledonia. Because no evidence has been found that *Ipomoea ochracea* would be an endemic species of the island of Timor, it is assumed that this was a flaw in Monk's work.

In the present study, a new record is presented to Timor: *Cuscuta campestris* Yunck. Since this taxon has a wide distribution in the tropics, this should not have direct implications in conservation strategies for the territory or for the species themselves.

4.3. Habit and Ecology

Most members of Convolvulaceae are creepers, climbers or lianas in habit. *Cuscuta* show an uncommon feature in their habit, as they are parasites, living on trees or herbaceous plants. Specimens from this genus found in Timor lived on woody plants such as *Ficus glomerata*, as well as on herbaceous plants such as *Medicago sativa*, *Trifolium* and *Satureja hortensis*.

In what concerns ecology, a great number of species of Convolvulaceae can be found in sites that are fully exposed to the sunlight. Contradicting this tendency

is *Cressa australis*, which was collected in the shade of a mangrove tree. However, in Timor, most collections have been made in open sites in forests, thickets, hedges, scrub, grasslands. Some *taxa* are also present in hillsides, roadsides, waste places, cultivated areas, fields and sunny meadows. Occasionally, they can be found in secondary forest, on periodically dry soil. A couple of specimens have also been collected between chalkrocks and on limestone.

Most of the species seem to prefer regions with dry seasons, whether feeble or very pronounced, and some of the species not only prefer these dry areas but they are also restricted to them. Opposite to this is *Ipomoea aquatica*, which can be found in moist, marshy or inundated localities, in shallow pools, ditches and wet rice-fields. Convolvulaceae are generally found, in Timor, at low and medium altitudes. No specimens were collected above 1300 m, although some have been collected in mountain sites.

4.4. Ethnobotanical data

The ethnobotanical value of plant species is closely related to the population's awareness of the resources that surround them. In the island of Timor, 21 *taxa* of Convolvulaceae are known to have medicinal use; 7 can be used as food; 4 are used for ornamental purposes and 3 have other various applications. This implies that the family plays an important role in the relationship between the people and their local botanical resources.




Although many species are cultivated, and some introduced from South America, they still bare conservation value, as they might hold people's interest in conserving other plant species and ecosystems. This can be a starting point to move the population into using their natural resources in a sustainable way and respecting protected areas and species.

The following chapter presents a list of uses of the Convolvulaceae that exist in Timor. Often, the listed uses do not refer to the current application by the Timorese people but, instead, they are based on general knowledge of the plant, or local data from other regions. This is because this list does not aim exclusively at characterising the uses in Timor but also at highlighting potential uses of the plants that occur in the island, especially in East Timor. Also note that all of the uses listed below have already been mentioned in the taxonomic treatment so, for reading simplicity, references were excluded.

Amongst the interesting variation of applications of Convolvulaceae, emphasis is to be given to *Argyreia* sp. A, which is most likely an endemic *taxon*, a possible new species and with medicinal use for treating gonorrhea. This can have special interest for the scientific community, but the fact that it has a vernacular name also suggests that it is familiar to the locals, so there is greater value in carrying out further studies on this *taxon*. All other species listed below have wider distribution ranges. Nevertheless, a great part of these *taxa* has been reported to East Timor, which is quite relevant in terms of the potential for exploitation of these resources by the local people.

Medicinal plants

Among the *taxa* with medicinal uses, two species which are known to be used medicinally are excluded from this list, since there was not enough information about their specific applications. These were *Ipomoea biflora* and *I. triloba*.

<i>Argyreia</i> sp. A <i>mau halé</i>	
	Bark <i>Medicinal use:</i> to treat gonorrhoea. <i>Application:</i> the bark is boiled and its boiling water is drunk.
Friedberg 257a (LISC)	
<i>Dinetus racemosus</i>	
	Whole plant <i>Medicinal use:</i> to treat “wind damage” and dyspepsia.
Forbes 4104 (L)	
<i>Evolvulus alsinoides</i> var. <i>alsinoides</i>	
 Foto: Ana João Sousa	Whole plant <i>Medicinal use:</i> used in Ayurvedic medicine as a remedy to a series of mental problems, such as epilepsy, insanity, nervous debility, and loss of memory; in Africa, used to treat low spirits and depression; in Malesia, it is only known to be used in the Philippines, for treating bowel problems.
Kooy 455 (L)	

Ipomoea aculeata* var. *mollissima
lak-laku; non hau kase (Dawan)



Leaves

Medicinal use: purgative.

Kooy 642 (L)

Ipomoea alba



Foto: Ana João Sousa

Whole plant

Medicinal use: to treat snakebite.

Forbes 3773 (BM)

Ipomoea aquatica

Whole plant

Medicinal use: used as a laxative, recommended for piles and said to have a nerve-calming effect, among other medicinal uses.


Ipomoea batatas




Stems

Medicinal use: young shoots are used for poulticing.

