



## *Begonia francisabuidii*, (section *Baryandra*, Begoniaceae) a new species endemic to Albay, Luzon Island, Philippines

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**ABSTRACT:** *Begonia francisabuidii* from Albay, Bicol region, Luzon Island is here described as a new species endemic to the Philippines. Belonging to section *Baryandra*, it resembles *B. madulidii* but is distinguished by shorter and puberulent rhizomes, densely hirsute stipules, reddish and pubescent petiole, smaller leaves, puberulous panicle, smaller bracts and 4-tepaled pistillate flower. According to the IUCN red list categories and criterion, *B. francisabuidii* is proposed to be placed in the Critically Endangered (CR) category.

**KEY WORDS:** *Begonia madulidii*, biodiversity, conservation, critically endangered, Southeast Asia, taxonomy.

### INTRODUCTION

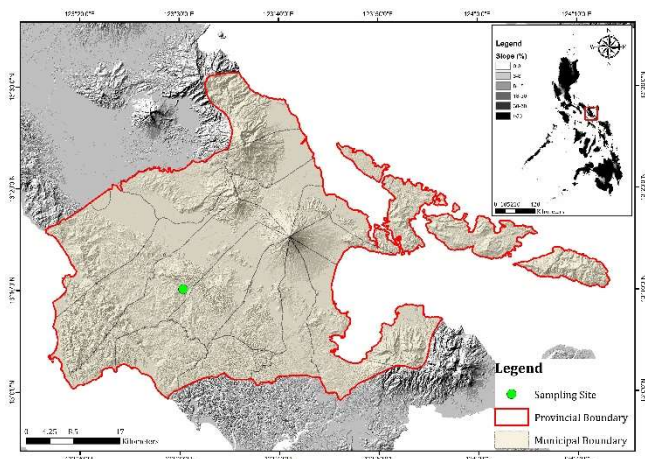
*Begonia* Linnaeus (1753: 1056) is a mega-diverse and fast-growing genus with about 2074 known species worldwide, making it the fifth-largest genus amongst angiosperms (Moonlight *et al.*, 2018; Tian *et al.*, 2018; Hughes *et al.*, 2015–). This number of *Begonia* is expected to increase as many undescribed species are waiting to be discovered in Southeast Asia, the center of *Begonia* diversity (Moonlight *et al.*, 2018). The Philippine archipelago has a rich and highly endemic *Begonia* flora, with 146 accepted species (Hughes *et al.*, 2015–). Following the comprehensive work of Merrill (1911), many taxonomic studies have contributed to the discovery of many new species of *Begonia* (e.g., Blasco *et al.*, 2021; Buenavista *et al.*, 2021; Camange *et al.*, 2021; Mazo *et al.*, 2021; Naive *et al.*, 2021 and Rubite, 2021). Philippine *Begonia*s are recently delimited into two sections, namely, *B. sect. Baryandra* A. de Candolle (1859:122) and *B. sect. Petermannia* (Klotzsch, 1855:74) A. de Candolle (1859:128) (Rubite, 2012; Rubite *et al.*, 2013). *Begonia sect. Baryandra* is composed of 85 species; 76 of which are endemic to the country, and the remaining species are originated in Borneo, New Guinea and Taiwan, making the Philippines a center of diversity (Rubite *et al.*, 2013, Hughes *et al.*, 2015–). Further survey in the Philippines is recommended due to the small distribution ranges of many *Begonia* species (Rubite and Madulid, 2009).

The province of Albay is one of the six provinces in the Bicol region that is located in the southeastern part of the island of Luzon. The province was declared as a Biosphere Reserve in the year 2016 by the UN Educational, Scientific and Cultural Organization (UNESCO), considered as a prime example of

sustainable development and biodiversity. Important areas for biodiversity are located in Albay such as Mt. Mayon and Mt. Malinao (Siler *et al.*, 2017; Balete *et al.*, 2013). Albay province is still unexplored for *Begonia* species. Based on herbarium specimens, there are only 4 species collected in Albay specifically in Mt. Mayon and Mt. Malinao. *Begonia aequata* A. Gray, *B. cumingiana* (Klotz.) DC, *B. lagunensis* Elmer and *B. pseudolateralis* Warb. were collected separately by Philippine Botanists Gregorio E. Edaña in the year 1956, Demetrio R. Mendoza in the year 1953 and Ernesto J. Reynoso in the years 1991 and 1995 (Hughes *et al.*, 2015–), all of them belong to *B. sect. Petermannia*. During a recreational visit of the second author in Nahulugang-Patok Falls, Barangay Oma-Oma, Ligao City, an interesting *Begonia* from *B. section Baryandra* was encountered. Morphological comparison with allied species concludes that the encountered *Begonia* do not belong to any known species. Further efforts to classify and distinct the *Begonia* species occurring in the region of Bicol is consolidated with a dichotomous key. This serendipitous discovery resulted to the description of a new species of *Begonia* under sect. *Baryandra*, the first *Begonia sect. Baryandra* species collected and described from the Province of Albay.

