

The identity of *Plagiostachys parviflora* (Zingiberaceae: Alpinioideae) unravelled after 196 years

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ABSTRACT. We collected specimens in Ilocos Norte, Philippines, and identified them as *Plagiostachys parviflora* (C.Presl) Ridl. (Zingiberaceae: Alpinioideae), a species of which the identity remains doubtful since its publication in 1827. This is one of the ginger species described and illustrated by Carl Presl using Thaddäus Haenke's specimen collected in the Philippines during the Malaspina expedition. The description of *Plagiostachys parviflora* is expanded here based on new collections including pickled fertile material, and the species is illustrated by a colour plate. Notes on its distribution, phenology, local names, and other notes are also given. *Amomum parviflorum* C.Presl var. *bifidum* C.Presl and *Plagiostachys rolfei* (K.Schum.) Ridl. are treated here as synonyms of *P. parviflora*. Lectotypes are designated for *Amomum parviflorum*, *Amomum parviflorum* var. *bifidum*, and *Alpinia rolfei* K.Schum., and their respective type localities are discussed. *Plagiostachys parviflora* matched the criteria of the IUCN Red List to be considered as Vulnerable (VU). An updated key to the Philippine species of *Plagiostachys* is also provided.

Keywords. *Amomum parviflorum* var. *bifidum*, Cagayan, Malaspina expedition, *Plagiostachys rolfei*, Tarosi, Thaddäus Haenke

Introduction

Some of the oldest specimens of Zingiberaceae from the Philippines were collected by the Czech botanist Thaddäus Haenke (1761–1816) as part of the Malaspina Expedition (1789–1794) funded by the Spanish government to make scientific discoveries (Fernandez-Armesto, 2006). A total of 11 taxa belonging to six ginger genera were collected in 1792 in the Philippines (see the full list of taxa in Table 1). The expedition arrived in Manila on March 1792, and Haenke explored the island of Luzon with Antonio Pineda (1751–1792), the head of the natural history team of the expedition (Madulid, 1982). The expedition visited the provinces of Albay, Bulacan, Cagayan, Camarines, Cavite, Ilocos Norte, Ilocos Sur, Pampanga, Pangasinan, Quezon, and Sorsogon. In December 1792, the expedition left the Philippines (Presl, 1827; David et al., 2003).

Table 1. List of ginger species collected by Thaddäus Haenke in the Philippines.

Original identification	Current identification (accepted name)	Herbarium
<i>Alpinia brevilabris</i> C.Presl	<i>Alpinia brevilabris</i> C.Presl	PR, PRC
<i>Alpinia haenkei</i> C.Presl	<i>Alpinia haenkei</i> C.Presl	PR
<i>Alpinia mollis</i> C.Presl	<i>Alpinia mollis</i> C.Presl	PR, PRC
<i>Amomum parviflorum</i> C.Presl	<i>Plagiostachys parviflora</i> (C.Presl) Ridl.	PR, PRC
<i>Amomum parviflorum</i> var. <i>bifidum</i> C.Presl	<i>Plagiostachys parviflora</i> (C.Presl) Ridl.	PR
<i>Curcuma</i> sp.	<i>Zingiber</i> sp.	PR
<i>Globba marantina</i> L.	<i>Globba marantina</i> L.	PR
<i>Globba parviflora</i> C.Presl	<i>Globba parviflora</i> C.Presl	PR, PRC
<i>Hellenia rufa</i> C.Presl	<i>Alpinia rufa</i> (C.Presl) Náves	PR, PRC
<i>Kolowratia elegans</i> C.Presl	<i>Alpinia elegans</i> (C.Presl) K.Schum	PR, PRC
<i>Leptosolena haenkei</i> C.Presl	<i>Leptosolena haenkei</i> C.Presl	PR, PRC

One of the gingers that Haenke collected belongs to the genus *Plagiostachys* Ridl. which currently comprises 32 species distributed from Nicobar Islands, India in the west to Sulawesi in the east, with a center of diversity in Borneo (Julius et al., 2007, 2008; Docot, 2020; Mazo, 2022). Although not completely diagnostic, *Plagiostachys* is distinguished by the inflorescence, which breaks through the leaf sheaths just above the ground or at some distance, thereby appearing lateral to the leafy shoot (Ridley, 1899). *Plagiostachys* was divided by Smith (1985) into species with mucilaginous and non-mucilaginous inflorescences but the molecular data of Julius et al. (2008) did not support that division. Presently, there are 13 names of *Plagiostachys* relevant to the Philippines, 10 of which are currently accepted (Pelser et al., 2011 onwards).

