Conspectus of the genus *Eugenia* (Myrtaceae) in the Philippines

P.G. WILSON

National Herbarium of New South Wales, Royal Botanic Gardens, Sydney NSW 2000, Australia
E-mail: peter.wilson@rbgsyd.nsw.gov.au

Abstract

This paper gives an overview of the genus *Eugenia*, with an emphasis on species found in the Philippines. In particular, the generic segregate *Jossinia*, adopted by Merrill for those species, is re-evaluated in the light of more recent research. This research does not support inclusion of species from the Asia-Pacific region in a segregate genus. Consequently, the Philippines species are here assigned to *Eugenia* and two new names, *Eugenia uminganensis* and *E. inaequisepala*, are proposed.

Introduction

The genus *Eugenia* was established by Linnaeus in 1735 with five species. Of these five species, only *Eugenia uniflora* remained in the genus at the time of publication of volume three of de Candolle's *Prodromus* in 1828. De Candolle himself transferred two of the species to the genus *Jambosa* (now considered a synonym of *Syzygium*). The other two species had already been reassigned to *Barringtonia* (Lecythidaceae). The number of species then considered to belong in *Eugenia* had grown rapidly, so that de Candolle included 194 species in it. McVaugh (1968) estimated that there were at least 500 species in tropical America alone and van der Merwe *et al*. (2005) suggest there are approximately 1000 species worldwide, predominantly in tropical America but including around 60 in Africa. In the Asia-Pacific region, the highest number of species occurs in New Caledonia where over 60 species occur (J.W. Dawson, pers. comm., 2006), many of which are undescribed.

Although *Syzygium* and other segregates were recognised by a number of early workers, there was widespread adoption of a broad generic concept of *Eugenia* that included the segregates. The foremost advocate of this was Bentham (1862, 1869) who emphasised the nature of the embryo,

with its thick, fleshy cotyledons, as a unifying feature of the group. As a result, his view largely held sway, particularly in English-speaking parts of the world, until well into the twentieth century. The resurgence of the recognition of *Syzygium* as a genus separate from *Eugenia* was led by Diels in the 1920s and was continued by Merrill and Perry in their various publications in the 1930s. Merrill (1951) traced the history of this and discussed some of the proposed segregates from *Syzygium* (ie, *Jambosa* and *Caryophyllus*), which he did not recognise as distinct.

Schmid (1972) published a summary of his research on floral anatomy in this group that showed that *Syzygium* could be distinguished from *Eugenia* by a fundamental difference in vascular supply to the placentas: in *Eugenia* the vascular supply is trans-septal, while in *Syzygium* it is axial. Wilson et al. (2005) have presented chloroplast sequence data that has confirmed this separation and, furthermore, demonstrated that the traditional concept of subfamily Myrtoideae is not monophyletic. They segregated *Syzygium* into a tribe, Syzygieae, separate from the main group of fleshy-fruited taxa, the Myrteae. More recently, Biffin et al. (2007) have reached similar conclusions from their analysis of nuclear ITS data. *Eugenia* is correctly placed in the Myrteae but the long-established division of this group into three subtribes does not receive any support in phylogenetic studies (Lucas et al. 2005, 2007).

Diels (1922: 376), in recognising the genus *Jossinia* Commers. ex DC., states that he is following Blume who, he says, separated the genus on the basis of the inflorescence type, the relatively large sepals, the broad staminal disk and the aestivation of the stamens in the bud. Merrill (1951) followed Diels in referring all Old World species of the *Eugenia* group to *Jossinia* and transferred a number of native Philippine species to that genus.

The major issues surrounding *Jossinia* have been typification of the genus and the application of some names. De Candolle recognised eight species that he stated were from Mauritius and the Mascarenes. One of the species, *Jossinia cotinifolia* (syn. *Eugenia cotinifolia*), was for a long time a name of uncertain application. Some workers, for example Hyland (1983), considered it quite likely that this name might apply to the species in Australia, for which he used the later name *Eugenia reinwardtiana* (syn. *Jossinia reinwardtiana*). It now seems certain that *Eugenia cotinifolia* is a New World species (Scott 1979) so the name is not applicable to any Old World taxon. Scott (1979) chose *Jossinia tinifolia*, a Mascarene species, as lectotype of the genus. The recently published phylogeny of the *Eugenia* group (van der Merwe et al., 2005) does support the monophyly of a group of Mascarene species that includes not only the type of *Jossinia* but also a member of the segregate genus *Monimiastrum*. However, the Australasian

species *Eugenia reinwardtiana* is not a member of this clade and it seems unlikely that any other Malesian or Pacific species that has been placed in the genus *Jossinia* by earlier workers would be a member of this clade either. While the phylogeny is inconclusive with regard to possible generic segregates, it does not give any support for the recognition of *Jossinia* in the broader sense adopted by Merrill and Diels. In a recent paper, Snow (2008) made new combinations in *Eugenia* for all *Monimiastrum* species.

