Gardens' Bulletin Singapore 68(2): 279–285. 2016
doi: 10.3850/S2382581216000211

Studies on *Begonia* (Begoniaceae) of the Moluccas III: A new *Begonia* from Seram, Indonesia

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ABSTRACT. A new species of *Begonia*, *Begonia nephrophylla* Undaharta & Ardi, is described from Manusela National Park, Seram Island, Moluccas, Indonesia. The species is endemic to Seram and belongs to *Begonia* section *Petermannia*. An illustration of the new species and a key to the Moluccan species of *Begonia* is presented.

Keywords. *Begonia*, Indonesia, Moluccas, new species

Introduction

Begonia (Begoniaceae) is one of the largest genera of flowering plants and most species are found in the understorey in tropical forests (Tebbitt, 2005). The Moluccas have relatively few species compared to the other islands in the eastern part of Indonesia, Sulawesi and Papua. As for most of the region, the *Begonia* flora of the islands is poorly known, as indicated by recent new species discoveries (Wiriadinata, 2012; Ardi et al., 2014; Ardi & Thomas, 2015; Ardhaka et al., 2016;) and as-yet undescribed species in both living and herbarium collections. Currently there are eight species known from the Moluccas, of which six are endemic to the archipelago or locally endemic to a single island (Table 1).

During the *Begonia* expedition to Seram which was carried out by "Eka Karya" Bali Botanical Gardens, Indonesian Institute of Sciences (LIPI) in 2010, several specimens suspected to be new to science were collected. Here a new species, named *Begonia nephrophylla* Undaharta & Ardi, is described from material collected in Seram and cultivated at Bali and Bogor Botanic Gardens. The species belongs to *Begonia* section *Petermannia* (Klotzsch) A.DC. which is characterised by protogynous inflorescences, 2-flowered female inflorescences or solitary female flowers, 3-locular ovaries with axile placentation and bilamellate placentae, fruits with equal or subequal wings, and anthers with unilaterally positioned slits (Doorenbos et al., 1998). All available *Begonia* specimens from BO, E, K, L and SING (Thiers, continuously updated) have been consulted without any additional material being found and hence it must be assumed, at least until more intensive collecting reveals otherwise, that this species has a restricted range and is endemic to Seram.

Table 1. *Begonia* species of the Moluccas (Wiriadinata, 2012; Ardi et al., 2014; Ardi & Thomas, 2015; Hughes et al., 2015; Ardhaka et al., 2016).

Species	Locality
Begonia aptera Blume	Mollucas, Papua, Sulawesi
Begonia aketajawensis Ardi & D.C.Thomas	Halmahera
Begonia galeolepis Ardi & D.C.Thomas	Seram
Begonia holosericea (Teijsm. & Binn.) Teijsm. & Binn.	Ternate
Begonia holosericeoides Ardi & D.C.Thomas	Halmahera
Begonia manuselaensis Ardhaka & Ardi	Seram
Begonia rieckei Warb. complex species	Mollucas, Papua, Sulawesi Phillipines, Pacific Islands
Begonia sageaensis Wiriad.	Halmahera

Begonia nephrophylla Undaharta & Ardi, **sp. nov.** (Section *Petermannia*)
Species resembling *Begonia galeolepis* Ardi & D.C.Thomas in the creeping habit and the sparse to moderately dense indumentum of fleshy, branched, appressed red scales on stems, petioles and abaxial leaf lamina veins, but differs consistently by shorter petioles (3–8 cm vs 7–22 cm in *B. galeolepis*), smaller kidney-shaped leaves (5–7 × 8–11 cm vs 12.5–17.2 × 16–23.8 cm), generally shorter male flower pedicels (4–5 cm vs 4–11 cm), obovate male flower tepals (vs broadly ovate), and fewer stamens (35–40 vs 45–51). – TYPE: Originally a living collection from Indonesia, Moluccas, Sawai Village, Manusela National Park, grown on as cultivated material, vouchered and selected as type material on 18 April 2016 as *N.K.E. Undaharta 4* (holotype BO; isotypes THBB (Herbarium Hortus Botanicus Baliense, Bali Botanic Gardens), KRB, SING. (Fig. 1, 2)

Perennial, monoecious herb, stem creeping, not rhizomatous, rooting where nodes touch the substrate, up to c. 30 cm long; stems, petioles, primary and secondary veins on the abaxial leaf lamina surfaces with a sparse to moderately dense indumentum of multicellular, red scales up to 4 × 2 mm. ***Stem*** branched, internodes 3–4 cm, green or reddish with short white stripes or spots. ***Leaves*** alternate; stipules persistent, 12–15 × 5–8 mm, ovate to narrowly triangular, acuminate, setose, margin entire and sometimes slightly revolute, reddish, translucent at the margins; *petioles* c. 3–8 cm long, adaxially deeply channelled, moderately covered by red scales which form a ring at the attachment of the petiole to the lamina base; *lamina* basifixed, 5–7 × 8–11 cm, broadly ovate to suborbicular, base cordate and lobes not overlapping, apex rounded or slightly acute, margin denticulate, the teeth bristle-pointed, adaxially dark green, glabrous, prominent between the veins, abaxial surface green and sparsely hairy on the veins, primary veins 7–10, actinodromus, secondary veins brochidodromus.