Plagiostachys parviflora (C.Presl) Ridl. was described by Presl (1827) as *Amomum parviflorum* C.Presl using Haenke’s specimen collected in Luzon, Philippines. In the same paper, Presl also described a variety, *Amomum parviflorum* C.Presl var. *bifidum* C.Presl, which is currently a synonym of *Plagiostachys parviflora*. Before Ridley (1909) combined it in *Plagiostachys*, the species was placed in several genera: [1] *Hellenia* Willd. (= *Alpinia* Roxb.) by Horaninow (1862); [2] *Alpinia* by Rolfe (1884); and [3] *Cardamomum* Rumph. ex Kuntze (= *Amomum* Roxb.) by Kuntze (1891).

Schumann (1904) described a species, *Alpinia rolfei* K.Schum., based on a collection by Hugh Cuming (1791–1865) from the province of Albay, Philippines. He placed it in *Alpinia* sect. *Bintalua* K.Schum. with *Alpinia parviflora* (C.Presl) Rolfe (= *Plagiostachys parviflora*). Although unsure, Ridley (1909) made the combination

Plagiostachys rolfei (K.Schum.) Ridl. having not seen any specimens matching the original description.

The identity of *Plagiostachys parviflora* as well as *P. rolfei* remained uncertain as their protologues are limited, and only a few specimens have till date been identified under these names. As a result of the present study, we were able to expand the description of *Plagiostachys parviflora*. Lectotypes are designated for three names and an updated key to the Philippine species of the genus is provided.

Materials and methods

Recent specimens used in this study were collected in Kalbario-Patapat Natural Park and Mount Palemlem, Ilocos Norte in June 2022. Relevant specimens including types deposited in the herbaria of BM, FEUH, FI, K, L, M, MEL, MW, NY, P, PR, PRC and US were examined on hand and by digital images (specimens at M, MEL and MW) and compared to our recent collections. Acronyms of herbaria follow Index Herbariorum (Thiers, continuously updated). Protologues of relevant species, as well as annotations and labels attached to specimens, were scrutinised. For the provisional conservation status, the extent of occurrence (EOO) of *Plagiostachys parviflora* was calculated using the Geospatial Conservation Assessment Tool (GeoCAT) (Bachman et al., 2011: <http://geocat.kew.org/>) and then assessed using IUCN guidelines and criteria (IUCN Standards and Petitions Committee, 2022).

Results and discussion

Type localities of Plagiostachys parviflora and P. rolfei

In the original label of one of the six sheets of the original material of *Plagiostachys parviflora*'s type (PR 335763: 1824A), Presl wrote "in insula Luzon: Tarosi" (on the island of Luzon: Tarosi). On JSTOR (<http://plants.jstor.org/>), Tarosi is written as the type locality of *P. parviflora*. We were unable to find a place (currently or formerly) named Tarosi in the provinces that Haenke visited. Interestingly, Tarosi is the local name of the ginger *Alpinia brevilabris* C.Presl in the Ilokano language (Antonio et al., 2018) and probably a generic name of any wild ginger species in that region. The colon after Luzon may indicate that Haenke referred to Tarosi as a vernacular plant rather than a name of a place, similar to the label information presented on one of the sheets of *Alpinia brevilabris* type (PR 335770: 1831A): "Luzon: Banai fallores", where Banai is also a general local name for wild gingers in the Ilokano language (Madulid, 2001). In fact, Tarosi is not even written in the locality details of *Plagiostachys parviflora* in the protologue. This information may also indicate that Haenke may have collected *P. parviflora* somewhere in Northern Luzon where most people speak the Ilokano language (Fig. 1).