Friedberg 67 (LISC)

<i>Ipomoea cairica</i>	
	<p>Whole plant</p> <p><i>Medicinal use:</i> for treating external infections.</p> <p>Fatty Acids (lignans and lignins) extracted from this plant</p> <p><i>Medicinal use:</i> antiviral activity (namely anti-HIV).</p> <p><i>Application:</i> in certain concentrations, the lignans and lignins inhibit the action of the HIV reverse transcriptase.</p>
van Steenis 18125 (L)	

<i>Ipomoea mauritiana</i> <i>laluli</i>	
	<p>Root</p> <p><i>Medicinal use:</i> for treating swellings; it is said to be cathartic.</p> <p><i>Application:</i> it is pounded and applied.</p> <p>Leaves and roots</p> <p><i>Medicinal use:</i> for treating tuberculosis and external breast infections.</p> <p><i>Application:</i> used externally.</p>
Spanoghe s.n. (L)	

Ipomoea nil



Friedberg 412 (LISC)

Seeds

Medicinal use: purgative.

Ipomoea obscura



Verdial 14 (LISC)

Leaves

Medicinal use: against sores.

Application: together with leaves of *Argyreia mollis*.

Ipomoea pes-caprae* subsp. *brasiliensis

tai ilaça (Timor: unknown dialect)



Foto: Ana João Sousa

Walsh 364 (BM)

Seeds

Medicinal use: for treating stomach-ache and cramp.


Leaves


Medicinal use: for treating swellings, wounds, ulcers and such.


Application: the leaves are made into poultices, which are used to ripen boils and then applied.

Stems (the juice)


Medicinal use: against bites and stings of fishes.


<p><i>Merremia emarginata</i> <i>naof luken</i> (Dawan)</p>	
 <p>Foto: Ana Joao Sousa</p>	<p>Leaves</p> <p><i>Medicinal use:</i> sometimes used as a diuretic and for coughs.</p>
<p>Kooy 1320 (L)</p>	

<p><i>Merremia hederacea</i> <i>ai-talic</i> (Tetum)</p>	
	<p>Whole plant</p> <p><i>Medicinal use:</i> for treating acute tonsillitis.</p> <p>Leaves:</p> <p><i>Medicinal use:</i> applied upon chapped hands and feet.</p> <p><i>Application:</i> a poultice of the leaves, with tumeric and broken rice.</p>
<p>Cinatti 332 (LISC)</p>	

<p><i>Merremia umbellata</i> subsp. <i>orientalis</i></p>	
	<p>Whole plant</p> <p><i>Medicinal use:</i> for treating infections.</p>
<p>Kooy 982 (L)</p>	

<p><i>Merremia vitifolia</i> <i>tcha-tchumaco</i> (Timor: unknown dialect)</p>	
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	<p>Whole plant</p> <p><i>Medicinal use:</i> for treating bladder infection, stomach ache and high fever.</p> <p><i>Application:</i> <i>poulticing</i>; an infusion is drunk for treating high fever.</p>
<p>Cinatti 295 (LISC)</p>	

<p><i>Operculina turpethum</i> <i>lak-laku</i> (Dawan); <i>tali anduk</i> (Tetum); <i>non-loli</i>. (Timor: unknown dialect).</p>	
	<p>Bark of the roots</p> <p>This plant produces two types of roots: white roots that are mild, and black roots that give drastic, often poisonous effects.</p> <p><i>Medicinal use:</i> purgative; laxative (intestinal worms of various kinds can be expelled by this effect); to reduce or balance humours; to reduce fevers.</p> <p><i>Compounds, extraction and dosage:</i> The active principles are apparently concentrated in the bark: turpethin, alpha-turpethin and beta-turpethin; they are extracted by water and alcohol; the dosage is free from nauseous taste and smell, although it may be pungent.</p>
<p>Cinatti 165 (LISC)</p>	

Porana volubilis

cidani (Tetum); *nuit* (or *nüif*) (Timor: unknown dialect).



Whole plant:

Medicinal use: used in stimulating the afterbirth.

Application: decoction of the plant.

Cinatti 194 (LISC)

***Xenostegia tridentata* (subsp. *hastata*)**



Foto: Ana João Sousa

Leaves

Medicinal use: for treating jungle-fever.

Application: the leaves are made into poultices and applied on the head.

van Steenis 18126 (L)

Edible plants

In Timor, we find 7 species of edible plants, of Convolvulaceae. Not all are included in the local people's diet, but some are known to be eaten or cultivated for food in other regions. Cases are where the plant is given to the animals, to feed them.

Dinetus racemosus



Leaves

In Laos the young leaves are eaten with pepper, and they are edible both in fresh and dry state.

Forbes 4104 (L)

Ipomoea alba



Foto: Ana João Sousa

Leaves

The young leaves are eaten as a vegetable; the dried flowers are used in pies and in *kimlo* (Chinese vegetable soup).

Forbes 3773 (BM)

Ipomoea aquatica

canco (Tetum), *kangkung* (Indonesian)

The plant is boiled and eaten with other vegetables. It is an excellent palatable vegetable, especially the young shoots and leaves; it is very popular as an addition to other foods at meals; also used for forage but in limited quantities, for its laxative effect.

Ipomoea batatas

sekal dila (Timor: unknown dialect); *sweet potato* (English).



It is a productive and adaptable crop

Tubers

The plant is cultivated for its edible tubers, which are an important source of starch.

