

Taxonomy, Recollection and Conservation of newly discovered populations of *Hedychium philippinense* (Zingiberaceae): an endemic and threatened species in the Philippines

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ABSTRACT

Recent explorations in the Philippines resulted in the recollection of *Hedychium philippinense*, an imperfectly known Philippine endemic and threatened Zingiberaceae species which was first collected and described over a century. Unlike *H. coronarium*, a widely cultivated and extensively studied species, there is little information about *H. philippinense*. It was in 1925 when the identity and taxonomy of the species was resolved by Merrill. This present paper reports the extended distribution of *H. philippinense* from Kasibu, province of Nueva Vizcaya in northern Luzon and Mt. Malambo, Marilog District, Davao City in southern Mindanao. Detailed taxonomic description, updated distribution and supplementary information such as local names, phenology, habitat and ecology, conservation status, medicinal value, and propagation are provided in this paper. Since the Philippine Zingiberaceae are poorly known, it is important to note the characteristics of *H. philippinense* to facilitate its proper identification. Findings in this paper must be disseminated to policy makers, local government units, research institutes, and other stakeholders to serve as basis for conservation, management, and investigation of this threatened species.

Key words: biodiversity, endangered, *Hedychium mindanaense*, nomenclature, Philippine endemic

INTRODUCTION

Zingiberaceae are mostly found in tropical forests (Sirirugsa & Larsen, 1995; Wood *et al.*, 2000) with 1,500 species distributed in 53 genera (Kress *et al.*, 2002; Lamb *et al.*, 2013). In Asia, Zingiberaceae are found particularly in humid lowland habitats or at high altitudes of South and Southeast Asia (Larsen & Larsen, 2006). Sixteen (16) genera and over 100 species have been reported so far in the Philippines (Pelser *et al.*, 2011 onwards). The distribution of these plants that commonly grow as wild type in the forests makes this family an interesting subject for studies (Hatarti *et al.*, 2014).

One of the most fascinating genera of Zingiberaceae is the *Hedychium* Koenig, a combination of Greek words meaning “sweet snow” that refer to sweet-scented white flowers (Sheehan, 1958). It was first established by Koenig (1783), which glimmered for several publications about the said genus by various botanists, such as Smith (1811), Roxburgh (1820), Roscoe (1824-1828), Wallich (1853), Baker (1892), Schumann (1904), Rao and Verma (1969-1972), and Sirirugsa and Larsen (1995). *Hedychium* comprises approximately 97 species with the center of diversity in Southeast Asia (Thomas *et al.*, 2017). They are recognized easily by their showy, many-flowered terminal spikes on the leafy

shoots consisting of bracts that are usually broad and closely overlapping (Picheansoonthin & Wongsuwan, 2011; Lamb *et al.*, 2013). Given their unique characters, new species of *Hedychium* had indisputably been discovered and described at the start of 21st century.

In the Philippines, *Hedychium* is represented by only two known species, namely – *H. coronarium* Koenig and *H. philippinense* K.Schum. The former is an invasive species (Chiba *et al.*, 2016), and widely-cultivated in the Philippines for ornamental purposes, while the latter is endangered (DAO 2017-11). *H. coronarium*, locally known as *camia*, had been extensively studied and became extremely popular. It had been the focus of majority of studies on inflorescence and flower development (Kirchoff, 1997), variations in tissue development (Cardenas, 2007), phytochemical constituents (Morikawa *et al.*, 2002; Dan *et al.*, 2007; Dos Santos *et al.*, 2010; Baez *et al.*, 2011; Singh *et al.*, 2013; Hartati *et al.*, 2014), pollen biology (Sakhanokho & Rajasekaran, 2010), and medicinal value (Bansal, 2010). On the other hand, no new studies on *H. philippinense* had been conducted in the last few decades.

