

SYNTHESIS OF *BUCEPHALANDRA* SCHOTT (ARACEAE: SCHISMATOGLOT-TIDEAE) STUDIES IN KALIMANTAN, INDONESIA: CHECKLIST, KEY, AND UPDATED DISTRIBUTION MAPS

Received May 8, 2025; accepted December 15, 2025

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ABSTRACT

YUZAMMI, ERLINAWATI, I., ASIH, N. P. S., DAMAYANTO, I. P. G. P., SUMADIJAYA, A., SULISTYANING-SIH, L. D., ARDIYANI, M., RUSTIAMI, H., WITONO, J. R., KEIM, A. P. & RAYHANNISA. 2025. Synthesis of *Bucephalandra* Schott (Araceae: Schismatoglottideae) studies in Kalimantan, Indonesia: checklist, key, and updated distribution maps. *Reinwardtia* 24(2): 185–198. — *Bucephalandra*, a member of the Araceae family, is an endemic rheophyte genus of Borneo. The majority (26 out of the 32 species) of this genus, are found in Indonesian Borneo (Kalimantan). *Bucephalandra oblanceolata* (M.Hotta) S.Y.Wong & P.C.Boyce, previously known from Brunei and Sarawak, has been identified in Kalimantan. This study presents a comprehensive overview of *Bucephalandra* in Kalimantan, accompanied by a detailed map and an identification key.

Key words: Araceae, *Bucephalandra*, checklist, Kalimantan, rheophyte, synopsis.

ABSTRAK

YUZAMMI, ERLINAWATI, I., ASIH, N. P. S., DAMAYANTO, I. P. G. P., SUMADIJAYA, A., SULISTYANING-SIH, L. D., ARDIYANI, M., RUSTIAMI, H., WITONO, J. R., KEIM, A. P. & RAYHANNISA. 2025. Sintesis *Bucephalandra* Schott (Araceae: Schismatoglottideae) di Kalimantan, Indonesia: daftar jenis, kunci identifikasi, dan pemutakhiran peta distribusi. *Reinwardtia* 24(2): 185–198. — Marga *Bucephalandra* merupakan tumbuhan reofit dari suku Araceae, dengan penyebaran hanya di Borneo. Sebagian besar *Bucephalandra* (26 dari 32 jenis) terdapat di Kalimantan. *Bucephalandra oblanceolata* (M.Hotta) S.Y.Wong & P.C.Boyce yang sebelumnya hanya tercatat di Brunei dan Sarawak, kini ditemukan juga di Kalimantan. Studi ini menyajikan gambaran umum yang komprehensif mengenai *Bucephalandra* di Kalimantan, disertai dengan peta terperinci dan kunci identifikasi.

Kata kunci: Araceae, *Bucephalandra*, daftar jenis, Kalimantan, reofit, sinopsis.

INTRODUCTION

The island of Borneo hosts the most diverse aroid flora in Southeast Asia, encompassing multiple genera and numerous endemic species. Among them, *Bucephalandra* is one of the endemic genera with 32 species distributed in the island (Wong *et al.*, 2022; Boyce & Croat, 2023; POWO, 2025). This genus was first described by Schott in 1858, based on a specimen collected by J. Motley in Kalimantan, later named *Bucephalandra motleyana* Schott. Motley first collected and documented this species in 1854 (Nugraha *et al.*, 2020). As an administrator of the Julia Hermina coal mine, he was keenly interested in botany and frequently sent plant specimens from Labuan, Borneo—including *Bucephalandra*—to Europe, also to Kew Herbarium (K), where the holotype specimen is deposited. In recognition of his contributions, *B. motleyana* was named in commemoration of his role as the first collector of this aquatic plant endemic to South Kalimantan (Boyce & Wong, 2012).

Over the past 160 years, this taxon has been extensively documented and studied. The extensive genetic diversity of *Bucephalandra* represents a valuable component of biodiversity, offering potential economic benefits. Due to its aesthetic appearance, *Bucephalandra* has gained popularity as an ornamental plant in aquariums. It can be cultivated in small pots with moist sand and abundant water to simulate its natural habitat. Additionally, it thrives in humid environments, such as rice fields, provided its roots remain consistently moist (Boyce, 1995). With a wide range of morphological characteristics, *Bucephalandra* has several

trade names. The trade names of *Bucephalandra* species are highly diverse, often driven by morphological differences (inflorescences and leaves) influenced by habitat conditions such as light intensity and growth substrate (soil, water, or rock). In recent years, several species of *Bucephalandra* have been commercially traded under the name “rheophyte”. As rheophytic plants, they exhibit remarkable adaptability, perennial growth, extensive root systems and rugged, streamlined leaves. However, the commercial utilization of this plant often lacks proper taxonomic understanding. Difficulties in recognizing members of *Bucephalandra* are apparent with the chronology of any misidentifications that may have occurred.

To facilitate identification of *Bucephalandra*, Boyce & Wong (2012) proposed a morphological key based on several characteristics: (1) the structure of the appendix staminodes, particularly surface ornamentation; (2) the shape and three-dimensional arrangement of the staminode filaments; (3) the insertion, orientation, and surface texture of the thecae; (4) the orientation, posture, and relative length of the thecae horns; (5) the shape and ventral surface topology of shield-shaped staminodes; (6) the shape and colouration of the pistils; and (7) the morphology of the subpistillar staminodes. In addition to the work of Wong & Boyce (2014), continued research into species diversity, identification, and morphological traits is crucial for accurately documenting the aquatic plant trade. The goal of this publication is to address the current taxonomic issues by generating an infrageneric classification and improving the species key of the genus *Bucephalandra*, exclu-