In the Philippines, two of the species described or recognised by Merrill (1951) lack combinations in *Eugenia* and these are provided here. The Philippine species are mostly still poorly known and the descriptions given below are often deficient in some way. Three of the nine native species are represented only by the type collection and a further three are known from fewer than five collections. With one exception, the types of the native species of *Eugenia* were collected before the war and, in all cases, the holotypes of these species were lost when the Manila herbarium (PNH) was destroyed during the battle for Manila in February 1945. Fortunately, almost all have isotypes that are preserved in other herbaria.

Since the genus is under-collected in the Philippines, little or nothing is known of the conservation status of the endemic species. It is reported (Hay, 1998) that rainforest is being destroyed in the Philippines at a rate second only to Madagascar's, with current estimates suggesting that less than three percent of the extensive primary forests that once covered the archipelago remain intact.

Eugenia L.

Eugenia L., Sp. Pl. 1 (1753) 470. – **Type species:** *Eugenia uniflora* L. (lectotype, vide N. L. Britton, Fl. Bermuda (1918) 261).
Jossinia Commerson ex DC., Prodr. 3 (1828) 237; Blume, Mus. Bot. 1 (1850) 119; Diels, Bot. Jahrb. 56 (1921) 531 & Bot. Jahrb. 57 (1922) 376; Merrill, J. Arnold Arbor. 31 (1950) 329 & Philipp. J. Sci. 79 (1951) 356. – **Type species**: *Jossinia tinifolia* (Lam.) DC. [lectotype, vide A.J. Scott, Kew Bull. 34 (1979) 474].

Shrubs or small trees; twigs glabrous or pubescent when young. Leaves opposite, petiolate; lamina gland-dotted, intramarginal vein visible. Inflorescence axillary; flowers solitary, fascicled or rarely in triads; peduncles pubescent; bracts pubescent, persistent. Flowers 4-merous, buds usually turbinate; sepals rounded, sparsely pubescent; petals ± orbicular, gland-dotted, with ciliate margins. Stamens in multiple whorls on a broad staminal disc.

Ovary 2-locular, ovules several to many, radiating from a centrally-located axile placenta; style about as long as the stamens or slightly longer; stigma not dilated. Fruit a succulent berry; sepals persistent; seed 1(–2), cotyledons of uniform texture, partly fused.

Key to Philippine species

1 Leaves ± sessile, lamina rounded to cordate at base ..... 2. ***E. uminganensis***
Leaves with petioles ≥ 2 mm long, lamina usually tapering to the petiole 2

2 Pedicels glabrous, usually ≥ 15 mm long; hypanthium ribbed ..... 1. ***E. uniflora***
Pedicels puberulent, to 12 mm long or flowers subsessile; hypanthium not ribbed 3

3 Lamina > 8 cm wide ..... 3. ***E. kamelii***
Lamina < 7 cm wide 4

4 Petiole ≤ 3 mm long 5
Petiole > 3 mm long 8

5 Lamina > 6 cm long ..... 4. ***E. aherniana***
Lamina < 6 cm long 6

6 Pedicels very short ..... 5. ***E. inaequisepala***
Pedicels ≥ 5 mm long 7

7 Leaves membranous ..... 6. ***E. loheri***
Leaves chartaceous or subcoriaceous ..... 7. ***E. pasacaensis***

8 Leaves ≥ 12 cm long; young stems ferrugineous-villous ..... 8. ***E. montalbanica***
Leaves mostly < 12 cm long; young stems not villous 9

9 Staminal filaments ± 10 mm long; hypanthium sparingly pubescent 10
Staminal filaments up to 5 mm long; hypanthium densely white-pubescent 11

10 Petiole 2–3 mm long; lamina 2–3 cm wide ..... 5. ***E. inaequisepala***
Petiole 4–10 mm long; lamina mostly 3–6.5 cm wide .... 9. ***E. tulanan***

11 Staminal filaments 4–5 mm long; intramarginal vein 2–6(–8) mm from margin ..... 4. ***E. aherniana***
Staminal filaments 3–4 mm long; intramarginal vein < 2 mm from margin ..... 10. ***E. sargentii***

1. ***Eugenia uniflora*** L.
E. uniflora L., Species Plantarum 1: 470 (1753). – **Type:** Micheli, Nov. Pl. Gen. (1729) 226, t. 108 (lecto selected by McVaugh, *Taxon* 5: 140, 1956).