H. philippinense is an imperfectly known Philippine endemic and endangered Zingiberaceae species which was first introduced to science in 1904 with type specimen collected from the island of Jolo (Schumann, 1904). Ridley (1909) and Elmer (1915) reported

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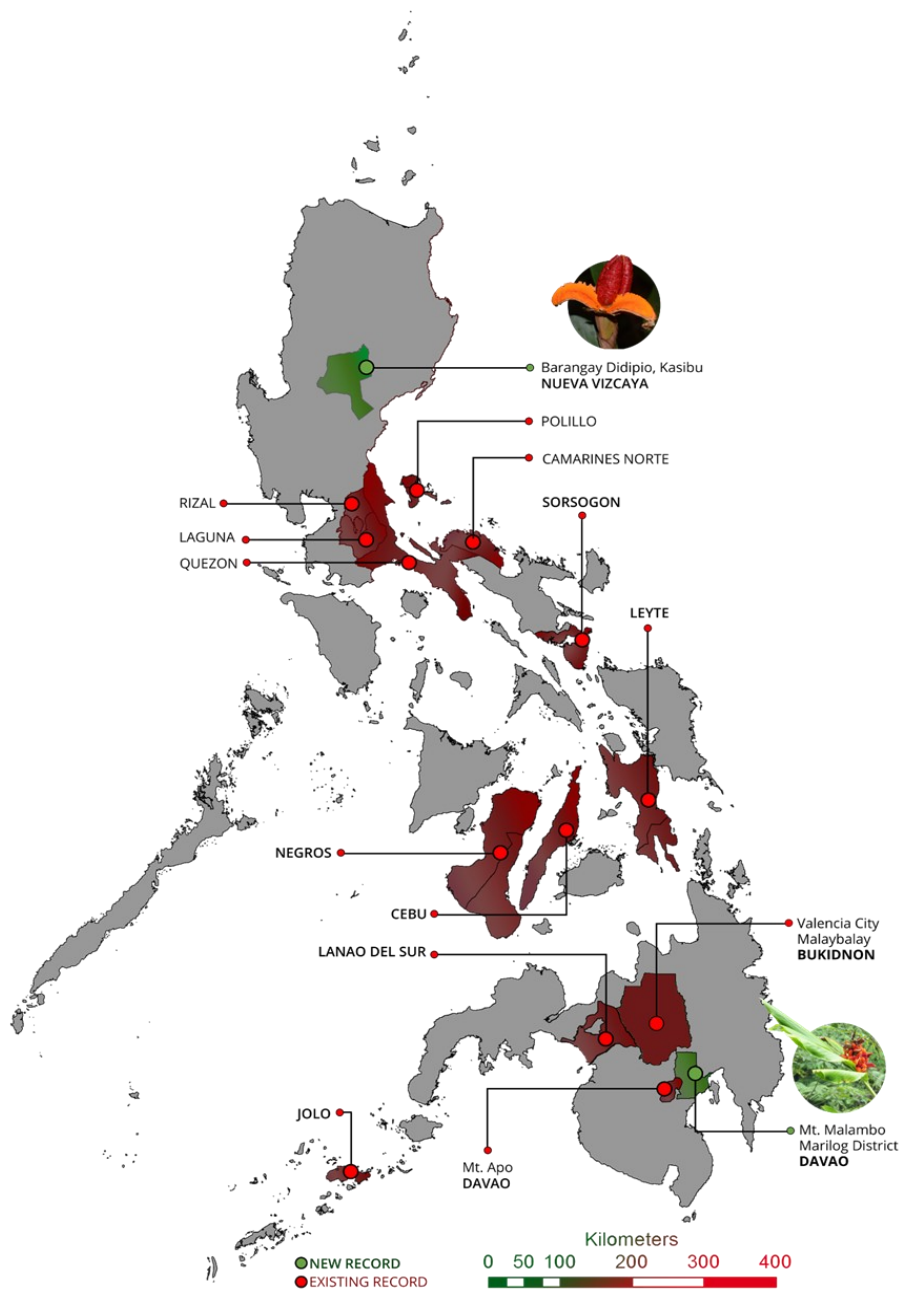


Figure 1. Updated distribution of *Hedychium philippinense*.