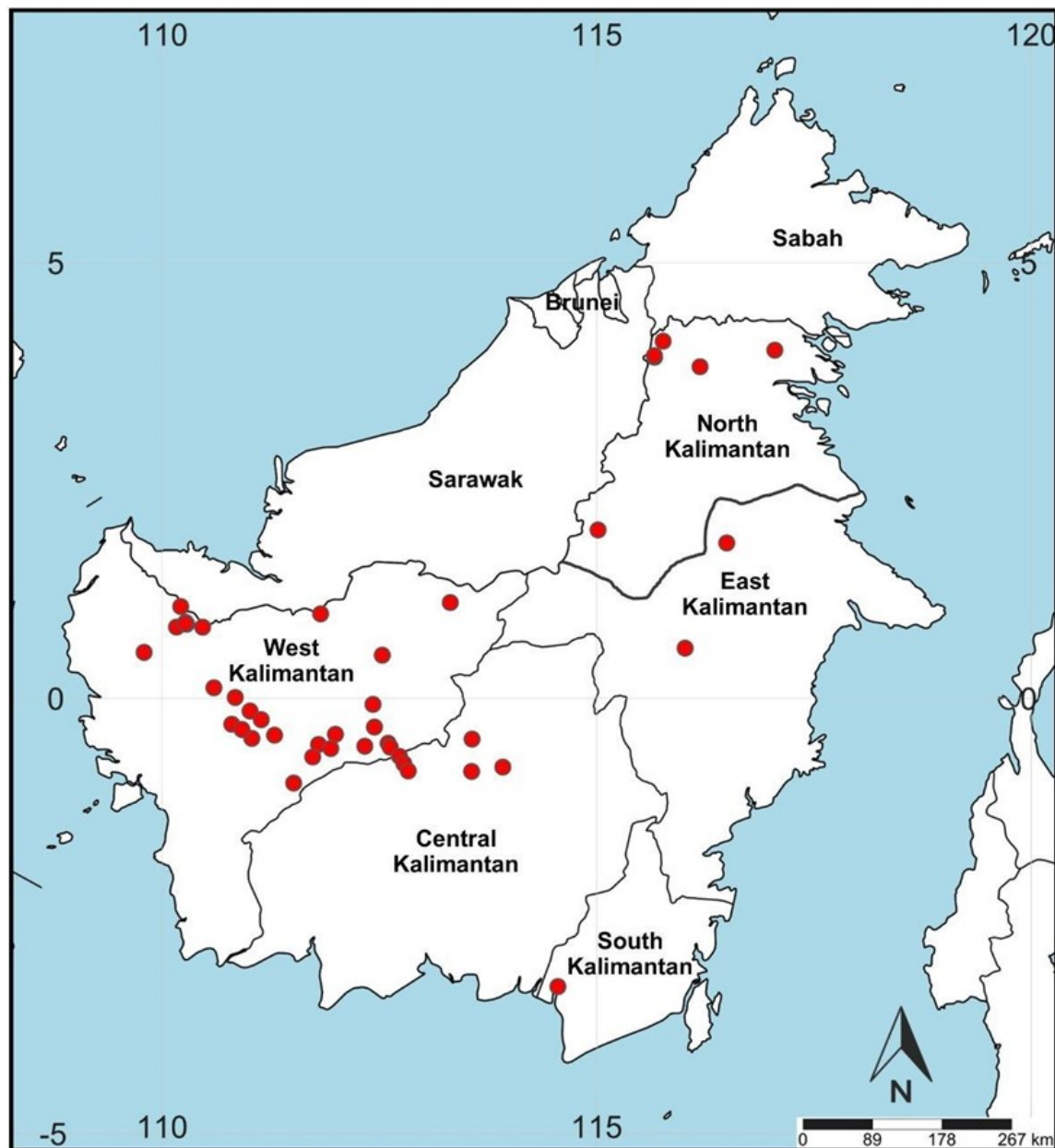


Fig 1. Distribution of all species of *Bucephalandra* in Kalimantan.

sively 26 species in Kalimantan, which were not included in previous publications.

MATERIALS AND METHODS

Study Area, Specimen Materials, and Literature Review

This study focused on *Bucephalandra* species across Kalimantan, Indonesia, with particular emphasis on regions where the genus is known to thrive, such as riverbanks, forest streams, and flood-prone terrestrial areas. Historical and recent herbarium specimens from institutions such as Herbarium Bogoriense (BO), Kew (K), and Naturalis (L) were examined to verify species identities and distributions. Literature reviews included taxonomic

revisions, floristic treatments, and ecological studies related to *Bucephalandra* species.

Morphological Characterization, Identification Key Development, and Distribution Mapping

Specimens were characterized using standard taxonomic methods. Key morphological characters were listed, including vegetative traits (plant height, leaf shape [oblong, obovate, and lanceolate], leaf margin [smooth, undulate, and crispulate], and substrate adaptation) and reproductive traits (inflorescence structure [spathe and spadix], staminode arrangement, thecae horn orientation, and pistil morphology). The key was refined using comparative analysis of specimens and type mate-

rial. Geographic coordinates from field collections and herbarium records were used to generate distribution maps (Figs. 1–7) using SimpleMapp (Short-house, 2010).

RESULTS AND DISCUSSION

Kalimantan, Indonesia, is a biodiversity hotspot for the genus *Bucephalandra*, harboring 26 species of *Bucephalandra*, 20 of which are endemic (Fig. 1). This accounts for approximately 81% of the total 32 species recorded in Borneo (see Wong *et al.*, 2022). There are six species of *Bucephalandra* (*B. akantha*, *B. kerangas*, *B. micrantha*, *B. oblan- ceolata*, *B. pygmaea*, and *B. spathulifolia*) that also present beyond Indonesian Borneo. In addition, we list two species, *i.e.* *B. akantha* and *B. kerangas*, previously recorded exclusively in Sarawak, also occur in Kalimantan, based on Wong &

Boyce (2014). A new record for Kalimantan has been documented: *B. oblan- ceolata*, recorded in North Kalimantan based on a herbarium specimen (Dewi Lestari 327). Previously, this species was only reported from Brunei Darussalam and Sarawak (Wong & Boyce, 2014). This was originally described as *Microcasia oblan- ceolata* M.Hotta and later transferred to *Bucephalandra* by Wong & Boyce (2014).

In this study, the 26 *Bucephalandra* species in Kalimantan are treated as one group. At the moment, we are unsuccessful in splitting these species into informal groups as in *Alocasia* (Hay, 1998; Asih *et al.*, 2024), *Rhaphidophora* (Boyce, 2001; Boyce & Haigh, 2016), and *Homalomena* (Ng *et al.*, 2011). The limited range of morphological characters, as a result of limited sampling across species, unfortunately, does not fulfill the division into informal groups.