In contrast, Ridley (1909) and Merrill (1923) clarified that the correct locality of *H. Cuming* 1327 (type of *Plagiostachys rolfei*) is Cagayan and not Albay as Schumann

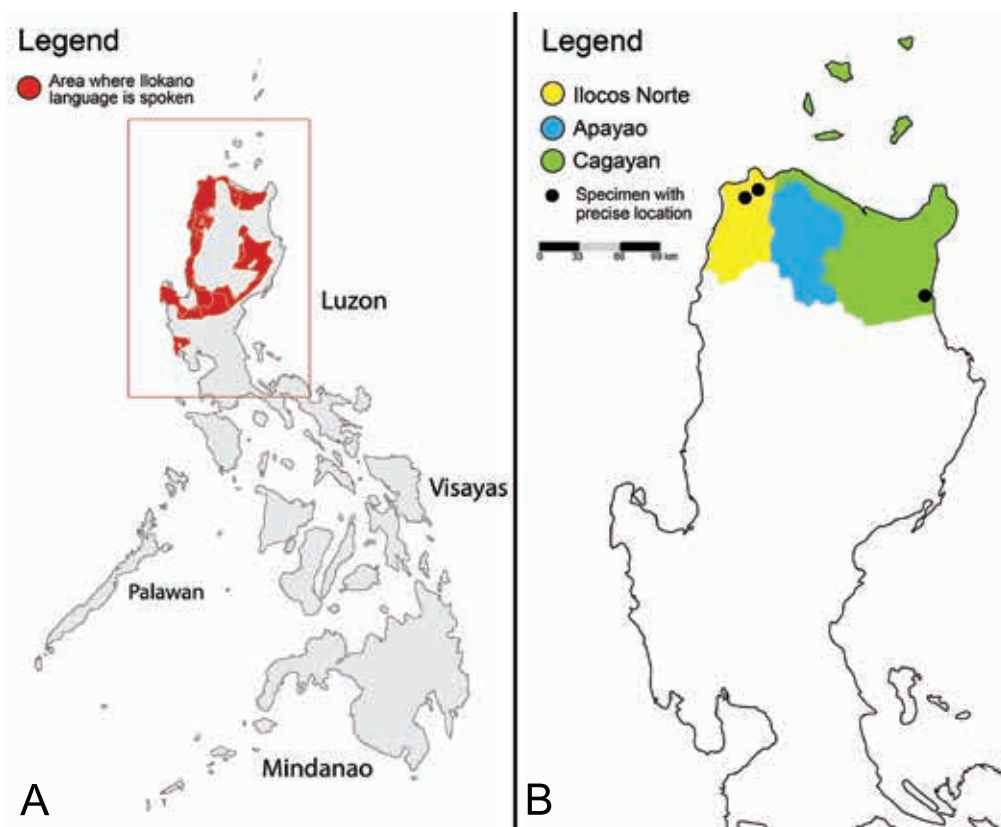


Fig. 1. Distribution map of *Plagiostachys parviflora* (C.Presl) Ridl. **A.** Map showing area where Ilokano language is spoken in the Philippines according to Ethnologue (<http://www.ethnologue.com/>). **B.** Provinces where *P. parviflora* is currently distributed based on specimen records. Only three out of nine specimens have precise location.

(1904) erroneously wrote in the original description (Fig. 1). Only the duplicate at MW has the correct label “Cagayan” as the locality. Specimens collected by Cuming numbered 1261–1380 are from Cagayan while no. 834–947 are from Albay (Merrill, 1926).

Synonyms of *Plagiostachys parviflora*

Presl (1827) when describing *Amomum parviflorum*, also published a variety, *A. parviflorum* var. *bifidum*. The description is very limited characterising it only by the branched inflorescence. *Amomum parviflorum* var. *bifidum* was not included in any accounts except on the Plants of the World Online website (<https://powo.science.kew.org/>) which listed it as a heterotypic synonym of *Plagiostachys parviflora*. As we examined the type that we have located at PR, it differs only by the branched inflorescence (see Table 2 for a detailed comparison). Smith (1985) explained that *Plagiostachys* inflorescences may be simple (Fig. 2D) or bear one or two branches

Table 2. A detailed morphological comparison between *Plagiostachys parviflora* var. *parviflora*, *P. parviflora* var. *bifida* and *P. rolfei* based on examination of their respective types.