Shrub or small tree; branchlets glabrous. **Leaves** opposite; lamina thinly coriaceous, ovate to broadly ovate, 2.5–5 cm long, 1.25–2.5 cm wide, apex shortly acuminate, base rounded or broadly cuneate; petiole 2–5 mm long. **Inflorescence** axillary; **flowers** solitary or paired; pedicels slender, (8–)15–25(–40) mm long, glabrous. Hypanthium 2–3 mm long, ca 1 mm wide, sparsely puberulent to glabrescent; sepals ± equal, ovate to lanceolate, 3–5 mm long, persistent, puberulent; petals white, obovate to elliptical, 7–8 mm long, ciliate; stamens numerous, 2.5–7 mm long. Ovary ribbed, 2-locular, style 5–7 mm long. **Fruit** usually orange-red, conspicuously 8-ribbed, 1–2(–3) cm diam.; **seed** one, rarely 2 or 3.

Distribution: Native of Surinam, Guyana and French Guiana, Brazil and Uruguay; now widely cultivated. Naturalised in Luzon.

2. ***Eugenia uminganensis*** Peter G. Wilson, *nom. nov.*
Garcinia heterophylla Merr., Philipp. J. Sci., Bot. 12 (1917) 285 ; Merrill, Enum. Philipp. Pl. 3 (1923) 84. — *Jossinia heterophylla* (Merr.) Merr., Philipp. J. Sci. 79 (1951) 359. – **Type:** Luzon, Province of Nueva Ecija, Mount Umingan, 13 Aug 1916, *Ramos & Edaño B.S. 26457* (holo, PNH†; iso, K–photo!, US–photo!).

Small tree; branchlets glabrous. **Leaves** opposite; lamina coriaceous, lanceolate to ovate, 6–10 cm long, 2–5 cm wide, shortly and obtusely acuminate, base obtuse to cordate; petiole very short. **Inflorescence** axillary; **flowers** apparently solitary; pedicels very short. Hypanthium and flower characters unknown. **Fruit** ± sessile, globose, 20–30 mm diam.; **seed** solitary.

Note: a new name is required due to the pre-existing name *E. heterophylla* A. Rich.

Habitat: "in forests, altitude about 300 meters".

Distribution: Luzon. 'Mount Umingan' is probably part of the Caraballo mountains, located close to the town of Umingan. The municipality of Umingan is today part of Pangasinan Province close to its border with the province of Nueva Ecija.

3. ***Eugenia kamelii*** Merr.
Eugenia kamelii Merr., Philipp. J. Sci., Bot. 10 (1915) 219; Merrill, Enum. Philipp. Pl. 3 (1923) 168. — *Jossinia kamelii* (Merr.) Merr., Philipp. J. Sci. 79: 359 (1951). – **Type:** Samar, Cauayan Valley, 26 Mar 1914, *Ramos B.S.* 17539 (holo, PNH†; iso, US–photo!, A–fragment).

Tall tree; branchlets glabrous. **Leaves** opposite; lamina coriaceous, elliptical, 15–20 cm long, 9–13 cm wide, shortly and obtusely acuminate, tapering rapidly to the petiole, glands inconspicuous; petiole 14–18 mm long. **Inflorescence** axillary; **flowers** fascicled, sessile or pedicels very short. Hypanthium to 10 mm long and 10 mm wide, slightly pubescent with scattered hairs; sepals unequal, orbicular-reniform, 4–7 mm long, 5–6 mm wide; petals white, obovate to elliptical, 10–12 mm long; staminal disk 2.7–3.5 mm wide; stamens numerous, 8–10 mm long. Ovary 2-locular, **fruit** unknown.

Note. Merrill (1951) said that this "species is still known only from the original collection … there being an excellent specimen of this in the U.S. National Herbarium". As far as I can tell, this isotype seems to be the only extant duplicate.

Local name: Damol (Northern Samar: a Central Visayan language).

Habitat: In the protologue, this is recorded as growing "in damp forests".