Key to the species of *Bucephalandra* in Kalimantan

- 1a. Herb below 30 cm tall 2
- 1b. Herb 30 cm tall or above 24
- 2a. Habitat exclusively in heath forest (kerangas) 12. *B. kerangas*
- 2b. Habitat favouring riparian areas 3
- 3a. Leaves in rosettes, creeping and forming dense carpet 4
- 3b. Leaves ascending to erect, not in rosettes 9
- 4a. Blade very narrowly oblong-linear 5
- 4b. Blade obovate to elliptic 8
- 5a. Interprimary veins invisible or nearly invisible 6
- 5b. Interprimary veins visible, pale coloured 7
- 6a. Interprimary veins invisible, structure of interstice 2 or 3 rows scale-like staminodes 15. *B. micrantha*
- 6b. Interprimary veins nearly invisible, structure of interstice a single row scale-like staminodes 4. *B. belindae*
- 7a. Blade relatively thin, margin usually weakly undulate 8. *B. diabolica*
- 7b. Blade relatively thick, margin somewhat recurved 24. *B. tetana*
- 8a. Blade adaxial semi-glossy, margin usually straight 21. *B. pygmaea*
- 8b. Blade adaxial olive green, margin undulate to crispulate 22. *B. sordidula*
- 9a. Ligule absent 10
- 9b. Ligule narrow to narrowly triangular 12
- 10a. Blade lanceolate, size up to 12 cm long, *ca.* 2.5 cm wide 14. *B. magnifolia*
- 10b. Blade not lanceolate, size up to 8 cm long, *ca.* 2.8 cm wide 11
- 11a. Blade coriaceous, interstice with up to 2 rows of flat, trapeziform to obovate 17. *B. motleyana*
- 11b. Blade strongly coriaceous, interstice with 1 row of flat, obovate 5. *B. catherineae*

Key to the species of *Bucephalandra* in Kalimantan (continued)

- 12a. Leaves spreading, petiole scabrid 13
- 12b. Leaves (sub) erect to arching, petiole not scabrid 15
- 13a. Blade ovate to broadly elliptic, up to 9.5 cm long, *ca.* 4.5 cm wide 19. *B. oncophora*
- 13b. Blade narrowly elliptic to oblong lanceolate, up to 12 cm long, *ca.* 2 cm wide 14
- 14a. Inflorescence several together 20. *B. pubes*
- 14b. Inflorescence solitary 25. *B. vespula*
- 15a. Blade oblong-spathulate, midrib abaxially weakly ridged 23. *B. spatulifolia*
- 15b. Blade elliptic or lanceolate or ovate, midrib abaxially prominent 16
- 16a. Blade adaxially very dark reddish black or purple-green, primary lateral veins very prominent adaxially 13. *B. kishii*
- 16b. Blade adaxially medium to dark green, margin usually straight, primary lateral veins flush with blade adaxially 17
- 17a. Appendix cylindrical 18
- 17b. Appendix globose to subglobose 21
- 18a. Appendix tip blunt, staminodes obpyramidal 19
- 18b. Appendix tip tapering, staminodes trapezoidal 20
- 19a. Appendix staminodes surfaces papillate; filament stout; connective arching, thecae horns pointing horizontally 1. *B. adei*
- 19b. Appendix staminodes surfaces smooth; filament slender; connective semi-terete, thecae horn upward-turned 16. *B. minotaur*
- 20a. Inflorescence up to three together; peduncle with numerous bright reddish speckles; pistils arranged in 3–5 spirals 3. *B. aurantiithecra*
- 20b. Inflorescence solitary; peduncle suffused reddish brown with dark red ridges; pistils arranged in *ca.* 3 rows 6. *B. chimaera*
- 21a. Appendix 15–20 mm long $\times$ 6–7 mm in diam., upper surface of staminodes smooth and slightly glossy 11. *B. goliath*
- 21b. Appendix 4–6 mm long $\times$ 3–4 mm in diam., upper surface of staminodes echinate 22
- 22a. Flowers in *ca.* 2 rows, pistillodes absent; staminate zone 2–3 mm long $\times$ *ca.* 3.5 mm in diam. 7. *B. chrysokoupa*
- 22b. Flowers in 3–5 rows, pistillodes present; staminate zone 3–5 mm long $\times$ 2–3 mm in diam. 23
- 23a. Pistillate zone 2.5–3 mm long $\times$ *ca.* 2 mm in diam., pistils cylindric-globose, arranged in 3 spirals; thecae horns spreading to slightly downward-directed 2. *B. akantha*
- 23b. Pistillate zone *ca.* 5 mm long $\times$ *ca.* 3 mm in diam., pistils rhombic-globose, arranged in *ca.* 4 spirals; thecae horns upward-directed 26. *B. yengiae*
- 24a. Spathe narrowly ovate, 8–10 cm long; pistillate zone 4–7 mm long $\times$ *ca.* 7 mm in diam.; appendix bullet-shaped 9. *B. forcipula*
- 24b. Spathe ovate to oblong-ovate, 2.5–4 cm long; pistillate zone 3–5 mm long $\times$ 1.5–3 mm in diam.; appendix cylindrical 25
- 25a. Stigma disc-like, pistilloides absent; thecae horns, 1.3–1.8 mm long, directed upwards 10. *B. gigantean*
- 25b. Stigma umbonate, pistilloides present; thecae horns very short *ca.* 0.3 mm long, directed outwards 18. *B. oblanceolata*

TAXONOMIC TREATMENT

BUCEPHALANDRA Schott, Gen. Aroid.: t. 56 (1858) — Type: *Bucephalandra motleyana* Schott = *Microcasia* Becc. in Bull. Reale Soc. Tosc. Ortic. 4: 180, fig. 8. 1879.

1. BUCEPHALANDRA ADEI S.Y.Wong, Hii & P.C.Boyce, J. Pl. Taxon. & Geogr. (Webbia) 77: 136 (2022). — Type: INDONESIA, Kalimantan Barat, Ngabang, Landak, Riam Desa Sungai Durian, 0°31'41"N 109°47'39"E, 45 m asl., 27 Jul. 2017, *A. A. Setiawan AR-2766* (holotype: SAR + spirit, isotype: BO + spirit).

West Kalimantan: Ngabang, Landak, Riam Desa Sungai Durian (Fig. 2).

2. BUCEPHALANDRA AKANTHA S.Y.Wong & P.C.Boyce. — Type: MALAYSIA, Sarawak, Bahagian Kuching, Padawan, Annah Rais, Kampung Sadir, Air Terjun Sadir, 01°06'28.3"N, 110°16'47.1"E, 6 Apr. 2012, *P. C. Boyce et al. AR-3863* (holotype: SAR, isotypes: SBC, SING).

West Kalimantan: Kabupaten Sanggau, Kecamatan Entikong (Fig. 2).

3. BUCEPHALANDRA AURANTIITHECA S.Y.Wong & P.C.Boyce, Willdenowia 44: 153 (2014). — Type: INDONESIA, Kalimantan Barat, Kabupaten Sekadau, Kecamatan Nanga Taman, SE of Manterahidup, 00°08'45.2"S, 111°00'47.0"E, 22 May 2012, *K. Nakamoto AR-3937* (holotype: BO, isotypes: SAR, SBC, SING).