Stems

Young shoots are eaten as a salad. Along with the leaves, are used as livestock forage.

Friedberg 67 (LISC)

Merremia hederacea



Animals eat the plant, even if given nothing else, may thrive on it.

Cinatti 332 (LISC)

Porana volubilis

cidani (Tetum); *nuit (or nüif)* (Timor: unknown dialect)





Leaves and Flowers

Both leaves and flowers are edible The leaves represent one of the ingredients used in pressing *djambu bagolan* in the *Principalities* where they are also eaten to remove an unpleasant taste from the mouth.

Cinatti 194 (LISC)

Ornamental plants

<i>Ipomoea alba</i>	
 <p>Foto: Ana Joao Sousa</p>	Cultivated in gardens for its nocturnal, fragrant flowers.
Forbes 3773 (BM)	

<i>Ipomoea hederifolia</i>	
	Cultivated in gardens for ornamental purposes.
Walsh 422 (BM)	

Ipomoea mauritiana



Cultivated for ornamental purposes.

Spanoghe s.n. (L)

Porana volubilis






Cultivated for ornamental purposes.

Cinatti 194 (L)

Other uses

Apart from being used medicinally, or cultivated for food and ornamental purposes, plants have many other applications in the day-by-day life of native people. Convolvulaceae are no exception and a couple of species of this family which are found in Timor can be used for various purposes, as listed below:

<i>Ipomoea aculeata</i> var. <i>mollissima</i> <i>lak-laku, non hau kase</i> (Dawan)	
	Leaves can be used as a substitute for soap.
Kooy 642 (L)	
<i>Ipomoea pes-caprae</i> subsp. <i>brasiliensis</i> <i>tai ilaça</i> (Timor: unknown dialect)	
	Used as a sand binder in the coastal areas.
Foto: Ana João Sousa	
Walsh 364 (BM)	

<p><i>Operculina turpethum</i> <i>lak-laku</i> (Dawan); <i>tali anduk</i> (Tetum); <i>non-loli</i>. (Timor: unknown dialect)</p>	
	<p>The stems are used for tying.</p>
<p>Cinatti 165 (L)</p>	

Vernacular names

Common plant names can stress how important a plant is to the local people, not only for the meaning of the name that is given, but also simply for the fact that there is a name, even if the used word does not give much information about the species, but only a general idea of it. Note that many of the species listed above do have a vernacular name in use by Timorese people, which suggests they might have a high implication in the local culture.

In some cases, there can be conflicts between different vernacular names or in the correspondence with the correct scientific name, which is not always univocal (Gledhill, 2002). Occasionally, it occurs that the same common name means one plant in a certain area but, in another region, it may refer to an entirely different plant. Other times, a vernacular name is restricted to a small area, or to a dialect that is not very commonly spoken. In such cases, there might not be ambiguity, but the name loses value as it cannot be used elsewhere or is hardly translated into other languages or dialects (Cady, 2005).

Also in the island of Timor such situations occur, namely in what concerns Convolvulaceae. For example, vernacular name *non luli*, and the variation *non loli*, identify three completely different species: *Ipomoea tricolor*, *Operculina turpethum* and *Stictocardia neglecta*. These two last species are also called *lak-laku*, or *lak-laku mè*, in Dawan dialect, and this vernacular name is thus shared with *Ipomoea aculeata* var. *mollissima*.

It does not seem a case of a name representing a general concept of a plant, which would not correspond to different taxonomic identities, because all the above mentioned species look very different from each other - in corolla shape, size and colour, as well as in leaf size and shape – giving them a totally different appearance. Alternatively, it might be possible that the names are used locally in small areas, where there is no overlap of the range of the different species.

Tab. 2. Convolvulaceae vernacular names used in the island of Timor.

Scientific name	Common name	Dialect	Gazetteer	Bibliographic source	Herbarium specimen
<i>Cuscuta cassyoides</i>	<i>non-atois</i>	dawan	Fautbena	-	Kooy 362 (L)
<i>Ipomoea aculeata</i> var. <i>mollissima</i>	<i>lak-laku</i>	dawan	Supul	-	Kooy 293 (L)
	<i>non hau kase</i>	dawan	Kuakole (Sanbèt)	-	Kooy 793 (L)
<i>Ipomoea decaisnei</i>	<i>daun tapahaik</i>	unknown	Timor	van Ooststroom, 1953	-
<i>Ipomoea pescaprae</i> subsp. <i>brasiliensis</i>	<i>tai ilaça</i>	unknown	unknown	van Ooststroom, 1953	-
<i>Ipomoea tricolor</i>	<i>non luli</i>	unknown	unknown	van Ooststroom, 1953	-
<i>Merremia dichotoma</i>	<i>knâtan</i>	unknown	unknown	van Ooststroom, 1953	-
<i>Merremia emarginata</i>	<i>naof luken</i>	dawan	unknown	-	Kooy 738 (L)
	<i>tali anduk</i>	tetum	Lahurus	-	Kooy 481 (L)
	<i>lak-laku</i>	dawan	Oetopa	-	Kooy 263
<i>Operculina turpethum</i>	<i>non loli</i>	unknown	?Kaslios	-	Walsh 414 (BM)
	<i>nuit or nuif</i>	unknown	unknown	van Ooststroom, 1953	-
<i>Stictocardia neglecta</i>	<i>lak-laku mè</i>	dawan	unknown	-	Kooy 292 (L)
	<i>non loli</i>	unknown	Oelo	-	Schmutz 2294 (L)
	<i>non laku</i>	unknown	Ofoe	-	Walsh 373 (BM, L)
	<i>lol loli</i>	unknown	unknown	van Ooststroom, 1953	-
<i>Stictocardia tiliifolia</i>	<i>sekal zon</i>	bunaq	Lamaknen	-	Friedberg 1440 (L)
	<i>faif foro</i>	unknown	Ken Kou	-	Kooy 1395 (L)