Distribution: Known only from the type collection. The locality 'Cauayan Valley' does not appear on the label of the type specimen, only in the protologue. The Cauayan Valley is in the province of Northern Samar near the town of Catarman.

4. ***Eugenia aherniana*** C.B. Rob.
-*Eugenia aherniana* C.B. Rob., Philipp. J. Sci. 4 (1909) 344; Merrill, Enum.

Philipp. Pl. 3 (1923) 157. — *Jossinia aherniana* (C.B.Rob.) Merr., Philipp. J. Sci. 79 (1951) 358. – **Type:** Mindanao, Province of Lanao del Sur, Lake Lanao, Camp Keithley, *Clemens 619* (holo, PNH†).
-*Eugenia melastomoides* Elmer, Leafl. Philipp. Bot. 4 (1912) 1429; Merrill, Enum. Philipp. Pl. 3 (1923) 171. – **Types:** Mindanao, Davao, Todaya (Mt. Apo), May 1909, *Elmer 10750* (isosyn [flowering], A, GH, K–photo!, NSW!, US–photo!); ibid, Jun 1909, *Elmer 11013* (isosyn [fruiting], A, GH, K– photo!, MO–photo!, NSW!, US–photo!).

Tree or small tree; branchlets pubescent, soon glabrescent. **Leaves** opposite; lamina chartaceous, elliptical to obovate or orbicular, (5–)6.5–12 cm long, (2.5–)3–5(–6) cm wide, acuminate (sometimes only shortly and obtusely), tapering gradually to the petiole, glands inconspicuous; petiole 3–7 mm long. **Inflorescence** axillary; **flowers** solitary or few and fascicled; pedicels very short, white-pubescent. Hypanthium ca 3 mm long, ca 5 mm wide, white-pubescent; sepals in unequal pairs, 3.5–5 mm long; petals white, obovate to elliptical, ca 6 mm long, ciliate; staminal disk 1 mm wide, covered with very dense white hairs; stamens numerous, 4–5 mm long. Ovary 2-locular, style ca 6 mm long. **Fruit** subglobose, 15–20 mm diam.; **seed** solitary.

Note: the type specimen of *E. aherniana* has not been located. There is a specimen in the Munich herbarium, collected by Mary Clemens at Lake Lanao in July 1907, that may be a type but it has no collecting number (H-J Esser, pers. comm., 2008). The paratype (Surigao, *Ahern 518*) has not been located, either.

Local names: Hangos (Surigao); Baring-oras, Magdan (Davao: Bagobo language). The fruit is said to be edible.

Habitat: In Elmer's protologue, he gives "in humid forests at 3500 feet altitude" as habitat for the flowering syntype and "dry woods at 2500 feet" for the fruiting syntype.

Distribution: Widespread, Luzon to Mindanao; also in Sulawesi.

5. ***Eugenia inaequisepala*** Peter G. Wilson, *nom. nov*.
Jossinia brachypoda Merr., Philipp. Journ. Sci. 79 (1951) 359, hom. illeg. – **Type:** Mindanao, Zamboanga, Santa Maria, Sep–Oct 1912, *Reillo B.S. 16403* (holo, GH; iso, BM, L–photo!, US–photo!).

Small tree; branchlets glabrous. **Leaves** opposite; lamina coriaceous,

elliptical or obovate-elliptical, 4–5.5 cm long, 2–3 cm wide, obtuse or shortly and obtusely acuminate, tapering gradually to the petiole, glands inconspicuous; petiole 2–3 mm long. **Inflorescence** axillary; **flowers** solitary or paired; sessile or pedicels very short, somewhat pubescent. Hypanthium ca 3 mm long, ca 6 mm wide, lightly pubescent; sepals unequal, rounded, one pair 5 x 6 mm, the other 6 x 7 mm, with scattered hairs on the outside; petals white, size unknown; stamens numerous, ca 10 mm long. Ovary 2-locular, style ca 10 mm long. **Fruit** unknown.

Note: a new name is required due to the pre-existing name, *E. brachypoda* DC.

Distribution: Mindanao. Province of Zamboanga.

6. ***Eugenia loheri*** C.B. Rob.
Eugenia loheri C.B. Rob., Philipp. Journ. Sci. 4 (1909) 345; Merrill, Enum. Philipp. Pl. 3 (1923) 169. — *Jossinia loheri* (C.B.Rob.) Merr., Philipp. Journ. Sci. 79 (1951) 360. – **Type:** Luzon, Province of Pampanga, Mount Arayat, Jun 1896, *Loher 2475* (holo, PNH†; iso, M).