West Kalimantan: Kabupaten Sekadau, Kecamatan Nanga Taman, SE of Manterahidup (Fig. 2).

4. BUCEPHALANDRA BELINDAE S.Y.Wong & P.C.Boyce, Willdenowia 44: 155 (2014). — Type: INDONESIA, Kalimantan Barat, Kabupaten Melawi, Kecamatan Nanga Pinoh, 33 km S of Nanga Pinoh and 11 km before Kotabaru junction of logging road to Kalimantan Tengah, 00°31'46.0"S, 111°48'02.4"E, 3 Feb. 2012, *K. Nakamoto AR-3531* (holotype: BO, isotypes: SAR, SBC, SING).

West Kalimantan: Kabupaten Melawi, Kecamatan Nanga Pinoh (Fig. 2).

5. BUCEPHALANDRA CATHERINEAE P.C. Boyce, Bogner & Mayo, Bot. Mag. 12: 152 (1995). — Type: INDONESIA, Kalimantan Utara, Kabupaten Malinau, Kecamatan Kayan Hulu, Apo Kayan, E of Long Nawan, Gunung Sungai Pendan, E ridge, ca. 01°56'N, 115°01'E, 14 Oct. 1991, *E. F. de Vogel & P. J. Cribb 9210* (holotype: L, isotype: K – spirit coll. no 57575).

North Kalimantan: Kabupaten Malinau, Kecamatan Kayan Hulu, Apo Kayan, east of Long Nawan, Gunung Sungai Pendan (Fig. 2).

6. BUCEPHALANDRA CHIMAERA S.Y.Wong & P.C.Boyce, Willdenowia 44: 159 (2014). — Type: INDONESIA, Kalimantan Barat, Kabupaten Sekadau, Kecamatan Nanga Taman, environs of Nanga Taman, 4 Apr. 2012, *K. Nakamoto AR-3846* (holotype: BO, isotypes: SAR, SBC, SING).

West Kalimantan: Kabupaten Sekadau, Kecamatan Nanga Taman, environs of Nanga Taman (Fig. 3).

7. BUCEPHALANDRA CHRYSOKOUPA S.Y.Wong & P.C.Boyce, Willdenowia 44: 161 (2014). — Type: INDONESIA, Kalimantan Utara, Kabupaten Nunukan, Kecamatan Mentarang Hulu, Long Berang, 03°48'25.2"N, 116°11'24.7"E, 18 Jun. 2012, *K. Nakamoto AR-3977* (holotype: BO, isotypes: SAR, SBC, SING).

North Kalimantan: Kabupaten Nunukan, Kecamatan Mentarang Hulu, Long Berang (Fig. 3).

8. BUCEPHALANDRA DIABOLICA S.Y.Wong & P.C.Boyce, Willdenowia 44: 163 (2014). — Type: INDONESIA, Kalimantan Barat, Kabupaten Melawi, Kecamatan Sayan, Bukit Baka-Bukit Raya National Park, Bukit Baka, 00°24'45.2"S, 111°59'43.9"E, 1 Sep. 2012, *M. Lo AR-4027* (holotype: BO, isotypes: SAR, SBC, SING).

West Kalimantan: Kabupaten Melawi, Kecamatan Sayan, Bukit Baka-Bukit Raya National Park, Bukit Baka (Fig. 3).

9. BUCEPHALANDRA FORCIPULA S.Y.Wong & P.C.Boyce, Willdenowia 44: 167 (2014). — Type: INDONESIA, Kalimantan Barat, Kabupaten Sekadau, Kecamatan Nanga Taman, SE of Nanga Taman, Gunung Tajam, E slope, 00°27'35.4"S, 111°02'03.2"E, 5 Feb. 2012, *K. Nakamoto AR-3772* (holotype: BO, isotypes: SAR, SBC, SING).

West Kalimantan: Kabupaten Sekadau, Kecamatan Nanga Taman, SE of Nanga Taman, Gunung Tajam (Fig. 3).

10. BUCEPHALANDRA GIGANTEA Bogner, Pl. Syst. Evol. 145: 159 (1984). — Type: INDONESIA, Central East Borneo, West Koetai, Kiau River, 25 Oct. 1925, *F. H. Endert 4580* (holotype: K!, isotypes: BO!, L!).

East Kalimantan: West Koetai, Kiau River (Fig. 3).

11. BUCEPHALANDRA GOLIATH S.Y.Wong & P.C.Boyce, Willdenowia 44: 169 (2014). — Type: INDONESIA, Kalimantan Barat, Kabupaten Mela-



Fig. 2. Distribution of *Bucephalandra adei*, *B. akantha*, *B. aurantiithecra*, *B. belindae*, and *B. catherineae* in Kalimantan.

wi, Kecamatan Nanga Pinoh, Jalan 28.8 km E of Kampong Nyangai, Landau Garong, logging road 25 km S of Nanga Pinoh, Ulu Sungai Reret and Ulu Sungai Sentulang, 00°34'31.9"S, 111°56'30.8"E, 16 Oct. 2012, *K. Nakamoto AR-4040* (holotype: BO, isotypes: SAR, SBC, SING).

West Kalimantan: Kabupaten Melawi, Kecamatan Nanga Pinoh (Fig. 4).

12. *BUCEPHALANDRA KERANGAS* S.Y. Wong & P.C.Boyce, Willdenowia 44: 171 (2014). — Type: MALAYSIA, Sarawak, Bahagian Samarahan, Simumjan District, Sebuyau, logging road at Sabal, 7 Feb. 1995, *Runi ak Punga et al. S.71313* (holotype: SAR, isotypes: K, KEP, L, MO, SAN).

West Kalimantan: Kabupaten Kapuas Hulu, Kecamatan Badau, Wong Garai (Fig. 4).

13. *BUCEPHALANDRA KISHII* S.Y.Wong & P.C.Boyce, Willdenowia 44: 173 (2014). — Type: INDONESIA, Kalimantan Barat, Kabupaten Melawi, Kecamatan Nanga Taman, Kampung Entebah, Gunung Saran, 00°25'24"S, 111°17'42"E, 1,500 m asl, 25 Aug. 2012, *K. Nakamoto AR-4019* (holotype: BO, isotypes: SAR, SBC, SING).

West Kalimantan: Kabupaten Melawi, Kecamatan Nanga Taman, Kampung Entebah, Gunung Saran (Fig. 4).