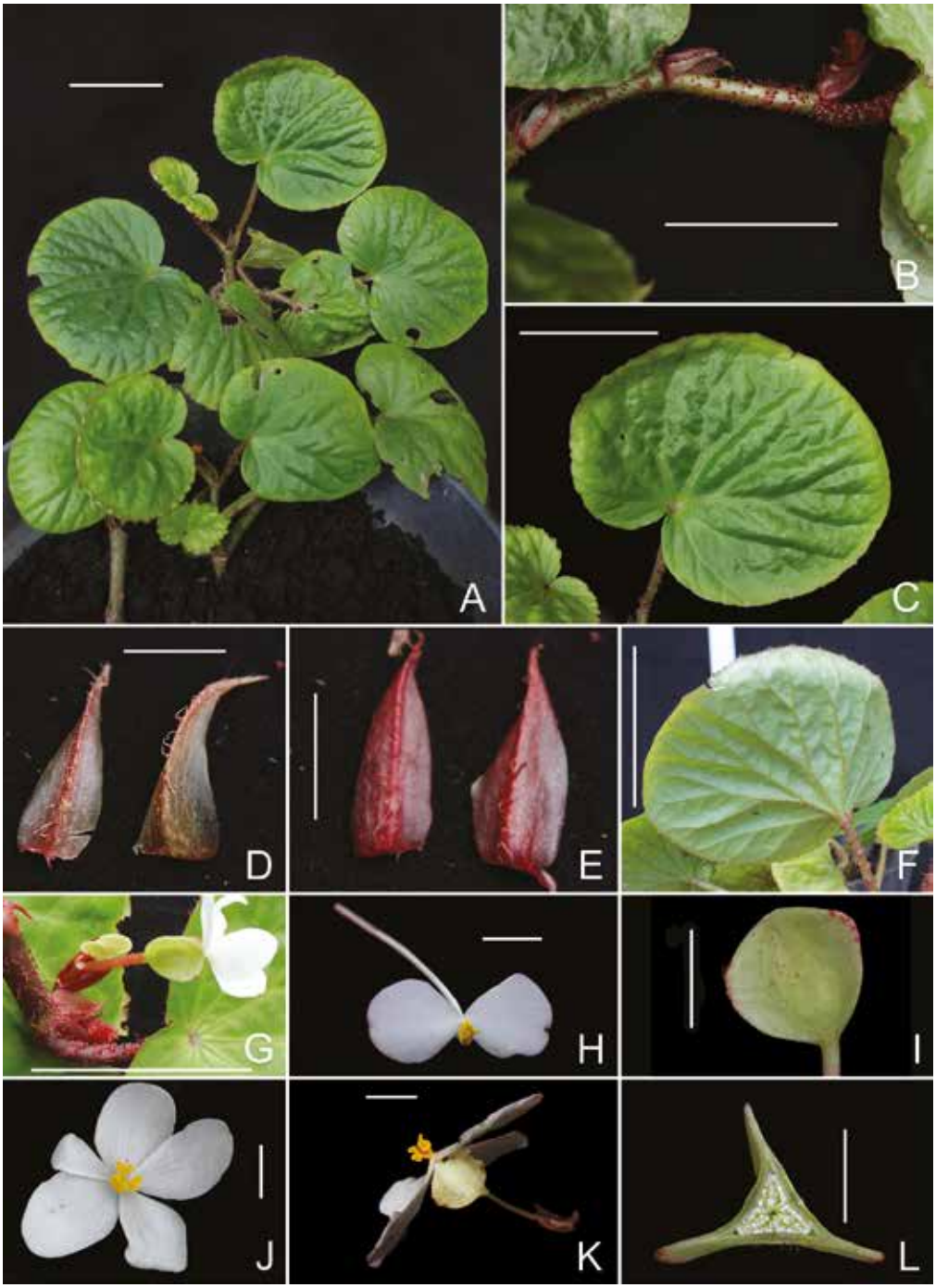

Fig. 1. *Begonia nephrophylla* Undaharta & Ardi **A.** Growth habit in cultivation. **B.** Red scales on stem and stipules. **C.** Adaxial leaf surface. **D.** Stipules. **E.** Bracts. **F.** Abaxial leaf surface. **G.** Inflorescence. **H.** Male flower. **I.** Fruits. **J–K.** Female flower. **L.** Ovary transverse section. Scale bars: A–C, F, G = 5 cm; D, E, H–L = 1 cm. (Photos: Gede Wawan Setiadi)