Habit unknown; branchlets ? glabrous. **Leaves** opposite; lamina membranous, lanceolate or narrow-lanceolate, rarely subelliptical, 2.5–5 cm long, 0.8–2 cm wide, obtusely acuminate, tapering gradually to the petiole, glands dense; petiole 1–2 mm long. **Inflorescence** in or above the axil; **flowers** solitary or rarely paired; pedicels 5–10 mm long, villous. Hypanthium ca 2 mm long, ca 3 mm wide, villous; sepals unequal, oblong, 3–4 mm long, ciliate; petals white, broadly elliptical to orbicular, 2.5–3 mm long; stamens numerous, 1.5–3 mm long. Ovary (1–) 2-locular, style ca 3 mm long. **Fruit** unknown.

Notes: Duplicates of the paratype, *Cuming 1388*, are held at BM and M, and a fragment at A. Merrill (1951) considered that this species was known only from the two original collections but it appears that Loher made a further collection of this taxon in January 1913 (Rizal Province, Jan 1913, *Loher 13920*,) that is held at M (H-J Esser, pers. comm., 2008).

Distribution: Luzon: Provinces of Nueva Ecija and Pampanga. Mt Arayat is an inactive volcano located ca 40 km ENE of Mt Pinatubo. The mountain is today incorporated in the Mt Arayat National Park. Nueva Ecija is an adjacent province to Pampanga.

7. ***Eugenia pasacaensis*** C.B. Rob.
Eugenia pasacaensis C.B. Rob., Philipp. J. Sci. 4 (1909) 346; Merrill, Enum. Philipp. Pl. 3 (1923) 173. — *Jossinia pasacaensis* (C.B.Rob.) Merr., Philipp. J. Sci. 79 (1951) 360. – **Type:** Luzon, Province of Camarines, Pasacao, May 1908, *Curran F.B. 10467* (holo, PNH†; iso, K–photo!, US-photo!, A–fragment).

Small tree or shrub; branchlets pubescent, glabrescent. **Leaves** opposite; lamina subcoriaceous, lanceolate or lanceolate-elliptical, 3–5 cm long, 1.5–2.5 cm wide, obtusely acuminate, tapering gradually to the petiole, glands dense but inconspicuous; petiole 1–2.5 mm long. **Inflorescence** axillary (often in the uppermost axils); **flowers** solitary or few and fascicled; pedicels 5–12 mm long, puberulent. Hypanthium ca 2 mm long, ca 3 mm wide, puberulent; sepals unequal, oblong-orbicular, 2.5–3.5 mm long; petals white, broadly oblong, ca 6 mm long; stamens numerous, 3–4 mm long. Ovary 2-locular, style ca 6 mm long. **Fruit** unknown.

Habitat: Protologue indicates that the type specimen was found "growing on limestone cliffs along the beach at an elevation of 100 m."

Distribution: Only known from the type locality. Merrill (1951) knew of this species only from the type collection but a probable further collection exists. This specimen, *van Wickle F.B. 700*, May 1904 (NSW!), agrees with the protologue in having glandular branchlets but appears to represent juvenile or sucker growth with leaves that are much longer and wider than mature foliage: the lamina is broadly ovate to broadly elliptical, 5.5–9 cm long and 3.4–6 cm wide, tapering abruptly to the petiole.

8. ***Eugenia montalbanica*** Merr.
Eugenia montalbanica Merr., Philipp. J. Sci. 30 (1926) 417. — *Jossinia montalbanica* (Merr.) Merr., Philipp. J. Sci. 79 (1951) 360. — *Eugenia diospyrifolia* Merr., Philipp. J. Sci., 27 (1925) 39 [non *E. diospyrifolia* Wall. ex Duthie]. – **Type:** Luzon, Rizal Province, Montalban, May 1913, *Loher 13307* (holo, PNH†; iso, K–photo!, M).

Small tree; branchlets ferrugineous-villous. **Leaves** opposite; lamina subcoriaceous, oblong to oblong-lanceolate, 12–17 cm long, 3–5 cm wide, shortly and obtusely acuminate, tapering gradually to the petiole, villous below; petiole 5–12 mm long. **Inflorescence** axillary; **flowers** solitary or few-flowered fascicles, sessile. Hypanthium ca 2 mm long, ca 4 mm wide, pubescent; sepals unequal, ovate, ca 3 mm long, subacute; petals white,

obovate, ca 3 mm long; stamens numerous, short. Ovary 2-locular, style short. **Fruit** globose, glabrous, ca 2 cm diam.; **seed** 1.