Fig. 3. Distribution of *Bucephalandra chimaera*, *B. chrysokoupa*, *B. diabolica*, *B. forcipula*, and *B. gigantea* in Kalimantan.

14. *BUCEPHALANDRA MAGNIFOLIA* H.Okada & Y.Mori, Acta Phytotax. Geobot. 51: 4 (2000). — Type: INDONESIA, Kalimantan Utara (“East Kalimantan”), Kabupaten Nunukan (“Bulungan”), Kecamatan Krayan, Long Bawan, Gunung Malim, 03°55'N, 115°40'E (estimated from Google Earth), 11 Sep. 1990, *H. Okada & D. Komara 5024* (holotype: TI, isotype: BO).

North Kalimantan: Kabupaten Nunukan (“Bulungan”), Kecamatan Krayan, Long Bawan, Gunung Malim (Fig. 4).

15. *BUCEPHALANDRA MICRANTHA* S.Y. Wong & P.C.Boyce, Willdenowia 44: 415 (2014). — Type: INDONESIA, Kalimantan Barat, Sintang, Sepauk, Kayu Lapis, village at km 46 on

road to SE of Kayu Lapis, 00°14'39.7"S, 111°08'29.1"E, 10 Dec. 2012, *H. Kishi AR-4080* (holotype: BO [spirit], isotype: SAR [spirit]).

West Kalimantan: Kabupaten Sintang, Sepauk, Kayu Lapis (Fig. 4).

16. *BUCEPHALANDRA MINOTAUR* S.Y.Wong & P.C.Boyce, Willdenowia 44: 175 (2014). — Type: INDONESIA, Kalimantan Barat, Sekadau/Melawi regencies boundary, 115 km S of Nanga Pinoh, 00°58'21.8"S, 111°30'54.4"E (estimated from Google Earth), 22 May 2012, *K. Nakamoto AR-3951* (holotype: BO, isotypes: SAR, SBC, SING).

West Kalimantan: Kabupaten Sekadau/Melawi

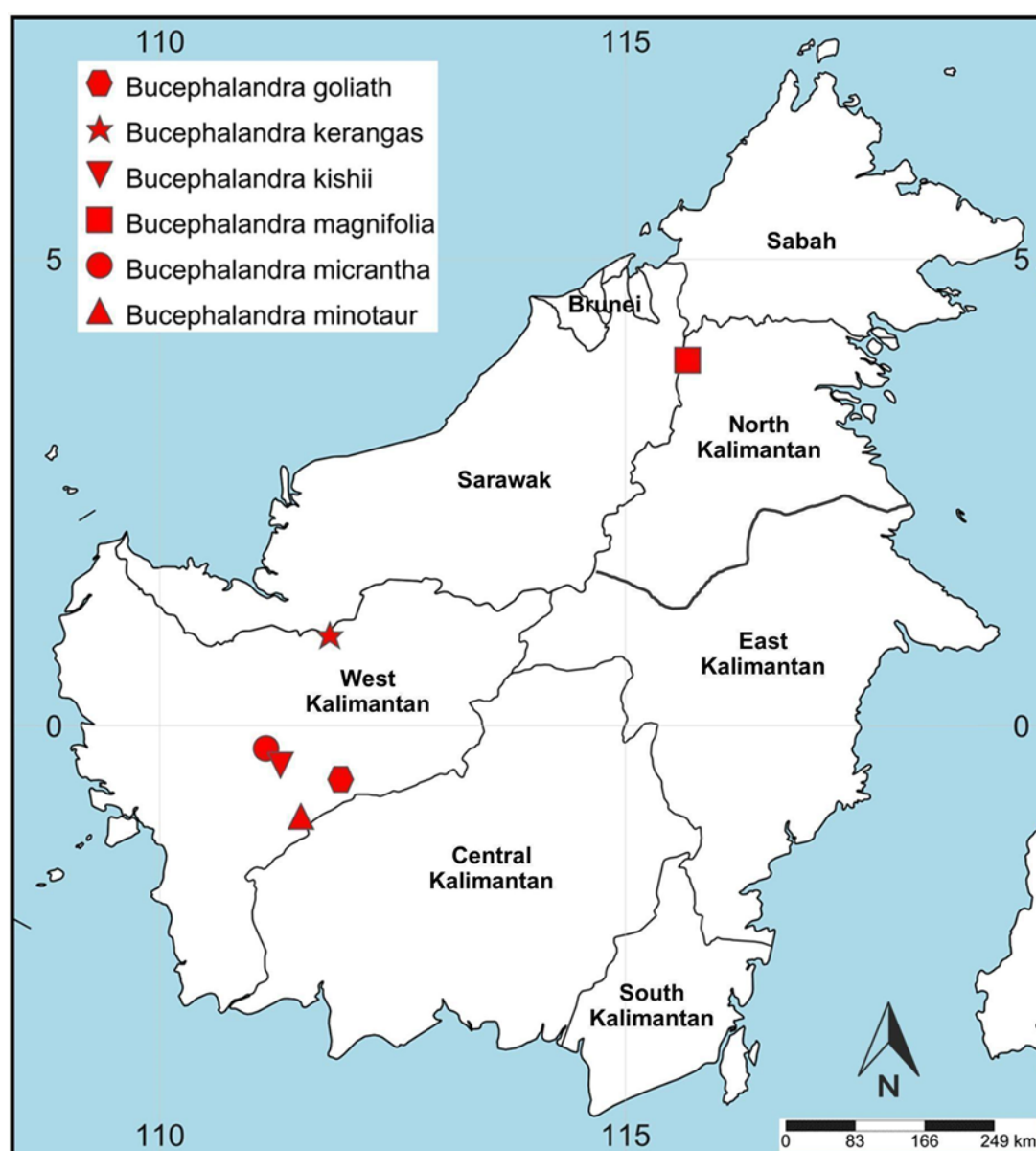


Fig. 4. Distribution of *Bucephalandra goliath*, *B. kerangas*, *B. kishii*, *B. magnifolia*, *B. micrantha*, and *B. minotaur* in Kalimantan.

regencies boundary, 115 km S of Nanga Pinoh (Fig. 4).

17. *BUCEPHALANDRA MOTLEYANA* Schott, Gen. Aroid.: t. 56 (1858). — Type: INDONESIA, Kalimantan Selatan, *J. Motley 404* (holotype K!).