### MATERIALS AND METHODS

Morphological studies on at least 10 plants of *Begonia francisabuidii* were made in the type locality at Nahulugang-Patok Falls, Barangay Oma-Oma, Ligao City (Figure 1). Further morphological studies were based on herbarium specimens and photo documentations. The subject is examined against other allied species via literatures, online herbarium records and photographs



**Fig 1.** Boundary map of Albay Province indicating Barangay Oma-Oma, Ligao City, the type locality of *Begonia francisabuidii*.

from online data base such as Co's digital flora of the Philippines (Pelser *et al.* 2011–). The collections were made under the Wildlife Gratuitous Permit No. R5-140.

### Key to the *Begonia* section *Baryandra* species of Bicol Region

1. Stems clinging to the trunk of trees, grows on elevation 1,800–2,100 m. Flowers orange ..... *B. oxysperma*  
– Stem rhizomatous on soil or rocks, grows on altitude 0–1000 m. Flowers white or pink ..... 2
2. Lamina variegated, green turning brown or having a contrasting darker vein ..... *B. titoevangelistae*  
– Lamina uniformly green to dull ..... 3
3. Rhizome creeping up to a meter long, with internodes up to *ca.* 7 cm long ..... *B. neopurpurea*  
– Rhizome generally do not exceed 20 cm long, internodes congested, up to *ca.* 1 cm long ..... 4
4. Pistillate flower consists of five tepals ..... 5  
– Pistillate flower consists of four tepals ..... 6
5. Leaf blade obliquely ovate, leaf margins with protruded, irregular angles ..... *B. madulidii*  
– Leaf blade almost orbicular, margin almost entire, shallowly undulate ..... *B. caramoanensis*
6. Bracts persistent, densely glandular ..... *B. mindorensis*  
– Bracts deciduous, glabrous ..... *B. francisabuidii*

## TAXONOMIC TREATMENT

*Begonia francisabuidii* C.J.P.Dela Cruz, S.R.Concepcion & Y.P.Ang, *sp. nov.* **Figs. 2 & 3**