H. philippinense and further elaborated its description. In 1915 and 1919, *H. mindanaense* had surfaced and later reduced to synonymy with *H. philippinense* (Merill, 1925). After a gap of more than 6 decades, its name was mentioned in the publication of Tan *et al.* (1986), which was the first list of endangered species of Philippine plants. *H. philippinense* was excluded in the list but it was reportedly occurring in many disturbed primary forests. Nonetheless, it has never been the subject of researches for almost a century.

METHODOLOGY

During fieldwork of NPM on 16 July 2017 to collect samples of *Etilingera fimbriobracteata* (K.Schum.) R.M.Sm. in Mt. Malambo, Marilog District, Davao City, Philippines, some individuals of an epiphytic ginger,

with a thick, fleshy and branched rhizomes growing on the tree trunks were encountered along the forest trails. The identity of the species was not confirmed due to the absence of the reproductive parts. On 10 January 2018, six populations of the mysterious epiphytic ginger bore fruits. Examination of the collected specimens and review of literature indicate that it is morphologically *H. philippinense* which holds a new distributional record in the area. Furthermore, *H. philippinense* was also documented in Kasibu, province of Nueva Vizcaya in northern Luzon by ABT and other colleagues from UP Los Baños.

Herbarium specimens were prepared using the wet method and were sundried. Taxonomic identification was done using fresh plant samples and pickled collection of the flowers. Published research works, taxonomic monographs, protologues and relevant online e-flora

were used for the identification. Detailed taxonomic description is provided here to facilitate its easy identification. The updated distribution, phenology, notes on local names, habitat and ecology, conservation status, medicinal value, and propagation of this species are also given.

TAXONOMIC TREATMENT

Hedychium philippinense K.Schum. in Engl., Pflanzenreich 20 (1904) 47; --Merr., EPFP 1 (1922) 242; --Type: Vidal 3924 (K), Jolo.

Epiphytic and/or lithophytic herb, 0.5 to 1 feet long. Leaves flat, submembranous, sessile, flattened, glabrous, oblong, pronounced venation in the adaxial surface and dull green, paler beneath, midrib conspicuous beneath, apex acuminate, margin entire to wavy, 8 to 17 cm apart, 20–47 cm long by 8–11.5 cm wide; leaf sheath erect, membranous, glabrous, 4 to 12 cm wide. Inflorescence terminal, erect, 18 cm long by 5 cm wide, subterete, basal bracts broad oblong, apex acute, base broad and clasping, 7.5 cm long, 3 cm wide below the middle, dull brown when dry, glabrous except the puberulent apex. Flowers 2 from the axils of the bracts; floral bract 3 to 5 cm long, broad and boot-like toward the base, thinner in texture, gradually tapering to the obtuse usually pubescent apex, open along the upper ventral side, oblong, similar in color on the dry specimens; calyx green, slender, tubular, 8 cm long, the upper somewhat thickened portion open along the ventral side, apex rounded and finely pubescent, otherwise glabrous; corolla long, the slender tube yellowish; exerted filament about as long as the corolla segments, glabrous, yellowish red, recurved; anther flat, horse-shoe shaped, 1.7 cm long, stigma hairy, barely exerted above the anther; style extending through the tubular filament and between the anther sacs. Infructescence capsule dehiscent, 1.5-inch-long, 3-sided, orange yellow when mature, dehiscent from the apex nearly to the base; the carpels thick, recurved, seeds dark red; receptacle or rather the placenta erect.

SPECIMENS EXAMINED - PHILIPPINES. Mindanao: Davao City, Marilog District, Brgy. Datu Salumay, Mt. Malambo 2, 1345 masl, 7° 29.378 'N 125° 15.331 'E, 16 July 2017, Mendez, NPM-007-2018.