South Kalimantan: Based on type locality. **West Kalimantan:** Betung Kerihun National Park, Putussibau, Harongan river; Ulu Juwoi Deras, near visitor lodge; Serawai, 8 km NE of Desa Jelundung, Batu Lintang; Serawai, Sungai Merah, 1 km to W of camp around S. Labang and surrounding environs; Serawai, 3 km south of Nanga Jelundung, growing beside Sungai Salake, branch of Sungai Serawai; Gunung Bentuang area; Sanggau;

along bank of Sungai Ella, 600 m east of camp, Bukit Baka National Park, Sintang; Sungai Menyakan, upstream of Sungai Sibau, Betung Kerihun National Park, Putussibau, Kapuas Hulu; Sungai Tekelan, Sungai Sabong, branch of Sungai Embaloh, Betung Kerihun National Park, Putussibau, Kapuas Hulu. **Central Kalimantan:** Headwaters of S. Kahayan, 5 km NW of Tumbang Sian logging camp, Sikatan Wana Raya logging concession; Bukit Raya; upper Katingan (Mendawai) River area, upper Samba river, 60–80 km NNW of Tumbang Samba, Base camp Tambang Riang; camp at logging road *ca.* 25 km W of the village Sungai Buluh, Nangabulik, Bulik, Lamandau. **East Kalimantan:** Between Long Bawan and Panado (Fig. 5).

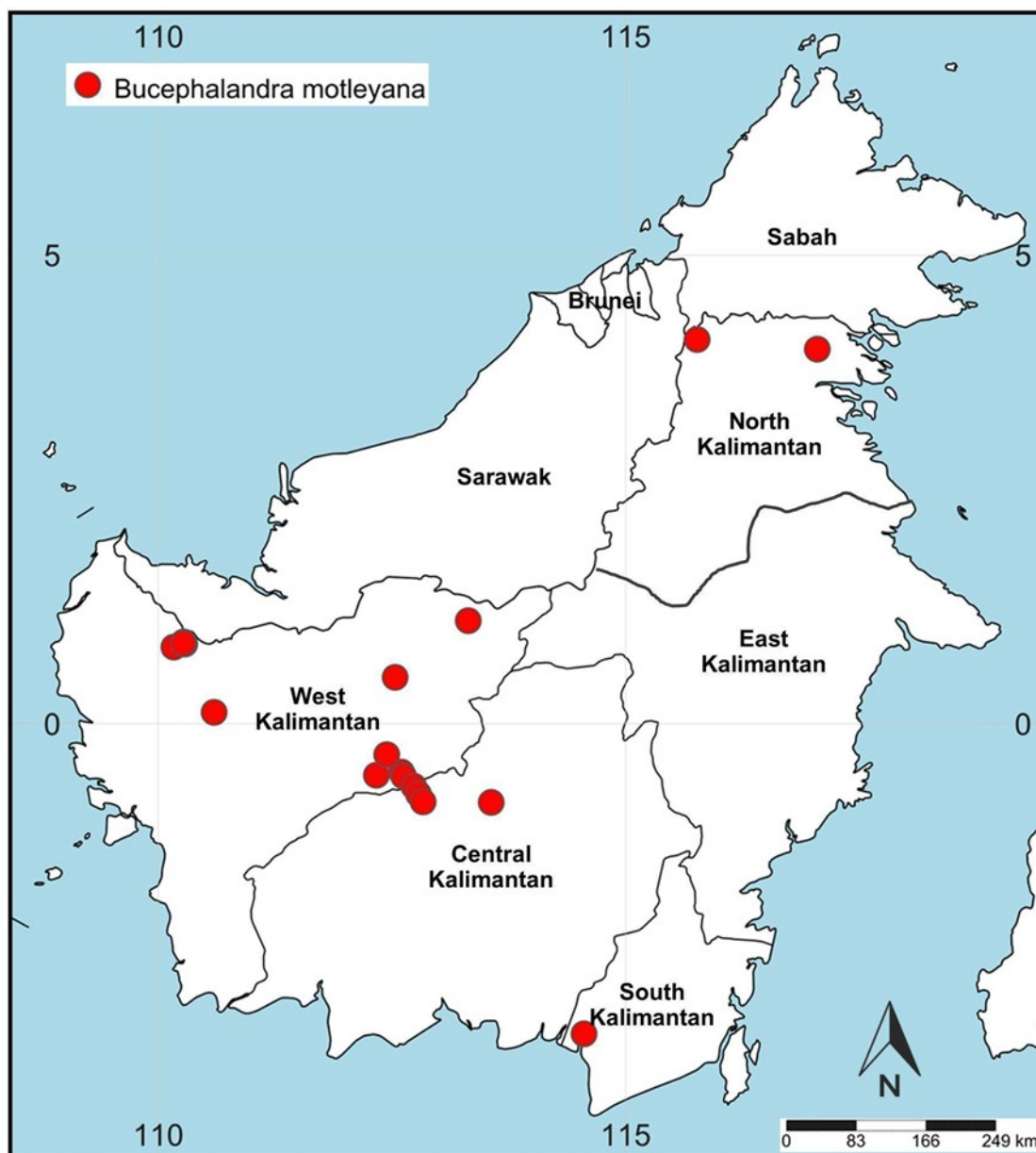


Fig. 5. Distribution of *Bucephalandra motleyana* in Kalimantan.

18. BUCEPHALANDRA OBLANCEOLATA (M.Hotta) S.Y.Wong & P.C.Boyce, = *Microcasia oblanceolata* M.Hotta in Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 32(1): 21. — Type: BRUNEI DARUSSALAM, Temburong Prov., vicinity of Labu, Bukit Peradayan, 25 Jan. 1964, *M. Hotta* 13586 (holotype: KYO, isotypes: L, SAR).

North Kalimantan: Kabupaten Nunukan, Pa Api, Taman Nasional Kayan Mentarang (Fig. 6).

19. BUCEPHALANDRA ONCOPHORA S.Y. Wong & P.C.Boyce, Willdenowia 44: 181 (2014). — Type: INDONESIA, Kalimantan Barat, Kabupaten Sekadau, Kecamatan Nanga Taman, nickel mine, 22 May 2012, *K. Nakamoto* AR-3932 (holotype: BO!, isotypes: SAR, SBC, SING).

West Kalimantan: Kabupaten Sekadau, Kecamatan Nanga Taman (Fig. 6).

20. BUCEPHALANDRA PUBES S.Y.Wong & P.C.Boyce, Willdenowia 44: 181 (2014). — Type: INDONESIA, Kalimantan Barat, Kabupaten Sekadau, Kecamatan Sekadau, 3 Feb. 2012, *K. Nakamoto* AR-3760 (holotype: BO!, isotypes: SAR, SBC, SING).