Morphological characters	<i>Plagiostachys parviflora</i> var. <i>parviflora</i>	<i>Plagiostachys parviflora</i> var. <i>bifida</i>	<i>Plagiostachys rolfei</i>
Sheath indumentum	Glabrous	Glabrous	Glabrous
Ligule indumentum	Pubescent	Pubescent	Glabrous (hairs may have been lost with age)
Petiole length (cm)	3–4.5	3–4	4
Lamina indumentum	Glabrous on both sides	Glabrous on both sides	Glabrous on both sides
Lamina margin	Glabrous, becoming pubescent towards the apex	Glabrous, becoming pubescent towards the apex	Glabrous, becoming pubescent towards the apex
Inflorescence	Unbranched	2 branches	2 or 3 branches
Inflorescence length (cm)	Up to 12	Up to 9	Up to 28
Bracteole indumentum	Densely pubescent	Densely pubescent	Densely pubescent
Anther connective indumentum	Pubescent	Pubescent	Pubescent
Thecae indumentum	Glabrous	Glabrous	With very few hairs

at the base (Fig. 2C). During our fieldwork, we observed both unbranched and branched inflorescences within the clump of an individual and this character is thus not a taxonomically useful character to separate taxa at any level in *Plagiostachys*. Therefore, we retain *Amomum parviflorum* var. *bifidum* as synonym of *Plagiostachys parviflora*.

The specimen *H. Cuming* 1327 was first identified by Vidal (1885) as *Plagiostachys parviflora*. Then in 1904, Schumann treated *H. Cuming* 1327 as a separate species and named it in honour of the English botanist, Robert Allen Rolfe (1855–1921), characterised by the long spike and absence of an anther crest (vs short and tridentate in *Plagiostachys parviflora*).

After examination of their respective types (see Table 2 for a detailed morphological comparison) there is no doubt that *Plagiostachys parviflora* and *P. rolfei* are conspecific. Aside from the length of the inflorescence (up to 12 cm long in the former vs up to 28 cm long in the latter) and the anther crest (tridentate vs absent), the indumentum of the ligule also differs (pubescent vs glabrous). As the inflorescence