5. Conclusion

Convolvulaceae is a large family, comprising *ca* 58 genera in a universe of *ca* 1650 species. Its global distribution is pantropical, although each genus has a somewhat more limited distribution. Especially because of the potential of these plants as medicinal, food or ornamental plants, exchanges have occurred between species of the Old World and the New World, mostly through the trading routes by western traders. This might explain the high diversity of this family in both regions. In Timor alone, we find a total of 61 different *taxa* of Convolvulaceae, among which there are 53 species of 15 different genera: 8 of the species have a circumtropical distribution, whereas 6 are most likely endemic to the island of Timor. The rest of the species have a larger distribution in Malesia, or expanded to tropical Africa and/or America.

A thorough taxonomic revision of the available specimens and the consultation of relevant publication concerning Convolvulaceae resulted in 10 nomenclatural changes to Flora Malesiana's taxonomic treatment. This is evidence that, even though van Oostroom proceeded a very complete and comprehensive work on Malesian Convolvulaceae, it cannot be faced as an immutable set of information: subsequent revisions to the family and a better acknowledgement of its world wide distribution brought up new data which put Flora Malesiana into perspective and some of its statements under reasonable doubt.

A few of the studied specimens remain to be identified, and a few nomenclatural issues are not yet fully resolved, namely in *taxa* such as *Ipomoea pes-caprae* (L.) Sweet, *Jacquemontia paniculata* (Burm. f.) Hallier f. and *Xenostegia tridentata* D. F. Austin & Staples, where further studies should be carried out.

No *taxa* were found to be endemic of East Timor, and even the new *taxon* *Argyreia* sp. A, which occurs in the eastern part of the island, also exists in West Timor so, at most, it will be endemic to the whole island, and not only to the Eastern side. The recent collection efforts in the island (2004/2005) added 5 new specimens of Convolvulaceae to AVE collection, and brought a new species record to East Timor (*Cuscuta campestris* Yunck.), which is simultaneously a new record to the island. The revision of preserved specimens from various herbaria also revealed a *taxon* which had not yet been reported to Timor (*Merremia quinata* (R.Br.) Ooststr.). Overall, the current study introduces 3 new records of Convolvulaceae to the island (*Argyreia* sp. A, *Cuscuta campestris* and *Merremia quinata*).

The reported endemisms are subject to future validation. This would mean analysing and comparing material from closely related *taxa*, from Timor or other regions, to sustain their taxonomic identity and unique distribution. For this purpose, more botanical collections should also be conducted in the island, especially in the Eastern part, where information deficiency is quite evident. Furthermore, this proposed endemisms are known to occur outside protected areas, which suggests that the localities where they are found might hold other

endemisms or unique associations of species, in which case special attention should be given to these areas, and their protection subject to consideration. However, this would require a comprehensive assessment of the botanical resources of the island, with greater effort in East Timor, for what taxonomic revisions of other families might come in useful.

A previous work also under the project “Contribution to flora resources management in East Timor” on Orchidaceae (Silveira *et al.*, *in press*) has made known 66 species of this family in Timor, among 38 genera, including 15 new genus and 32 new species record for the island. Also, 4 new species were described, and the conservation status of 12 species assessed, where 8 were considered to be Critically Endangered, and 3 others Endangered. Although Orchidaceae is generally a very diverse family (*ca* 25,000 species), its level of diversity in the island can be considered overwhelming and could bring a wider interest of botanical studies to the area. The alarming conservation status of the existant species might also be a suggestion of the before argued need for sustainable resources management in the island.

As a complement, the ethnobotanical compilation present in the current study is expected to favour the local population directly, by working as a tool in the production of non-scientifically oriented publications, such as field guides or ethnobotanical leaflets or books. Although this work may have a limited impact in what concerns the economical, social or political context of East Timor, it might as well be a solid starting point for continuous botanical research in the territory, thus exponentially building up better and more scientific knowledge of the country’s natural potential.