DISTRIBUTION - LUZON (Camarines Norte; Rizal; Laguna; Quezon; Sorsogon; Nueva Vizcaya), POLILLO, LEYTE, NEGROS, CEBU, MINDANAO (Bukidnon; North Cotabato; Davao City; Lanao del Sur), JOLO (Pelser et al., 2011 onwards and present study). Elmer 10673, 1909, 15968, Loher 6996, Clemens 747, B. S. 22897 McGregor, 35015 Ramos & Pascasio, 27947 Ocampo, 20777 Escritor, 15206, 10692, 10003 Ramos, R.B. 4252 Everett (Figure 1). In dam forests at low and medium altitudes, ascending to 1,100 m; often epiphytic or pseudoepiphytic. Endemic.

LOCAL NAMES – Lumoluyaw (Lagunday and Cabana, 2013); Dainsuli (Sub.); Kalauag (Bagobo); Tagbak (P. Bis.)

PHENOLOGY – Flowering and fruiting between the months of November to February.

HABITAT AND ECOLOGY – The populations of *H. philippinense* in Mt. Malambo were found epiphytic on the tree trunk at elevations between 800-850 masl. The populations are mainly associated with gingers *E. fimbriobracteata* and *Hornstedtia conoidea* Ridl., ferns *Davallia heterophylloides* (Blume) Copel (Davall.), *Nephrolepis cordifolia* (L.) C.Presl, *N. falcata* (Cav.) C.Ch., orchid *Appendicula* sp. and the area is surrounded by invasive *Piper aduncum*

CONSERVATION STATUS - *Hedychium philippinense* is under the endangered category (DAO 2017-11). The taxon was rare with a limited population size, which may likely suffer from habitat destruction caused by anthropogenic activities, such as burn farming, illegal logging, agriculture (common in Mt. Malambo) and developments in the area (common in northern Luzon).

MEDICINAL VALUE - The only ethno-medicinal study of *H. philippinense* was reported by Lagunday & Cabana (2013); however, the authors failed to identify its taxonomic identity and reported that it could be a species new to science. Based on the photographs provided in the paper and personal communication with Noel E. Lagunday (first author of the paper) done by NPM, the species that they have studied was *H. philippinense*.

Rhizomes of *H. philippinense* were used by Talaandig tribe for post-partum, tonic and birth control. The rhizomes were prepared in seven slices good for seven days and were applied as a decoction drink. This means that for every one week, one plant will be harvested from the wild and will be used for treatment.

PROPAGATION – Seeds of *H. philippinense* were brought to the province of Bukidnon for *ex situ* conservation. The 10 collected seeds in which each represents the replicate of the species were planted in the soil inside the polyethylene cellophane on 17 July 2017. The planting area is filtered/shady at elevation of 520 masl.

Results of the propagation revealed that out of the 10 planted seeds, 7 of which survived. The first leaf of the planted seeds was observed 2 weeks after planting with an average length of 0.5 cm and during 6 weeks of monitoring after the initial planting, the average length was 4 cm. Since plantlets continued to grow, they were carefully removed from the polyethylene cellophanes and were transferred immediately to the garden as part of the *ex situ* conservation of the Philippine threatened plant species (Department of Environment and Natural Resources., 2017).

CONCLUSION

H. philippinense holds a new distribution records in northern Luzon and southern Mindanao in the Philippines. The occurrence of *H. philippinense* in northern Luzon, Philippines corresponds to its wide distribution. The repeated discovery of new distribution records and new ginger species in the Philippines confirms that more fieldwork still needs to be carried out in the Philippines. The endemic distribution and various anthropogenic activities in the areas have led to the verge of extinction of *H. philippinense*. It is imperative that steps be taken to

conserve this endangered taxon. Hence, adequate measures should be taken to protect this species through micropropagation and *ex situ* conservation in the gardens. Mass micropropagation and reintroduction of this species in the wild is also recommended.

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