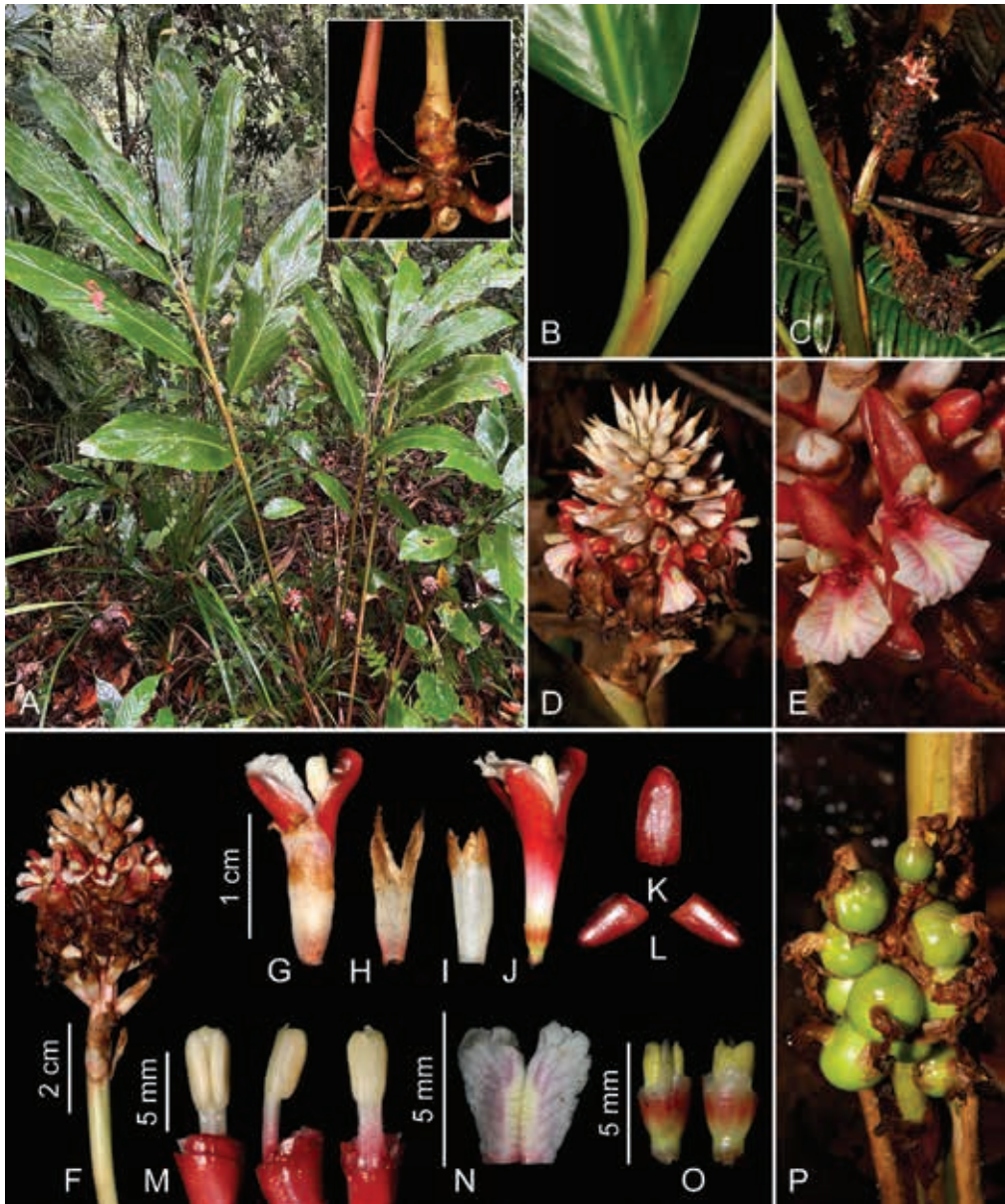


Fig. 2. *Plagiostachys parviflora* (C.Presl) Ridl. **A.** Habit. Inset: Close-up of rhizome and base of two pseudostems. **B.** Ligule and leaf base attached to pseudostem. **C.** Inflorescence, branched. **D.** Inflorescence, unbranched. **E.** Flowers. **F.** Inflorescence. **G.** Flower (with bracteole). **H.** Bracteole. **I.** Calyx tube. **J.** Flower (calyx tube removed exposing the floral tube). **K.** Dorsal corolla lobe. **L.** Lateral corolla lobes. **M.** Stamen (ventral, lateral and dorsal views). **N.** Labellum. **O.** Epigynous gland (top) and ovary (bottom). **P.** Infructescence. A, C–P from R.V.A. Docot et al. 333; B from R.V.A. Docot et al. 331. (Photos: R.V.A. Docot)

matures in *Plagiostachys* (and other ginger genera), the main axis (peduncle and rachis) elongates. This implies that the type of *Plagiostachys parviflora* are young inflorescences, while the type of *P. rolfei* has maturing ones. Especially on dried material, the anther crest becomes very fragile and may completely detach. Schumann may have examined a flower with an anther crest already detached or overlooked it as it is only 1–1.5 mm long (Fig. 2M). Moreover, only the duplicate of *H. Cuming* 1327 at E has an intact ligule and it is indeed glabrous. The degree of hairiness of the ligule in *Plagiostachys* may change over time (ligules glabrescent) and might have been the case for *H. Cuming* 1327. In fact, the type locality of *Plagiostachys rolfei* (Cagayan) is located in Northern Luzon which is believed to be the type locality of *P. parviflora*. With the evidence presented, we are confident to synonymise *Plagiostachys rolfei* with *P. parviflora*.