§ *Baryandra*

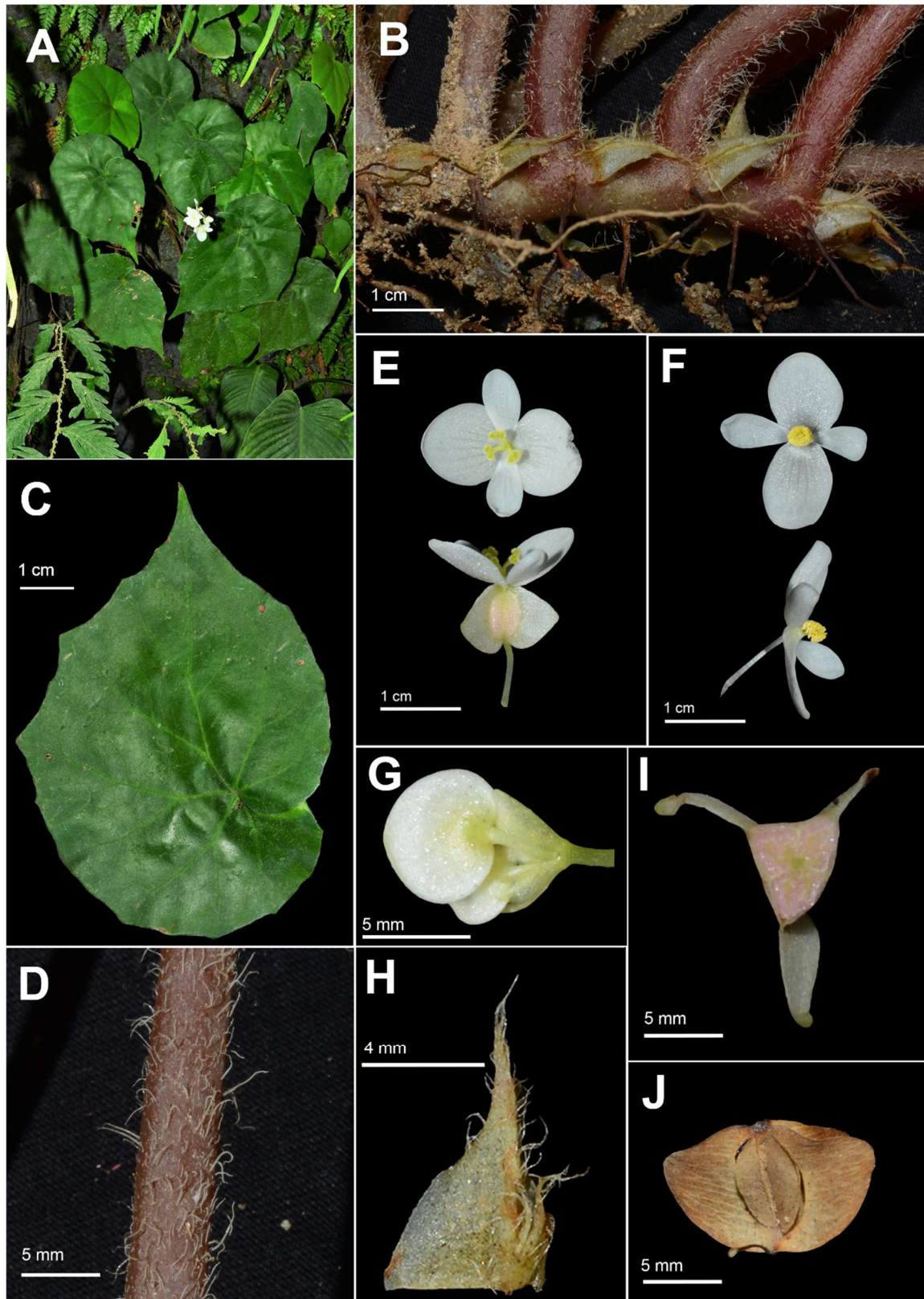
**Type:** PHILIPPINES. Luzon, Albay, Ligao City, Barangay Oma-Oma, Nahulugang-Patok Falls, secondary forest, elevation 187 m, 13°10.1015'N, 123°30.3652'E, 6 November 2021, C.J.P. Dela Cruz 0001 with S.R. Concepcion. (Holotype PNH; Isotype CEBU)

**Diagnosis:** *Begonia francisabuidii* is similar to *B. madulidii* in overall habit: oblique to widely ovate lamina with an acuminate apex, pale green and glabrous adaxially, stipules ovate-triangular and strongly keeled, bracts widely ovate. However, the new species differs in having subpubescent rhizomes (vs. glabrous), petiole

reddish and pubescent (vs. pale green with very sparsely erect velutinous hairs), smaller lamina (13–15.1 × 8–10 cm vs. 11.5–21.5 × 9.5–18 cm), panicle puberulous (vs. glabrous), smaller bracts (3–4 mm long vs. 10–12 mm long) and pistillate flower 4-tepaled (vs. 5-tepaled). A more detailed comparison is provided in **Table 1**.

**Description:** Lithophytic herb, monoecious, rhizomatous. **Rhizome** creeping, *ca.* 10 cm long, 6–7 mm thick, subpubescent, reddish to burgundy with scattered brown to black dots and prominent petiolar scars, internodes 6–12 mm long. **Stipules** persistent, pale green, ovate triangular, 9–10 mm long, 6–7 mm wide, herbaceous, strongly keeled with long pale green to pale brown hair fused at the base of the keel, abaxially densely hirsute on lower half and keel, adaxially glabrous, margin entire, apex aristate, arista 6–7 mm long. **Leaves** alternate, petiole terete, reddish to pale brown with age, 9.5–20.5 cm long, 3–4 mm thick, pubescent, densely towards the base of the petiole; leaf blade asymmetric, succulent, oblique, ovate to widely ovate, slightly undulating, 12–15.1 cm long, 8–9.7 cm wide, broad side width 5–7 cm, basal lobes cordate, sinus overlaps prominently, apex acuminate, margin broadly serrate, white to pale green puberulous; adaxially green, glabrous, glossy, abaxially pale green, glabrous except sparsely white puberulous hair on veins, venation palmate, *ca.* 7 primary veins, midrib distinct with *ca.* 2 secondary veins on each side, branching dichotomously, tertiary veins reticulated.