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Anex I

Collected specimens of Convolvulaceae by the different collectors that visited Timor

Collectors	Nº
C. W. Kooy	44
Unkown collectors (s.c.)	40
M. E. Walsh	19
Spanoghe	14
Zippelius	13
Cinatti	13
Riedlé	11
Guichenot	9
H. O. Forbes	8
R. Brown	8
Reinwardt	6
Teysmann	5
Verdial	5
Friedberg	4
Riedel	4
Van Steenis	4
Leschenault de la Tour	3
Paiva & Silveira	3
Sauveur	3
Silva	3
Fr. E. Schmutz SVD	2
Guil. Henr. De Vriese	2
Hombron	2
Jacquinet	2
Le Guillou	2
O. Jaag	2
Osório de Castro	2
Paiva, Silveira & Sousa	2
Baudin	1
Bloembergen	1
Despreaux	1
E. Cosson	1
Francisco Newton	1
Gaudichaut	1
Hallier	1
Jonker	1
Junior J. Flood	1
Naumann	1
Voogd	1
Wiles & Smith	1
Zeije	1

Anex II

Number of studied specimens of each *taxon*

Genus	Species	Infraspecific taxa	Nº	
<i>Argyreia</i>	<i>reinwardtiana</i>	-	11	
	<i>walshae</i>	-	3	
	sp. A		3	
<i>Cressa</i>	<i>australis</i>	-	2	
<i>Cuscuta</i>	<i>campestris</i>	-	1	
	<i>cassytoides</i>	-	4	
	<i>reflexa</i>	-	2	
	sp.		2	
<i>Dinetus</i>	<i>racemosus</i>	-	4	
<i>Erycibe</i>	<i>timorensis</i>	-	6	
<i>Evolvulus</i>	<i>alsinoides</i>	var. <i>alsinoides</i>	6	
		var. <i>decumbens</i>	4	
		var. <i>javanicus</i>	0	
<i>Hewittia</i>	<i>malabarica</i>	-	9	
<i>Ipomoea</i>	<i>aculeata</i>	var. <i>mollissima</i>	5	
	<i>alba</i>	-	2	
	<i>aquatica</i>	-	1	
	<i>batatas</i>	-	2	
	<i>biflora</i>	-	4	
	<i>cairica</i>	-	2	
	<i>carnea</i>	subsp. <i>fistulosa</i>	3	
	<i>decaisnei</i>	-	3	
	<i>eriocarpa</i>	-	1	
	<i>hederifolia</i>	-	1	
	<i>marginata</i>	-	10	
	<i>mauritiana</i>	-	1	
	<i>nil</i>	-	7	
	<i>obscura</i>	-	11	
	<i>ochracea</i>	-	3	
	<i>pes-caprae</i>	-		0
		subsp. <i>brasiliensis</i>		9
	<i>pes-tigridis</i>	-	3	
	<i>polymorpha</i>	-	11	
	<i>purpurea</i>	-	1	
	<i>quamoclit</i>	-	7	
	<i>sumatrana</i>	-	1	
	<i>trichosperma</i>	-	5	
<i>tricolor</i>	-	4		
<i>triloba</i>	-	3		
<i>violacea</i>	-	1		

<i>Jacquemontia</i>	<i>paniculata</i>	<i>var. paniculata</i>	16
		<i>var. tomentosa</i>	2
	<i>zollingeri</i>	<i>var. zollingeri</i>	1
		<i>var. jonkeri</i>	0
<i>Merremia</i>	<i>dichotoma</i>	-	2
	<i>emarginata</i>	-	13
	<i>gemella</i>	-	2
	<i>hederacea</i>	-	7
	<i>quinata</i>	-	2
	<i>tuberosa</i>		1
	<i>umbellata</i>	subsp. <i>orientalis</i>	6
	<i>vitifolia</i>	-	17
<i>Operculina</i>	<i>riedeliana</i>	-	2
	<i>turpethum</i>	-	14
<i>Polymeria</i>	<i>pusilla</i>	-	1
<i>Porana</i>	<i>volubilis</i>	-	29
<i>Stictocardia</i>	<i>discolor</i>	-	4
	<i>neglecta</i>	-	4
	<i>tiliifolia</i>	-	3
<i>Xenostegia</i>	<i>tridentata</i>	subsp. <i>tridentata</i>	1
		subsp. <i>hastata</i>	3
		subsp. <i>angustifolia</i>	5
Total number of specimens			283

Anex III

Morphological characters that separate *Argyreia* sp. A from *Argyreia walshae* and *Argyreia reinwardtiana*

Morphological characters	<i>Argyreia walshae</i>	<i>Argyreia</i> sp. A	<i>Argyreia reinwardtiana</i>
Leaves			
Shape	broadly ovate to ovate	elliptic-oblong	ovate, ovate-oblong or elliptic-oblong
Length/Width proportion	length less than two times the width	length two (or more) times the width	length <i>ca</i> two times the width.
Lower surface	densely pubescent to tomentose with short curled hairs	sparsely to rather densely pilose with short, appressed, straight hairs	sparsely to rather densely pilose with short, appressed, straight hairs
Petiole	up to 10 cm long	2,5 – 3 cm long	2 – 5 cm long
Inflorescences			
Number of flowers	4 – 12 (- 20) flowers	3 - 5 (-10) flowers	2 - few flowers
Peduncles	Up to 10 cm long	1,5 – 5,5 cm long	1 - 2,5 cm long
Pedicels	3 - 6 mm long	3 - 10 mm long	3 – 5 mm long
Bracteoles	caducous	1 - 4 mm long	8- 15 mm long
Corolla			
Shape	tubular to funnel-shaped	tubular to funnel-shaped	funnel-shaped
Color	whitish to yellowish?	whitish to yellowish?	purplish pink
Size	3-4,5 cm	2-2,75 cm	
Sepals			
	subequal	subequal	unequal (outer ones larger than inner ones)
Size	6 – 8 mm long	5 - 8 mm long	outer sepals: (10-) 15- 18 mm long inner sepals: (7-) 8 – 9 mm long
Indumentum	outside densely sericeous	outside densely sericeous	outside sericeous, less so towards the apex