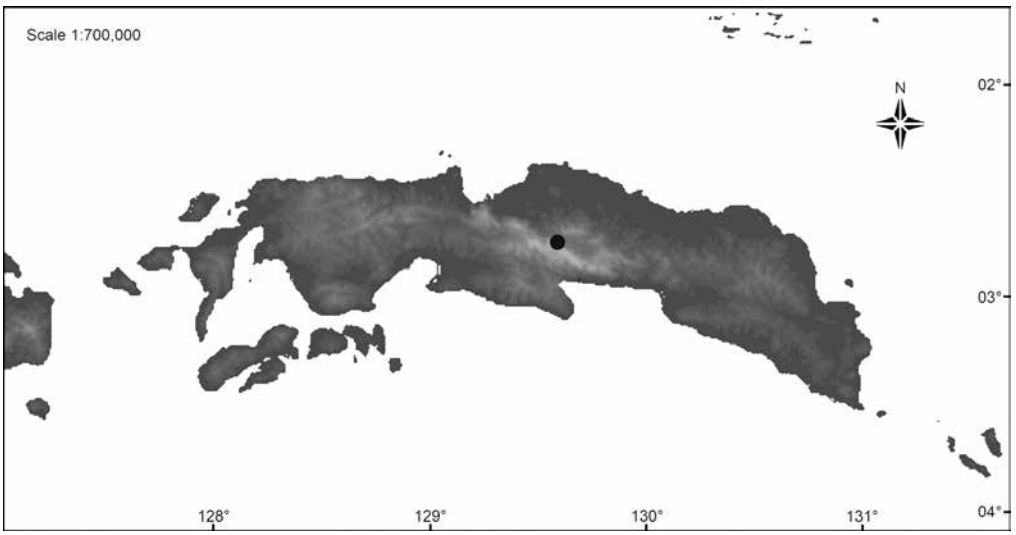

Fig. 2. Distribution of *Begonia nephrophylla* Undaharta & Ardi. Collection sites are indicated by a circle (Manusela National Park). Specimen location information was georeferenced using the GeoNames geographical database (http://www.geonames.org/).

Inflorescences axillary, protogynous, female partial inflorescence 1–2-flowered, basal to the male partial inflorescences, peduncles c. 3 mm long; male partial inflorescences 2–3, monochasial, each monochasium with 2–4 flowers, peduncles c. 5 mm long; *bracts* ovate to elliptic, 10–20 × 7–10 mm, creamy, tinged pink, with an abaxially prominent midrib and sparse tiny red scales, apex projecting acuminate. ***Male flowers***: pedicels 4–5 cm long, glabrous; *tepals* two, white or white with a pink tinge at the margin, abaxially glabrous, obovate, 14–16 × 14–15 mm; *androecium* of 35–40 stamens, yellow, filaments 1–2 mm long, slightly fused at the very base, anthers c. 1–1.5 mm long, obovate, dehiscing through unilaterally positioned slits c. 1/2 as long as the anthers. ***Female flowers***: pedicel 1.8–2 cm long, sparsely hairy, red to green; *tepals* (4–)5, white tinged with pink, unequal, the four larger 20–21 × 12–18 mm, obovate, the smallest 16–17 × 3–4 mm, elliptic, abaxially glabrous; *ovary* obovoid, 10–12 × 5–6 mm (excluding the wings), green, glabrous but sometimes sparsely red hairy, locules 3, placentation axile, placentae bilamellate, wings 3, green to reddish, base rounded, apex cuneate, style basally fused, 3-branched, each stylodium bifurcate in the stigmatic region, stigmatic surface a spirally twisted papillose band, orange. Fruits borne on pedicels up to 4 cm long, capsule obovoid, up to c. 19 × 10 mm (excluding the wings), sparsely hairy, dehiscent, wing shape as for ovary. ***Seeds*** unknown.

Distribution. Endemic to Seram, Manusela National Park, locally common.

Habitat. Primary lowland rainforest, growing on damp soil, near a river in light shade, 19 m altitude.

Etymology. The specific epithet is derived from the Greek *nephros* (kidney) and *phyllum* (leaf). Refers to the leaf shape which resembles a kidney.