Habitat: as suggested by the name of the region, this species is also likely to occur on limestone substrates.

Distribution: This species is known only from the type and two paratypes (*Loher 13328* & *14879*), all from the Montalban region in Rizal Province.

9. ***Eugenia tulanan*** Merr.
Eugenia tulanan Merr., Philipp. J. Sci., Bot. 11 (1916) 201; Merrill, Enum. Philipp. Pl. 3 (1923) 179. — *Jossinia tulanan* (Merr.) Merr., Philipp. J. Sci. 79 (1951) 360. – **Type:** Samar, Province of Northern Samar, Catubig River at Pinipisakan, Mar 1916, *Ramos B.S. 24453*, (holo, PNH†; iso, A, K–photo!, NSW!).

Tree up to 15 m high; branchlets glabrous. **Leaves** opposite; lamina ± coriaceous, elliptical to oblong elliptical, 5–12.5 cm long, 3–6.5 cm wide, shortly and obtusely acuminate, triplinerved at the base, tapering to the petiole, glands inconspicuous; petiole 4–10 mm long. **Inflorescence** axillary; **flowers** solitary or fascicled, pedicels stout, ca 1.5 mm long. Hypanthium glandular, ca 4 mm long, 6–7 mm wide, sparsely pubescent; sepals glandular, unequal, orbicular-ovate, 3–7 mm long, 3–4 mm wide; petals white, obovate to elliptical, to ca 10 mm long; staminal disk 1.5 mm wide, densely covered with golden-brown hairs; stamens numerous, to ca 10 mm long. Ovary and **fruit** not described.

Local name: Tulanan (a Visayan language).

Habitat: At type locality, the plant is described as growing "in damp forests at low altitudes".

Distribution: In the protologue, Merrill cites two localities, Pinipisakan and Palapag, both on the Catubig River in northern Samar. Pinipisakan, the type locality, is a waterfall, further upstream from Palapag, the site of the paratype collection (*Ramos B.S. 24421*). The species is fairly widespread and has been recorded from Luzon (Rizal Province and Tayabas (Quezon) Province); Bohol; and Mindanao (Province of Agusan).

10. ***Eugenia sargentii*** Merr.
Eugenia sargentii Merr., Philipp. J. Sci. 18 (1921) 290; Merrill, Enum.

Philipp. Pl. 3 (1923) 177. — *Jossinia sargentii* (Merr.) Merr., Philipp. J. Sci. 79 (1951) 360. – **Type:** Luzon: Province of Cagayan, [Littoe, vicinity of] Peñablanca, 5 Jun 1917, *Adduru 169* (holo, PNH†; iso, A, K–photo!).

Tree 5–12 m high; branchlets densely white-tomentose, glabrescent. **Leaves** opposite; lamina ± coriaceous, oblong-elliptical to ovate-elliptical, 4.5–9 cm long, 2–4 cm wide, apex shortly and obtusely acuminate, retuse, base tapering gradually to the petiole, glands scattered; petiole 5–10 mm long. **Inflorescence** axillary (often in the uppermost axils); **flowers** fascicled, sessile. Hypanthium ca 2 mm long, ca 4 mm wide, white-tomentose; sepals unequal, reniform to orbicular-ovate, 2.5–3 mm long; petals white, obovate to elliptical, ca 5 mm long; stamens numerous, 3–4 mm long. Ovary 2-locular, style ca 4 mm long. **Fruit** ovoid, ca 15 mm diam., nearly glabrous; **seed** solitary.

Local names: Tulisayan and tumaluhu (Cagayan Province: Ibanag language); Pandaraga (Ticao: probably Masbateño, a Visayan language).

Distribution: Also recorded from other areas in Luzon (Provinces of Zambales, Pampanga, Ilocos Norte and Rizal) and in the Bicol Region (Province of Masbate: Ticao). The island of Ticao has substantial deposits of limestone that are being mined for cement production.

Acknowledgements

I am indebted to Hans-Joachim Esser (M) for information about specimens collected by August Loher in the Philippines, and to Jeremy Bruhl (Australian Botanical Liaison Officer at Kew 2007–8) and John Boggan and Ingrid Lin (US) for supplying photographs of type specimens.

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