**Inflorescence** axillary, 18.5–25 cm long, erect, bisexual, protandrous, cymosely branching panicle 22.5–30.5 cm long, peduncle with dichasial branching initially, staminate inflorescences eventually transit into monochasial cymes, pale green in general and brownish red towards the base, white puberulous, glabrescent. **Bracts** deciduous, pale green, hyaline, widely ovate, boat-shaped, 3–4 mm long, *ca.* 3 mm wide, glabrous, margin entire, apex mucronate. **Staminate flower** pedicel 0.8–1 cm long, glabrous; tepals 4, white, outer 2 widely elliptic, abaxial surface generally glabrous, but with sparse minutely brown hairs in the lower half portion at higher magnification (see notes), 9–10 mm long, 7–8 mm wide; inner 2 oblance-ovate, glabrous, *ca.* 7 mm long, 3 mm wide, apex rounded; androecium actinomorphic, 2–3 mm in diameter; stamens yellow, 37–55, filaments fused at the base; anthers obovate, *ca.* 1 mm long, 2-locular, apex obovate, subequal at filaments. **Pistillate flower** pedicel *ca.* 0.8 cm long, glabrous; tepals 4, white; outer 2 widely elliptic, generally glabrous, but with sparse minutely brown hairs in the lower half portion at higher magnification (see notes), *ca.* 9 mm across; inner 2 oblance-ovate, glabrous, apex rounded, *ca.* 7 mm long, 3 mm wide; ovary trigonous-ellipsoid, white to pale pink or yellow, generally glabrous, but with sparse minutely brown hairs observable at higher magnification (see notes), *ca.* 6 mm long, 3 mm thick (wings excluded); 3-winged, wings subequal, deltate, proximally cordate,



**Fig 2.** *Begonia francisabuidii* C.J.P.Dela Cruz, S.R.Concepcion, Y.P.Ang. **A.** Habit and habitat; **B.** Rhizome, showing stipules and petioles base; **C.** Lamina adaxial surface; **D.** Petiole showing vestiture; **E.** Pistillate flower, face and side views showing ovary; **F.** Staminate flower, face and side views; **G.** Immature inflorescence with bracts; **H.** Stipules; **I.** Ovary cross-section; **J.** Capsule. All from C.J.P. Dela Cruz 0001.

TABLE 1. Morphological comparison of *Begonia francisabuidii* and *B. madulidii*.

	<i>Begonia francisabuidii</i>	<i>Begonia madulidii</i>
Rhizome		
color	reddish to burgundy with scattered brown hairs	pale green
length (cm)	4.8–9.5 or longer	20 or longer
vestiture	subpubescent	glabrous
Stipule		
length (excluding apex extension, mm)	9–10 × 6–7	12–25 × 15–20
vestiture	abaxially densely hirsute on lower half and keel	few fleshy pale green hairs fused into at the base of the keel
Leaves		
petiole	reddish to pale brown with age, pubescent and densely pubescent at the base of the petiole	pale green, very sparsely erect velutinous, hairs pale green, some with few fleshy hairs at base of the petiole
leaf margin	broadly serrated with ciliate white to pale green hairs	denticulate
lamina	dark green adaxially, sparsely white puberulous on all veins abaxially	bright green adaxially, sparsely erect velutinous on all veins abaxially
Inflorescence		
panicle (cm)	22.5–30.5, pubescent	26–40, glabrous
peduncle (cm)	18.5–25, pubescent	20–33, glabrous
Bracts (mm)	3–4 × ca. 3	ca. 10 × 12
Staminate flower		
outer tepal (mm)	widely elliptic, 9–10 × 7–8	narrowly obovate to oblanceolate, ca. 9 × 3–5
Pistillate flower		
tepal count	4	5
outer tepal (mm)	widely elliptic, ca. 9 × 9	widely obovate to suborbicular, 9–14 × 8–13
Ovary		
appearance	white to pinkish with sparse brown hairs	creamy green to pinkish, glabrous
length (mm)	ca. 6	4–6

