UPDATE ON ALOCASIA CUPREA K.KOCH DISTRIBUTION IN NORTH KALIMANTAN

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ABSTRACT

Key words: Araceae, Borneo, distribution, diversity, Krayan.

INTRODUCTION
The last revision of Alocasia in West Malesia and Sulawesi was conducted by Hay (1998), yielding 31 Alocasia species. Since then, several new species have been described, six of which are from Borneo (Boyce, 2007; Hay, 2000; Kurniawan & Boyce, 2011; Wong & Boyce, 2016; Wong & Boyce, 2020) and two species are from Sulawesi (Yuzammi & Hay, 1998; 2002). These new species bring the total of Alocasia in West Malesia and Sulawesi to 39 species, with 26 species officially recognized as originating from Borneo.

Borneo, a center of Alocasia diversity (Wong & Boyce, 2016), is estimated to have 50 Alocasia species, the majority of which are endemic (Kurniawan & Boyce, 2011). Kalimantan is a large area in Borneo that is less well known (Kurniawan & Boyce, 2011). According to Hay (1998) and Kurniawan & Boyce (2011), it has acknowledged that there are only ten known Alocasia species in Kalimantan. However, the Alocasia reginae specimen with collection number Burley et al. 527 deposited in Harvard University’s Gray Herbarium, is misidentified. Alocasia reginae is restricted in Mulu National Park’s karst area (P.C. Boyce 2021, pers. comm., 13 November 2021). As a result, there are only nine species of Alocasia in Kalimantan. This number is only 35% of the total number of Alocasia in Borneo. This resulted to a great opportunity for fieldwork and a more intensive study of Alocasia in Kalimantan.

During fieldwork in 2016 in Kayan Mentarang National Park (KMNP), Krayan, North Kalimantan, many species of Araceae, including Alocasia, were collected. Some species have not been formally described. Alocasia cuprea K.Koch was known to be distributed in Sabah (Hay, 1998) and Serawak (Boyce, 2004), was also found in KMNP (Fig. 1). This first report on the distribution of A. cuprea in Kalimantan brings the number of Alocasia in Kalimantan to 10 species.

MATERIALS AND METHODS
Plant material was obtained from fieldwork in KMNP in May 2016. The material was cultivated in Eka Karya Bali Botanic Garden (EKBBG), Candikuning, Baturiti, Tabanan, Bali. The morphological characters were described based on this living collection. The habitat was recorded during the fieldwork in Pa’ Pulid forest, near to Pa’ Api
village, Krayan, Nunukan, North Kalimantan. The identification key to *Alocasia* species was made based on Hay (1998).

**RESULTS**

**TAXONOMIC TREATMENT**

**ALOCSIA CUPREA** K.Koch


Herb to ca. 49.5 cm tall; *rhizome* erect; leaves 3–4 together; *petiole* to ca. 46 cm long, each subtended by cataphyll, green-green yellowish at the tip than gradually green and ivory reddish at the base, adaxially faintly mottled greenish, abaxially not mottled and paler color, sheathing in the lower 1/4–1/3, green reddish at the margin; *blades* leathery, peltate, ovate, bullate between the main veins, adaxially glossy silver-green, green darker near the primary veins and midrib, abaxially deep purple, with a hyaline colorless margin ca. 1.5 mm wide; *anterior lobe* with the tip cuspidate and mucronate 4 mm; *anterior costa* with 4–5 primary lateral veins on each side, proximal ones diverging at ca. 125° then arching forward and outward to join a sub-marginal vein, distal primary veins diverging at ca. 55°; all primary veins with very conspicuous axillary glands abaxially; secondary veins forming well-defined undulating inter-primary collective veins; *posterior lobes* completely united except for

![Fig. 1. Distribution of *A. cuprea* in Sabah (Boyce et al., 2002; Sulaiman & Shumugam, 2010; Wong & Joling, 2021), Sarawak (P.C. Boyce 2021, pers. comm., 13 November), and Krayan (North Kalimantan) (Google earth and modified by Ni Putu Sri Asih (unpublished data)).](image-url)
Fig. 2. Habitat of *A. cuprea*. A. *A. cuprea* in KMNP. B. *A. cuprea* cultivated in Bali Botanic Gardens. Photos by A. Dewi Lestari, B. Ni Putu Sri Asih.

Fig. 3. Habitus of *A. cuprea*. A. The adaxial leaf. B. Flower which almost all male flower within lower spathe. C. Flower with artificial opened. D. The abaxial leaf. Photos by Ni Putu Sri Asih.
TAXONOMY

Identification key to *Alocasia* species in Kalimantan

1a. Leaf blades not peltate in adult plants .......................................................... 2
1b. Leaf blades shallowly to completely peltate in adult plants .............................. 7

2a. Leaf abaxially with prominent venation, interprimary vein well defined and leaf blade abaxially pubescent .................................................. *A. sarawakensis*
2b. Leaf abaxially without prominent venation, interprimary vein not well defined and leaf blade abaxially glabrous .................................................... 3

3a. Leaf abaxially glaucous ...................................................................................... 4
3b. Leaf abaxially not glaucous ................................................................................ 4