Taxonomy

Plagiostachys parviflora (C.Presl) Ridl., Philipp. J. Sci., C 4: 178 (1909). – *Amomum parviflorum* C.Presl, Reliq. Haenk. 1: 112 (1827). – *Hellenia parviflora* (C.Presl) Horan., Prodr. Monogr. Scitam. 36 (1862). – *Alpinia parviflora* (C.Presl) Rolfe, J. Linn. Soc., Bot. 21: 316 (1884). – *Cardamomum parviflorum* (C.Presl) Kuntze, Revis. Gen. Pl. 2: 687 (1891). – TYPE: Philippines, Luzon, 1792, *T. Haenke s.n.* (lectotype PRC [PRC450020], designated here; isoelectotypes PR [335763: 1824A, B, C & D], PRC [PRC450019]). (Fig. 2)

Amomum parviflorum var. *bifidum* C.Presl, Reliq. Haenk. 1: 112 (1827). – TYPE: Philippines, Luzon, 1792, *T. Haenke s.n.* (lectotype PR [335764: 1825A & B, mounted on two sheets], designated here).

Alpinia rolfei K.Schum. in Engler (ed.), Pflanzenr. IV, 46: 368 (1904). – *Plagiostachys rolfei* (K.Schum.) Ridl., Philipp. J. Sci., C 4: 179 (1909), **syn. nov.** – TYPE: Philippines, Luzon, Cagayan, 1841, *H. Cuming* 1327 (lectotype K [K000292346], designated here; isoelectotypes BM [BM014605324], FI [FI011940], K [K000292345], L [L0428268], M [M0242447], MEL [MEL2527267A], MW [MW0591765], P [P02202006], PR [68563]).

Terrestrial herb in loose clumps. **Rhizome** 6–12 mm diam. white, scales thin, 1.5–2 × 2–4 cm, glabrous, brown. **Pseudostem** 1–1.5 m long, arching at various degrees, distance between two pseudostems 4–5 cm long, base 1.6–2.2 cm diam. across; both bladeless sheaths and sheaths which end in leaf blade light green, glabrous; **ligule** ovate, 9–10 × 7–8 mm, light green with reddish base, glabrescent, apex emarginate; **petiole** 3–4.5 cm long, channelled, light green, glabrous; **lamina** narrowly ovate on lower ones, narrowly oblong on upper ones, 45–46 × 9–10 cm, dark green above, light green beneath, glabrous on both sides, plicate, base unequal, margin entire, glabrous, becoming pubescent towards the sharply attenuate apex. **Inflorescence**

protruding from the pseudostem 15–30 cm above the ground, non-mucilaginous, elongate with age; *sterile bracts* 2–3, brown with age; free part of the *peduncle* 2–3 cm long, light green, pubescent; *rachis* 5–13 cm long, light green, pubescent; *spikes* ovoid to narrowly ovoid, simple or 2–3 branched, the main spike up to 28 cm long, the spikelet at the base 5–7 cm long, all spikes 1–3 cm wide; *fertile bracts* 1–2 per spike, narrowly ovate, 8–9 mm long, keeled, brown with age, pubescent, apex sharply acuminate; bracteoles tubular, 10–13 mm long, reddish at the base, becoming white toward the apices, densely pubescent, apex 2-dentate, incised on one side 5–6 mm from apex. **Flowers** subsessile, 1.5–2 cm long, congested along the rachis; *calyx tube* 12–13 mm long, white, pubescent, apex 3-dentate; *floral tube* 8–10 mm long, lower half whitish, upper half reddish, internally glabrous, externally glabrous at base, becoming densely pubescent towards base of the lateral corolla lobes; *corolla lobes* narrowly ovate, rufous, sericeous above, glabrous beneath, apex cucullate; *dorsal corolla lobe* 7–11 × 3–4 mm; *lateral corolla lobes* 5–7 × 3–4 mm; *labellum* obcordate, 7–8 × 5–6 mm, white with pink lines, yellowish in centre, glabrous on both sides, apex bilobed, curving downwards at anthesis, incised 1–2 mm; *lateral staminodes* tooth-like, 2–4 mm long, rufous, glabrous; *stamen* 6–8 mm long; *filament* 2–3 mm long, reddish at base, white towards the anther, pubescent; *anther* 4–5 × 2–3 mm, the connective yellowish white, hairs glandular; *anther crest* 1–1.5 mm long, yellow, glabrous, apex 1–3 dentate; *thecae* 3–4 × 1–1.5 mm, yellow, glabrous or with few hairs at margins, dehiscent along its entire length; *pollen* white; *style* 12–20 mm long, white, pilose; *stigma* funnel shape, c. 1 mm wide, white, glabrous, ostiole transverse, ciliate, with three ventral grooves; *epigynous gland* subglobose, 2–3 mm long, yellow, positioned abaxially to the style; *ovary* obovoid, 3–4 × 2–3 mm, green at base, with reddish tinge and paler vertical lines distally, glabrous, coriaceous, trilocular with axile placentation. **Fruits** globose with persistent calyx, 7–9 × 8–9 mm (excl. calyx), light green, glabrous, irregularly grooved; *seeds* c. 2 mm wide, irregular, black, embedded in semi-translucent aril.