West Kalimantan: Kabupaten Sekadau, Kecamatan Sekadau (Fig. 6).

21. BUCEPHALANDRA PYGMAEA (Becc.) P.C.Boyce & S.Y.Wong, Webbia 67: 142 (2012). = *Microcasia pygmaea* Becc. in Bull. Reale Soc. Tosc. Ortic. 4: 180. 1879; Engl. in Beccari,

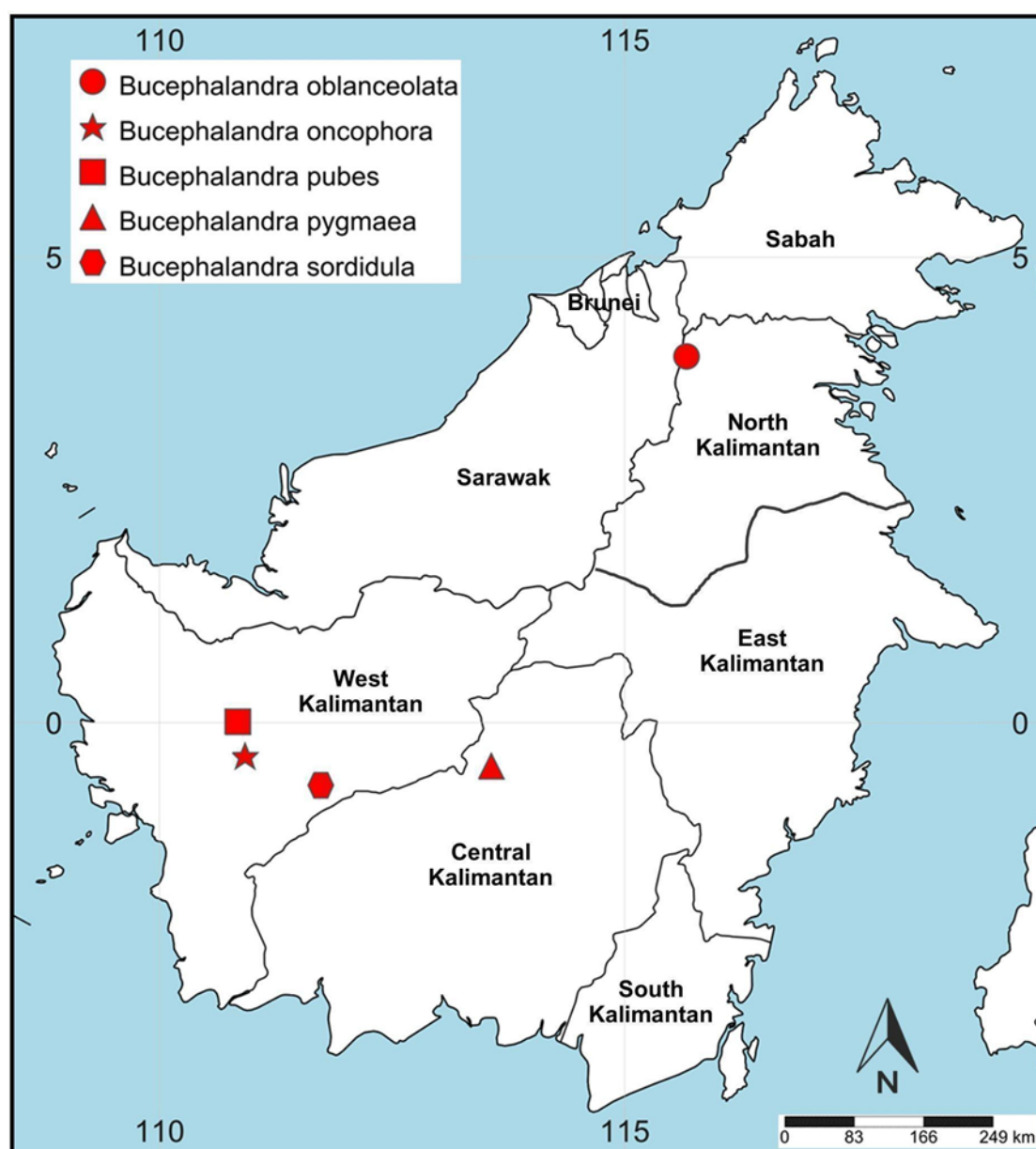


Fig. 6. Distribution of *Bucephalandra oblanceolata*, *B. oncophora*, *B. pubes*, *B. pygmaea*, and *B. sordidula* in Kalimantan.

Malesia 1: 290, t. 22, f. 21–24. 1883; Nat. Pflanzenfam. 2(3): 132, fig. 85. 1889; Pflanzenr. 55 (IV.23Da): 128, fig. 77A–D. 1912. — Type: MALAYSIA, Sarawak, Sarikei Division, Julau, Sungai Entabai, 28 Oct. 1867 (annotated on FI sheet), or Sept. 1867 (annotated on B sheet, and stated in Beccari, 1879), or 26 Oct. 1867 (stated in Beccari, 1902, 1904), *O. Beccari* PB 3883 (holotype: FI, isotype: B).

Central Kalimantan: Headwaters of S. Kahayan, 5 km NE of Haruwu Village, ridge of N. Nyoochoy River (Fig. 6).

22. BUCEPHALANDRA SORDIDULA S.Y. Wong & P.C.Boyce, Willdenowia 44: 184 (2014). — Type: INDONESIA, Kalimantan Barat, Kabupaten Melawi, Kecamatan Nanga Pinoh, 33 km S of Nanga Pinoh and 11 km before Kotabaru junction of logging road to Kalimantan Tengah, 00° 40'21.6"S, 111°44'03.4"E, 16 Oct. 2012, *K. Nakamoto* AR-4042 (holotype: BO, isotypes: SAR, SBC, SING).

West Kalimantan: Kabupaten Melawi, Kecamatan Nanga Pinoh (Fig. 6).