Anex IV

Geographic coordinates of collection sites

WT = West Timor; ET = East Timor

<i>Taxa</i>	<i>Gazetteer</i>	<i>Locality notes</i>	<i>Coordinates</i>
<i>Argyreia reinwardtiana</i>	WT Soe		9°52'0" S, 124°17'0" E
<i>Argyreia reinwardtiana</i>	WT Tjamplong		10°2'0" S, 123°55'0" E
<i>Argyreia reinwardtiana</i>	Nonbaun ?		not found
<i>Argyreia sp. A</i>	WT Nikiniki		9°49'0" S, 124°28'0" E
<i>Argyreia sp. A</i>	WT Supul	near Soe	9°52'0" S, 124°17'0" E
<i>Argyreia walshae</i>	WT Tobaki (Naitimu)	Beloe district	9°16'2.121" S, 124°52'1.652" E
<i>Cressa australis</i>	ET Batugadé	Bé-Malai lagoon	8°52'46" S, 125°0'44" E
<i>Cuscuta campestris</i>	ET Dili	in the streets of Dili	8°33'31" S, 125°34'25" E
<i>Cuscuta cassytoides</i>	WT Fautbena		9°41'13" S, 124°45'57" E
<i>Cuscuta cassytoides</i>	WT Kupang		10°10'0" S, 123°35'0" E
<i>Cuscuta sp.</i>	WT Oeoh	near Nikiniki	not found
<i>Cuscuta sp.</i>	F[u]llas ?		not found
<i>Dinetus racemosus</i>	Kashoi?	Gunung Mutis	9°34'0" S, 124°14'0" E
<i>Dinetus racemosus</i>	ET Fatunaba		8°35'47" S, 125°34'34" E
<i>Dinetus racemosus</i>	WT Tjamplong		10°2'0" S, 123°55'0" E
<i>Evolvulus alsinoides var. alsinoides</i>	WT Enoana	near Bokong	9°58'0" S, 124°4'0" E
<i>Evolvulus alsinoides var. alsinoides</i>	WT Soe		9°52'0" S, 124°17'0" E
<i>Evolvulus alsinoides var. alsinoides</i>	ET Suai		9°18'45" S, 125°15'20" E
<i>Evolvulus alsinoides var. decumbens</i>	WT Nurobo(?)		9°21'53" S, 124°48'46" E
<i>Hewittia malabarica</i>	WT Noitoko		9°33'0" S, 124°22'0" E
<i>Hewittia malabarica</i>	WT Kupang		10°10'0" S, 123°35'0" E
<i>Hewittia malabarica</i>	ET Lospalos		8°31'10" S, 126°59'43" E
<i>Hewittia malabarica</i>	WT Kiupakan		9°26'38" S, 124°42'11" E
<i>Ipomoea sp.</i>	WT Bone		9°57'0" S, 124°27'0" E
<i>Ipomoea aculeata var. mollissima</i>	WT Supul	near Soe	9°52'0" S, 124°17'0" E
<i>Ipomoea aculeata var. mollissima</i>	WT Kuakole	Sanbèt	not found
<i>Ipomoea aculeata var. mollissima</i>	WT Fatu Nasimètan	6km S of Kapan	9°44'0" S, 124°17'0" E
<i>Ipomoea aculeata var. mollissima</i>	ET Cailaco		8° 54' 0 S, 125° 16' 60 E
<i>Ipomoea aculeata var. mollissima</i>	WT Kot Olim	near Menu	9°52'0" S, 124°43'0" E
<i>Ipomoea aquatica</i>	ET Dili	in the streets of Dili	8°33'31" S, 125°34'25" E
<i>Ipomoea batatas</i>	ET Weluli		9°16'37" S, 125°3'54" E
<i>Ipomoea cairica</i>	ET Mehera	Plateau of Fuiloro (Lautém)	8°23'46" S, 127°11'12" E
<i>Ipomoea carnea subsp. fistulosa</i>	ET Dili		8°33'31" S, 125°34'25" E
<i>Ipomoea carnea subsp. fistulosa</i>	WT Oenopu		9°23'1" S, 124°46'45" E
<i>Ipomoea decaisnei</i>	WT Brug Noeliu ?	can be Noe Kiu	9°18'42" S, 124°31'6" E
<i>Ipomoea hederifolia</i>	WT Asoemanoe	Beloe district	9°4'S, 125°6' E
<i>Ipomoea marginata</i>	WT Noemuti		9°35'0" S, 124°38'0" E
<i>Ipomoea marginata</i>	WT Lalian	there are several villages called Lalian	9°11'18" S, 124°36'30" E
<i>Ipomoea marginata</i>	WT Soe		9°52'0" S, 124°17'0" E
<i>Ipomoea marginata</i>	ET Maupitine	Plateau of Fuiloro	8°30'40" S, 127°7'24" E
<i>Ipomoea marginata</i>	ET Caicoli	marsh behind Dili	8°33'33" S, 125°34'23" E
<i>Ipomoea nil</i>	WT Soe		9°52'0" S, 124°17'0" E
<i>Ipomoea nil</i>	ET Fatunaba		8°35'47" S, 125°34'34" E