Notes. The character of a creeping stem in *Begonia* section *Petermannia* is not well represented in Asia except in a number of species in Borneo (*B. bosuangiana* S.Julia, *B. bakunensis* S.Julia, *B. benaratensis* S.Julia, *B. conipila* Irmsch. ex Kiew, *B. crockerensis* Rimi, *B. divergens* Kiew & S.Julia, *B. johariana* S.Julia & C.Y.Ling, *B. kachak* K.G.Pearce, *B. kasutensis* K.G.Pearce, *B. kiamfeii* Kiew & S.Julia, *B. kinahimiae* Rimi, *B. lucychongiana* S.Julia & Kiew) (Kiew et al., 2015; Repin et al., 2015), the Moluccas (*B. aketajawensis, B. holosericea, B. holosericeoides, B. manuselaensis, B. galeolepis, B. sageaensis*) (Wiriadinata, 2012; Ardi et al., 2014; Ardi & Thomas, 2015; Hughes et al., 2015; Ardhaka et al., 2016) and Sulawesi (*B. gemella* Warb. ex L.B.Sm. & Wassh., *B. heteroclinis* Miq. ex Koord. and *B. flacca* Irmsch.) (Thomas et al., 2013), but *Begonia nephrophylla* can easily be distinguished from all of these species by the moderately dense indumentum of fleshy, branched, appressed red scales on the stems, petioles and abaxial leaf lamina veins. Otherwise *Begonia nephrophylla* is morphologically similar to *B. galeolepis* from Seram except that its creeping stem never tends to be erect or semi erect, while in *B. galeolepis* it initially has a semi-erect stem which becomes creeping when older. Other characters to distinguish the two species are given in the diagnosis.

Provisional IUCN conservation assessment. Data Deficient (DD). *Begonia nephrophylla* is known from a single locality in a legally protected area, Manusela National Parks, where no signs of major anthropogenic disturbance were noticed. Further exploration is required to assess the species' current range.

Identification key to *Begonia* in the Moluccas
(updated from Ardi et al., 2014)

1a. Plant erect 2
1b. Plant creeping 3

2a. Leaves broadly ovate; female flowers with 2–5 tepals; male flowers with 2 tepals, anther connectives not projecting at apex ..... *B. rieckei* complex
2b. Leaves oblong, elliptic or broadly elliptic; female flowers with 6 tepals; male flowers with 4 tepals, anther connectives projecting at apex ..... *B. aptera*

3a. Stem with branched hairs 4
3b. Stem with red scales **7**

4a. Male flower with 4 tepals; leaves obovate to orbicular ..... *B. aketajawensis*
4b. Male flower with 2 tepals; leaves ovate or broadly ovate to suborbicular 5

5a. Leaves densely hairy on both sides ..... *B. sageaensis*
5b. Leaves upper surface glabrous 6

6a. Leaves broadly ovate to suborbicular with rounded apex; female inflorescence peduncle 2–3 mm long; ovaries densely hairy ..... *B. holosericea*
6b. Leaves ovate with acuminate apex; female inflorescence peduncle 1.1–3.5 cm long; ovaries sparsely hairy or glabrous ..... *B. holosericeoides*

7a. Stem thin with sparse, small, red, flattened scales on the stem and petioles; leaves small (4.8–7 × 3–5 cm), ovate to elliptic; male partial inflorescences 1(–2) per inflorescence ..... *B. manuselaensis*
7b. Stem thicker with moderately dense larger red flattened scale and petioles, larger broadly ovate or suborbicular leaves (> 7 × 5 cm); male partial inflorescences 2–3 per inflorescence 8

8a. Leaves adaxially green to reddish, broadly ovate or suborbicular, 16–23.8 × 12.5–17.2 cm, apex acuminate; male flower pedicels 4–11 cm long, tepals broadly ovate, stamens 45–51; female flower tepals 5(–6), abaxially sparsely hairy to glabrescent, ovary wings with slightly rounded to cuneate base, apex of wings truncate ..... *B. galeolepis*
8b. Leaves adaxially dark green, suborbicular, 8–11 × 5–7 cm, apex shortly acute or rounded; male flower pedicels 4–5 cm long, tepals obovate, stamens 35–40; female flower tepals (4–)5, abaxially glabrous, ovary wings with rounded base, apex of wings cuneate ..... *B. nephrophylla*

ACKNOWLEDGEMENTS. We thank the *Begonia* expedition to Seram team members, I Gede Tirta, I Made Ardhaka and I Putu Suparta, the curators of A, B, BM, BO, CEB, E, K, L and SING for allowing us access to herbarium material, and Daniel Thomas and David Middleton for their comments and correcting the English.

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