Distribution and habitat. *Plagiostachys parviflora* is endemic to the Philippines in the provinces of Apayao, Cagayan, and Ilocos Norte (Fig. 1). It inhabits semi-shaded secondary forest with wet humus up to 700 m elevation.

Phenology. Flowering individuals were observed from March to July. Fruiting between June and late October.

Etymology. The specific epithet refers to the small flowers.

Vernacular name. It is locally known as Pisa and Tarosi in Ilokano language.

Provisional IUCN conservation assessment. *Plagiostachys parviflora* is preliminarily assessed as Vulnerable (VU B1ab(iii), D). Since only three out of nine specimens have precise location (*M.S. Allen 150138*, *R.V.A. Docot et al. 331* and *R.V.A. Docot et al. 333*), we used the total areas of Apayao, Cagayan, and Ilocos Norte provinces to

determine the extent of occurrence (total EOO is 16,725 km²). *Plagiostachys parviflora* is abundant in Mount Palemlem, Ilocos Norte with c. 300 mature individuals observed along the trail. The three provinces are situated in two major mountain ranges in Luzon namely the Cordillera Range (Apayao & Ilocos Norte) and Sierra Madre Range (Cagayan), both of which are surrounded by threats including conversion of forest into agricultural lands for crop production and mining activities. The assessment shall be updated as more information on this species becomes available.

Additional specimens examined. PHILIPPINES: **Apayao:** precise locality unknown, May 1917, *E. Fénix* 28239 (K, L, NY, P, US). **Cagayan:** Mount Balatongan, 1500 ft, 10 Nov 1929, *G.E. Edaño* 78253 (NY); Mount Babatngin, 1900 ft, 20 May 1930, *G.E. Edaño* 79403 (NY); Baguio Cove, 130–170 ft, 22 Mar 1981, *M.S. Allen* 150138 (PNH). **Ilocos Norte:** Adam, Kalbario-Patapat Natural Park, Mount Palemlem, 18°30'54.8"N 120°54'26.1"E, 561 m, 15 Jun 2022, *R.V.A. Docot et al.* 331 (FEUH incl. spirit, SING); 18°31'09.7"N 120°54'05.3"E, 695 m, 15 Jun 2022, *R.V.A. Docot et al.* 333 (FEUH incl. spirit, SING).

Notes. Our recent collections match most of the observable characters on the type and the characters stated in the protologue but with a few exceptions. For example, Presl described the base of the lamina as attenuate which is also our observation on the type. The base of the lamina, however, is actually unequal at fresh state (Fig. 2B). Presl, described the labellum as oblong which is the same as our observation. Our on-site dissection of flowers, however, revealed an obcordate labellum (Fig. 2N). Furthermore, Presl described the anther crest as tridentate. Unfortunately, we were not able to find flowers with intact anther crest on the type. Our recent material, however, revealed a 1-dentate apex. It is possible that the number of teeth in anther crest differs between populations and therefore, we described the anther crest as 1–3-dentate. Dimensions and shapes of leaves and other leaf-like structures may change upon drying due to dehydration (Tomaszewski & Górkowska, 2016). Presl described *Plagiostachys parviflora* using dried material 35 years after Haenke's expedition. Therefore, these mismatches by Presl are not surprising when compared with recent collections.