<i>Ipomoea</i>	<i>nil</i>		ET Fatuahi	Dili	8°34'3" S, 125°38'4" E
<i>Ipomoea</i>	<i>nil</i>		ET Cailaco		8° 54' 0 S, 125° 16' 60 E
<i>Ipomoea</i>	<i>nil</i>		WT Kupang		10°10'0" S, 123°35'0" E
<i>Ipomoea</i>	<i>obscura</i>		WT Nikiniki		9°49'0" S, 124°28'0" E
<i>Ipomoea</i>	<i>obscura</i>		ET Lospalos		8°31'10" S, 126°59'43" E
<i>Ipomoea</i>	<i>obscura</i>		ET Fatunaba		8°35'47" S, 125°34'34" E
<i>Ipomoea</i>	<i>obscura</i>		WT Soe		9°52'0" S, 124°17'0" E
<i>Ipomoea</i>	<i>ochracea</i>		WT Kolbano		10°2'0" S, 124°31'0" E
<i>Ipomoea</i>	<i>ochracea</i>		WT Kupang		10°10'0" S, 123°35'0" E
<i>Ipomoea</i>	<i>pes-caprae</i>		WT Atapupu		9°0'0" S, 124°51'0" E
<i>Ipomoea</i>	<i>pes-caprae</i>		ET Loré		8°39'43" S, 127°1'34" E
<i>Ipomoea</i>	<i>pes-caprae</i>		WT Kolbano		10°2'0" S, 124°31'0" E
<i>Ipomoea</i>	<i>pes-caprae</i>	subsp. brasiliensis	ET Dili	Nein Feto	8°33'31" S, 125°34'25" E
<i>Ipomoea</i>	<i>pes-caprae</i>	subsp. brasiliensis	WT Kolbano		10°2'0" S, 124°31'0" E
<i>Ipomoea</i>	<i>pes-caprae</i>	subsp. brasiliensis	WT Kupang		10°10'0" S, 123°35'0" E
<i>Ipomoea</i>	<i>pes-tigridis</i>		ET Dili	in the streets of Dili	8°33'31" S, 125°34'25" E
<i>Ipomoea</i>	<i>pes-tigridis</i>		ET Bobonaro		9°1'55" S, 125°19'30" E
<i>Ipomoea</i>	<i>pes-tigridis</i>		WT Kupang		10°10'0" S, 123°35'0" E
<i>Ipomoea</i>	<i>polymorpha</i>		WT Fatukopa		9°17'42" S, 124°46'58" E
<i>Ipomoea</i>	<i>polymorpha</i>		ET Lospalos		8°31'10" S, 126°59'43" E
<i>Ipomoea</i>	<i>quamoclit</i>		ET Fatuahi	Dili	8°34'3" S, 125°38'4" E
<i>Ipomoea</i>	<i>quamoclit</i>		ET Dili	on the mountain slope	8°33'31" S, 125°34'25" E
<i>Ipomoea</i>	<i>quamoclit</i>		ET Samoro	Sobale Mountain	8°49'12" S, 125°51'14" E
<i>Ipomoea</i>	<i>trichosperma</i>		WT Meo?	can be Weoe	9°41'32" S, 124°50'19" E
<i>Ipomoea</i>	<i>trichosperma</i>		WT Kumlol		not found
<i>Ipomoea</i>	<i>trichosperma</i>		WT Oesau		10°7'0" S, 123°48'0" E
<i>Ipomoea</i>	<i>tricolor</i>		WT Nusa?		not found
<i>Ipomoea</i>	<i>tricolor</i>		WT Maubesi	N. U. Timor	9°26'0" S, 124°34'0" E
<i>Ipomoea</i>	<i>tricolor</i>		WT Maobessi	Dusano district	9°26'0" S, 124°34'0" E
<i>Ipomoea</i>	<i>triloba</i>		WT Lalian		9°11'18" S, 124°36'30" E
<i>Ipomoea</i>	<i>triloba</i>		ET Dili		8°33'31" S, 125°34'25" E
<i>Ipomoea</i>	<i>triloba</i>		ET Suai		9°18'45" S, 125°15'20" E
<i>Ipomoea</i>	<i>violacea</i>		WT Mamboea	Beloe district	9°23'10" S, 124°20'56" E
<i>Jacquemontia</i>	<i>paniculata</i>		WT Kobehaumené	Nikiniki	9°49'0" S, 124°28'0" E
<i>Jacquemontia</i>	<i>paniculata</i>		ET Suai		9°18'45" S, 125°15'20" E
<i>Jacquemontia</i>	<i>paniculata</i>		WT Tjamplong		10°2'0" S, 123°55'0" E
<i>Jacquemontia</i>	<i>paniculata</i>		WT Kolbano		10°2'0" S, 124°31'0" E
<i>Merremia</i>	<i>dichotoma</i>		WT Berg Sanbèt ?		9°7'29" S, 124°58'42" E
<i>Merremia</i>	<i>dichotoma</i>		WT Kolbano		10°2'0" S, 124°31'0" E
<i>Merremia</i>	<i>emarginata</i>		WT Weoe	Beloe district	9°41'32" S, 124°50'19" E
<i>Merremia</i>	<i>emarginata</i>		WT Kupang		10°10'0" S, 123°35'0" E
<i>Merremia</i>	<i>emarginata</i>		WT Noeliu	can be Naoeleoe	9°47'0" S, 124°47'0" E
<i>Merremia</i>	<i>gemella</i>		ET Mehera	Plateau of Fuiloro (Lautém)	8°23'46" S, 127°11'12" E
<i>Merremia</i>	<i>hederacea</i>		ET Dili		8°33'31" S, 125°34'25" E
<i>Merremia</i>	<i>quinata</i>		WT Oekiu		9°9'0" S, 124°45'0" E
<i>Merremia</i>	<i>quinata</i>		WT Enoana-Oekui		9°9'0" S, 124°45'0" E
<i>Merremia</i>	<i>umbellata</i>	subsp. orientalis	WT Nenuk	North Beloe	9°9'53" S, 124°53'36" E
<i>Merremia</i>	<i>vitifolia</i>		ET Loré		8°39'43" S, 127°1'34" E
<i>Merremia</i>	<i>vitifolia</i>		ET Hatolia		8°48'41" S, 125°19'6" E
<i>Merremia</i>	<i>vitifolia</i>		WT Kupang		10°10'0" S, 123°35'0" E