4a. Male zone wholly exerted from the lower spathe chamber .................................. *A. macrorrhizos*
4b. Male zone half or completely within the lower spathe chamber .......................... 5

5a. Petiole about equaling length of leaf blade, blade very thickly leathery to almost succulent, ovato-sagittate to broadly ovato-sagittate ................................................... *A. scabriuscula s.l.*
5b. Petiole much exceeding the leaf of leaf blade, blade thinly leathery to leathery but not succulent, narrowly triangular .................................................. *A. princeps*

6a. Leaf blades dark green and leathery, peduncle relatively short, male zone about half enclosed within the lower spathe chamber ..................................... *A. principiculus*
6b. Leaf blades grey-green and thinly leathery, peduncle relatively long, and male zone fully enclosed within the lower spathe chamber .................................. *A. longiobila*

7a. Leaf slightly peltate to deeply peltate, membranous or occasionally thinly leathery, plants often unifoliolar, stigma stellate .................................................................. *A. longiobila*
7b. Leaf strongly to almost completely peltate, thickly coriaceous, leaves several, the main venation and lamina border not white to pale grey-green adaxially, stigma rounded .................................. 8

8a. Leaf bullate among the main veins, inflorescence paired .................................... 9
8b. Leaf not bullate among the main vein, inflorescence solitary ............................... *A. peltata*

9a. Leaf stiffly and thickly coriaceous, raised areas pale grey against a darker blade, abaxially pale green with the primary and margin veins purplish-brownish red, male zone \( \frac{1}{3} - \frac{1}{2} \) enclosed within lower spathe chamber ................................................................. *A. baginda*
9b. Leaf leathery, the bullate glossy bronze-green, abaxially the leaf and venation deep purple, male zone \( \frac{2}{3} \) within lower spathe chamber ................................................................. *A. cuprea*

a shallow retuse notch, rounded; posterior costae diverging at *ca.* 30°; inflorescences 2 paired, subtended by green brown reddish cataphylls; peduncle to *ca.* 20 cm long, pale green reddish at the base and green light reddish-green at the tip, not mottled; spathe green to greenish maroon, *ca.* 11.6 cm long; lower spathe oblong ovoid, *ca.* 5.5 cm long *ca.* 2.4 cm diam; limb about equal to the lower spathe, at first erect and cucullate, then sharply deflexed, separated from the lower spathe by an abrupt constriction at the top of male flowers; spadix considerably shorter than the spathe *ca.* 8 cm long, very shortly stipitate, 1.5–5 mm, the color is pale red, cylindric except appendix; female zone narrowly cylindric, *ca.* 2 cm long, *ca.* 1.2 cm wide; ovaries subglobose, longitudinally 3–4-ribbed; stigma raised on a slender style *ca.* 1 mm, conspicuously 2–(4) lobed, yellow at female flower anthesis; sterile interstice not attenuate, isodiametric or slightly narrower than male, *ca.* 2 whorls of rhomboid synandria; male zone cylindric, \( \frac{3}{4} \) or all within the lower spathe, 2.7 cm long; synandria rhomboid, with the synconnective raised above but not overlapping the thecae; thecae opening by apical pores; appendix white, gradually tapering to the tip, blunt, faintly irregularly channeled, *ca.* 2.6 cm long; fruit unknown.

Distribution. Borneo: Sabah, Sarawak and North Kalimantan

Habitat. Terrestrial, riverbank to cliff of montane forest, sandy soil texture to leaf litter-covered brown humus soil, and open to moderate shade at 1,005 m asl. The soil where this species found in Kalimantan has 6.7 pH, and soil moisture 50%.
Notes. In Kalimantan, A. cuprea is currently found in Pa’ Pulid forest, mountainous forest, that located in Pa’ Api village, Krayan Distric. It is found in two small populations of three to seven individuals. This species found in Kalimantan differ from the former species in blade colour and number of primary veins. The blade colour of Kalimantan species is glossy silver-green adaxially with 4–5 primary vein, while the colour blade of the former species is glossy bronze-green adaxially with 8–11 primary vein. These variations, how ever, are common in Alocasia species.

The habitat of this species in Sarawak and Sabah is kerangas or heath forest (P. C. Boyce, 2021, pers. comm., 13 November). Kerangas forest has strongly acidic soil (Katagiri et al., 1991; Suratman et al., 2011). This condition differs with the soil in Pa’ Pulid forest, where the soil tends to neutral pH. These different habitat findings indicate that this species is quite tolerant. Hay (1998) said this species appear to be unaffected by substrate, occurring on ultramafic, limestone and sandstone areas.

Specimen examined. INDONESIA, North Kalimantan, Nunukan, TN Kayan Mentarang, SPTN I Long Bawan, Krayan, Pa’ Pulid, 20 May 2016, Dewi Lestari 122/HK 1668 (Bali Botanic Gardens Accession E2016060025, THBB! BO!)

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AUTHOR CONTRIBUTORS

NPSA and DL are the principal author of this manuscript. Both authors analyzed the data and wrote the manuscript.

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