Ridley (1909) translated the protologue of *Plagiostachys parviflora* having not seen the type nor the figure of Presl (1827). We are confused why Ridley added a few characters, which are not in the protologue (e.g., stem 50 cm long, a description of the ligule, and indumentum of the ovary) since he did not cite any additional specimens as he usually does. Nevertheless, most of the descriptions that Ridley included matched the protologue and the type.

Schumann (1904) noted that he failed to locate the type of *Plagiostachys parviflora* at the Prague National Museum Herbarium (PR). The reason for this may be that the type was still unmounted and not publicly available when he visited the herbarium (Otakar Šída, pers. comm.). The type was located by Jana Škorničková in 2002: four sheets at PR (335763: 1824A, B, C & D) and two sheets at PRC (PRC450019 & PRC450020). Presl worked as a professor of botany at the University of Prague (now Charles University) at the same time he published *Reliquiae Haenkeanae* (1825–1835). This means that Presl already examined all specimens of Haenke in

PRC before some duplicates were moved to PR. Nevertheless, we have chosen the sheet at PRC [PRC450020] as the lectotype of *Amomum parviflorum* which also has superior vegetative and reproductive parts. Although not explicitly mentioned as the type of *Amomum parviflorum* var. *bifidum*, PR no. 335764:1825 is the only specimen with branched inflorescence among Haenke's *Plagiostachys* specimens and hence chosen here as the lectotype. For *Plagiostachys rolfei*, we have found eight additional duplicates of *H. Cuming* 1327 after Newman et al. (2005 onwards) and selected the sheet at K [K000292346] as the lectotype since it has superior vegetative and reproductive parts.

Key to *Plagiostachys* species in the Philippines

The key presented below is an updated version of Docot (2020) with an additional two species described by Mazo (2022). As soon as new material is obtained of imperfectly known species (e.g., species described based on a fruiting collection only), it will be possible to construct a more detailed key.

- 1a. Height < 40 cm; lamina narrowly ovate *P. elegans*
- 1b. Height > 40 cm; lamina narrowly oblong to oblong 2
- 2a. Petiole 65–80 mm long; lamina margin coarsely undulating *P. longipetiolata*
- 2b. Petiole 2–50 mm long; lamina margin slightly undulating 3
- 3a. Fruits globose to subglobose 4
- 3b. Fruits oblong 8
- 4a. Labellum strongly curved upward; fruit maroon when mature *P. lourdesiae*
- 4b. Labellum held flat; fruit mid-green when mature 5
- 5a. Inflorescence mucilaginous; labellum entire 6
- 5b. Inflorescence non-mucilaginous; labellum bilobed 7
- 6a. Ligule pubescent; corolla lobes red with yellowish apex; labellum white with pink streaks *P. philippinensis*
- 6b. Ligule glabrous; corolla lobes white with pinkish apex; labellum yellow with red streaks *P. albiflora*
- 7a. Ligule brownish, sericeous; lamina glabrous beneath; spike conically ovoid; bracteoles white; labellum white with pink line streaks and yellow central part; anther yellowish white; fruits glabrous *P. parviflora*
- 7b. Ligule reddish, pubescent; lamina pubescent beneath; spike ovoid to narrowly ovoid; bracteoles red; labellum red; anther red; fruits pubescent *P. subsessiliflora*

- 8a. Petiole 1–2 mm long (subsessile) *P. escritorii*
 8b. Petiole 20–50 mm long 9
- 9a. Ligule membranous; midrib glabrous; fruits pale green *P. lata*
 9b. Ligule non-membranous; midrib puberulent; fruits reddish *P. corrugata*

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