<i>Merremia</i>	<i>vitifolia</i>	WT Nenuk	Atambua	9°9'53" S, 124°53'36" E
<i>Operculina</i>	<i>turpethum</i>	WT Lahurus		9°4'25" S, 125°2'51" E
<i>Operculina</i>	<i>turpethum</i>	ET Dili		8°33'31" S, 125°34'25" E
<i>Operculina</i>	<i>turpethum</i>	ET Lospalos		8°31'10" S, 126°59'43" E
<i>Operculina</i>	<i>turpethum</i>	WT Mota Maro		9°21'9" S, 124°52'9" E
<i>Operculina</i>	<i>turpethum</i>	WT Oetuba		9°42'30" S, 124°46'10" E
<i>Operculina</i>	<i>turpethum</i>	Kaslios?		not found
<i>Polymeria</i>	<i>pusilla</i>	ET Mehera	Plateau of Fuiloro (Lautém)	8°23'46" S, 127°11'12" E
<i>Porana</i>	<i>volubilis</i>	ET Liquiçá		8°40'35" S, 125°19'30" E
<i>Porana</i>	<i>volubilis</i>	ET Dili		8°33'31" S, 125°34'25" E
<i>Porana</i>	<i>volubilis</i>	Fallas ?		not found
<i>Porana</i>	<i>volubilis</i>	WT Kupang		10°10'0" S, 123°35'0" E
<i>Porana</i>	<i>volubilis</i>	WT Benlutu	near Soe	9°52'0" S, 124°17'0" E
<i>Porana</i>	<i>volubilis</i>	WT Gunung Bambu	near Nikiniki	9°49'0" S, 124°28'0" E
<i>Porana</i>	<i>volubilis</i>	WT Nikiniki		9°49'0" S, 124°28'0" E
<i>Porana</i>	<i>volubilis</i>	WT Kampung Noelmina		9°10'6" S, 124°34'35" E
<i>Porana</i>	<i>volubilis</i>	WT Kolbano		10°2'0" S, 124°31'0" E
<i>Stictocardia</i>	<i>discolor</i>	[J]upala ?		not found
<i>Stictocardia</i>	<i>discolor</i>	WT Bone		9°57'0" S, 124°27'0" E
<i>Stictocardia</i>	<i>neglecta</i>	ET Oeolo	Oekussi	not found
<i>Stictocardia</i>	<i>neglecta</i>	ET Abis	Lamaknen	not found
<i>Stictocardia</i>	<i>neglecta</i>	WT Ofoe	can be Oefau	9°56'0" S, 124°21'0" E
<i>Stictocardia</i>	<i>tiliifolia</i>	ET Cailaco		8° 54' 0 S, 125° 16' 60 E
<i>Stictocardia</i>	<i>tiliifolia</i>	WT Kumlol		not found
<i>Stictocardia</i>	<i>tiliifolia</i>	WT Kupang		10°10'0" S, 123°35'0" E
<i>Xenostegia</i>	<i>tridentata</i>	WT Kupang		10°10'0" S, 123°35'0" E
<i>Xenostegia</i>	<i>tridentata</i>	ET Saluki	Kalabaki peak	not found
<i>Xenostegia</i>	<i>tridentata</i>	ET Lospalos	Fuiloro	8°30'30" S, 126°59'24" E
<i>Xenostegia</i>	<i>tridentata</i>	ET Dili	on the mountain slope	8°33'31" S, 125°34'25" E