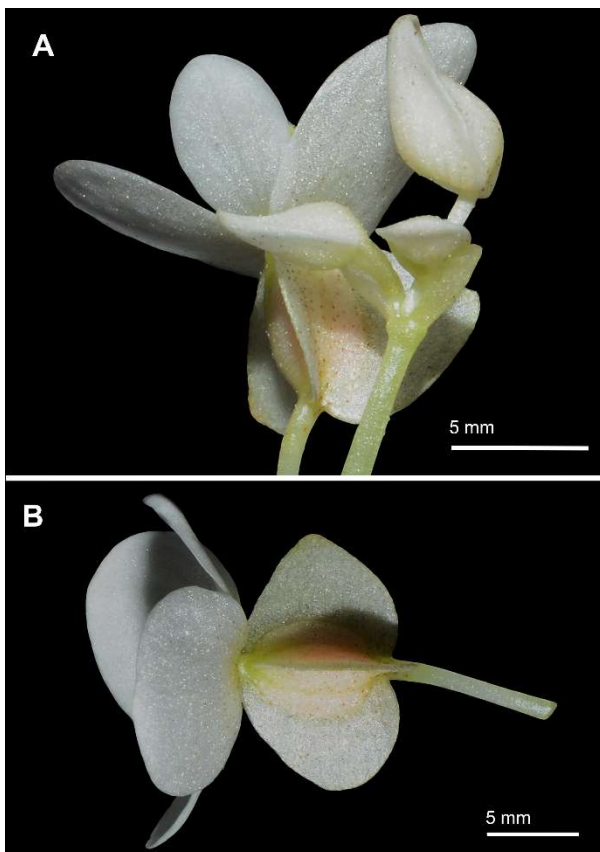


Fig 3. *Begonia francisabuidii* C.J.P.Dela Cruz, S.R.Concepcion, Y.P.Ang. **A.** Pistillate flower with immature florescence; **B.** Pistillate flower and ovary.

distally truncated at an angle, margin entire, 6 mm long, 5–6 mm wide; ovary 3-locular, placenta bilamellate; styles 3, yellow, ca. 2 mm long, stigma spirally twisted and papillose all around. **Capsule** pendent, tepals deciduous, pedicel 8–9 mm long; ovary body 5–6 mm long, 3–4 mm thick, greenish to slightly reddish to brown when fresh, wings subequal, lunate with a blunt angle, 7–8 mm long, lateral wings slightly elongate to 4–6 mm wide, abaxial wing ca. 4 mm wide.

**Etymology:** This *Begonia* is named after the late young Bicolano conservation biologist, Mr. Francis Gregor P. Abuid (1996–2021), in acknowledgement of his efforts in inspiring young Bicolanos to protect, conserve, and study the biodiversity of the Bicol region.

**Distribution and Ecology:** *Begonia francisabuidii* is known only from a small area in Barangay Oma-Oma, Ligao City, Albay. The main population occurs on semi-exposed limestone rock near a waterfall, seen growing along with *Selaginella* sp.

**Phenology:** The plant was observed flowering during the months of September and November.

**Provisional conservation assessment:** Only one population of less than 200 mature individuals was observed in an area less than 75 m<sup>2</sup> near a waterfall in Barangay Oma-Oma, Ligao City, Albay (Bachman *et al.*, 2011). The population is vulnerable and at risk of decline as the site is frequently visited by local tourists. In addition, the area is not currently protected under the country's Expanded National Integrated Protected Areas System by the Department of Environment and Natural



Resources. Following the IUCN 14 Red List guidelines (IUCN Standards and Petitions Subcommittee, 2019), observations of *Begonia francisabuidii* in situ satisfies the criteria of Critically Endangered (CR:B1ab(iii,v)+2ab(iii,v) category based on vulnerability, possible decline in population, restricted geographic range (EOO and AOO less than one km<sup>2</sup> area) with only one single known location and about 200 mature individuals by estimation.

**Other specimen examined:** *Begonia caramoanensis*. PHILIPPINES. Luzon: Camarines Sur, Caramoan, 2 November, 2018, R.R. Rubite 988 (PNH). *Begonia madulidii*. PHILIPPINES. Luzon: Camarines Sur, Sangay, 22 May 2006, R. Rubite 290. *Begonia mindorensis*. PHILIPPINES. Luzon: Sorsogon, Irosin, April 1916, A.D.E. Elmer (PNH 15755). *Begonia neopurpurea*. PHILIPPINES. Luzon: Sorsogon, Irosin, July 1916, A.D.E. Elmer 16565 (NY 00118657); Luzon: Aurora Province, Municipality of Maria Aurora, Barangay. Villa Aurora, 12 April 2012, J.R.C. Callado 434 (PNH 255686). *Begonia titoevangelistae* PHILIPPINES. Catanduanes Island: Gigmoto, Barangay San Pedro, Nahulugan Falls, 28 June 2015, Tandang 1994 (PNH 254960).

**Notes:** Under close inspection, tiny sparse brown trichomes can be observed on the abaxial surfaces of the staminate and pistillate tepals, and the ovary (Figure 3). These scale-like brown trichomes appear as tiny spots, could be easily missed and were more observable in fresh blooms. Therefore, it should be used with caution as a diagnostic characteristic. *Begonia francisabuidii* was observed growing only in moist shaded rocks near a waterfall. We assume that this species is highly dependent on moisture. No records of *B. francisabuidii* are known in any use for ornamental, traditional medicine, or consumption by the locals.

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