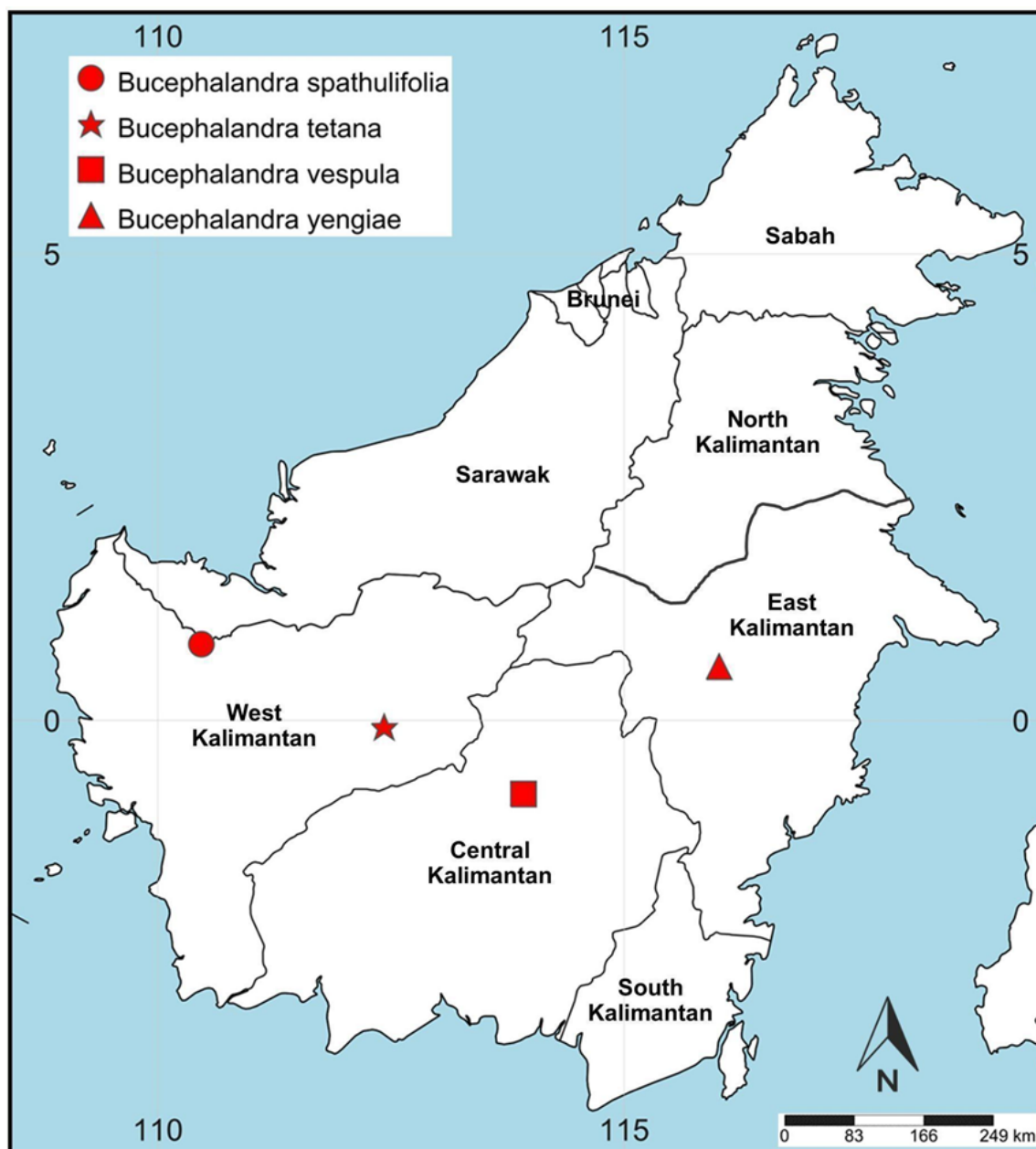


Fig. 7. Distribution of *Bucephalandra spathulifolia*, *B. tetana*, *B. vespula*, and *B. yengiae* in Kalimantan.

23. **BUCEPHALANDRA SPATHULIFOLIA** Engl. ex S.Y.Wong & P.C.Boyce, Willdenowia 44: 417 (2014). — Type: INDONESIA, “Borneo, Exp. Nieuwenhuis, 1898–1899”, Soengai Boeleng [? Sungai Boeloengan = Sungai Kajan, see Nieuwenhuis 1900: 262], 28 Oct. 1898, *Amdjah* 127 (holotype: BO!).

West Kalimantan: Kabupaten Sanggau, Sekayam, Balai Karangan (Fig. 7).

24. **BUCEPHALANDRA TETANA** S.Y.Wong & P.C.Boyce, Willdenowia 44: 186 (2014). — Type: INDONESIA, Kalimantan Barat, Kabupaten Sintang, Kecamatan Serawai, Gunung Alat, N of

Nanga Serawai and 120 km E of Nanga Pinoh, 00° 04'09.0"S, 112°25'38.6"E, 17 May 2013, K. Nakamoto AR-4146 (holotype: BO!, isotypes: SAR, SBC, SING).

West Kalimantan: Kabupaten Sintang, Kecamatan Serawai, Gunung Alat (Fig. 7).

25. **BUCEPHALANDRA VESPULA** S.Y.Wong & P.C.Boyce, Willdenowia 44: 190 (2014). — Type: INDONESIA, Kalimantan Barat, Kabupaten Sekadai, Kecamatan Sekadai Hilir, Kayu Lapis, S of Kayu Lapis, 00°47'21.3"S, 113°55'15.7"E, 20 Sep. 2011, K. Nakamoto AR-3664 (holotype: BO!, isotypes: SAR, SBC, SING).

West Kalimantan: Kabupaten Sekadau, Kecamatan Sekadau Hilir, Kayu Lapis (Fig. 7).

26. BUCEPHALANDRA YENGIAE P.C.Boyce, Willdenowia 44: 192 (2014). — Type: INDONESIA, Kalimantan Timur, Kabupaten Kutai Kartanegara, Kecamatan Tabang, 00°34'33.2"N, 116°01'05.9"E, 17 Oct. 2012, K. Nakamoto AR-4050 (holotype: BO, isotypes: SAR, SBC, SING).

East Kalimantan: Kabupaten Kutai Kartanegara, Kecamatan Tabang (Fig. 7).

CONCLUSION

There are 26 species of *Bucephalandra* in Kalimantan, Indonesia. The majority are found growing in aquatic areas all across Kalimantan, with most species concentrated in West Kalimantan. The number of valid *Bucephalandra* species is likely to grow as ongoing research uncovers new ones.

ACKNOWLEDGEMENTS

We would like to express our sincere gratitude to the Director of Scientific Collection Management (Herbarium Bogoriense) at the National Research and Innovation Agency (BRIN), Indonesia, for granting us access to the specimens. RIIM from LPDP contract number 7501/II.7.5/FR.06.00/11/2024 and B-7766/III.5/FR.06.00/11/2024. We also acknowledge Naturalis BioPortal, the Global Biodiversity Information Facility, JSTOR's Global Plants, and the Kew Data Portal for their data contributions.

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