

HEPTAPLEURUM CONNATUM (ARALIACEAE): A NEW SPECIES OF HEPTAPLEURUM FROM SARAWAK, MALAYSIA

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ABSTRACT

RAMNOR, N., AHMAD PUAD, A. S. & FRODIN, D. G. 2024. *Heptapleurum connatum* (Araliaceae): a new species of *Heptapleurum* from Sarawak, Malaysia. *Reinwardtia* 23(2): 77–83. — A new *Heptapleurum* species from Sarawak, Borneo is described and illustrated as *Heptapleurum connatum* N.Ramnor, A.Puad & D.G.Frodin. It is an epiphyte or treelet recorded at various vegetation types such as near riverbank, limestone forests, remnant forests, hills and peat swamp forests from 10–1,219 m asl. It is distinguished from *H. truncatifructum* by being slightly larger in size, having more second-order venations with narrow spacing between them, more flowers per umbel, and more stigmata on fused style. A distribution map of the species in Sarawak has also been constructed.

Key words: Araliaceae, Borneo, *Heptapleurum*, Sarawak.

ABSTRAK

RAMNOR, N., AHMAD PUAD, A. S. & FRODIN, D. G. 2024. *Heptapleurum connatum* (Araliaceae): jenis baru *Heptapleurum* dari Sarawak, Malaysia. *Reinwardtia* 23(2): 77–83. — Jenis *Heptapleurum* baru dari Sarawak, Borneo dipertelakan dan diilustrasikan sebagai *Heptapleurum connatum* N.Ramnor, A.Puad & D.G.Frodin. Jenis ini merupakan tumbuhan epifit atau pohon kecil yang terdapat pada berbagai jenis vegetasi seperti di tepi sungai, hutan kapur, hutan sisa, perbukitan, dan hutan rawa pada ketinggian 10–1.219 m dpl. Tumbuhan ini dibedakan dari *H. truncatifructum* dengan ukurannya yang sedikit lebih besar, memiliki lebih banyak jumlah venasi urutan kedua dengan jarak yang sempit di antara venasi, lebih banyak bunga pada satu *umbel* dan lebih banyak kepala putik pada tangkai kepala putik yang menyatu. Peta distribusi jenis ini di Sarawak juga telah dibuat.

Kata kunci: Araliaceae, Borneo, *Heptapleurum*, Sarawak.

INTRODUCTION

Heptapleurum Gaertn. is a genus within the Araliaceae family and the Apiales order. Introduced by Gaertner in 1791, its inaugural species was described in Sri Lanka. Characterized as small to medium-sized and highly branched, plants in this genus are distinguishable by their palmately compound leaves, fused stipules evolving into a ligula at the petiole base and panicles bearing inflorescences of umbels, capitula, racemules or spicules. Notably, these plants exhibit no articulation at the pedicels and lack prickles on vegetative organs (Frodin, 1975). Historically, members of *Heptapleurum* were classified within the large genus of *Schefflera*. However, subsequent research has revealed that *Schefflera* is polyphyletic, demonstrating that its five clades - African-Malagasy, Asian, Melanesian, Neotropical and *Schefflera sensu stricto* - are not interrelated (Fiaschi &

Plunkett, 2011; Gostel *et al.*, 2017; Li & Wen, 2014; Plunkett *et al.*, 2005, 2020; Plunkett & Lowry, 2012). The reclassification of all Asian *Schefflera* species into *Heptapleurum* has resulted in it becoming the largest genus in the Araliaceae, boasting 317 species and ten varieties with an estimated 200 additional species pending description. *Heptapleurum* is predominantly found across tropical and subtropical regions of Asia, extending to various islands and archipelagos of the western Pacific. Its habitats span a wide range of vegetations and altitudes, from sea level up to 3,600 m asl (Plunkett *et al.*, 2020).

Despite the scattered documentation of *Heptapleurum* species in Sarawak and Borneo at large, spanning various publications (Blume, 1826; Miquel, 1856, 1861, 1863; Seemann, 1865; Clarke, 1879; Boerlage, 1890; Harms, 1894, 1917; Merrill, 1928, 1950, 1918a, 1918b; Ridley, 1946; Hutchinson, 1967; Puad *et al.*, 2018; Plunkett *et*

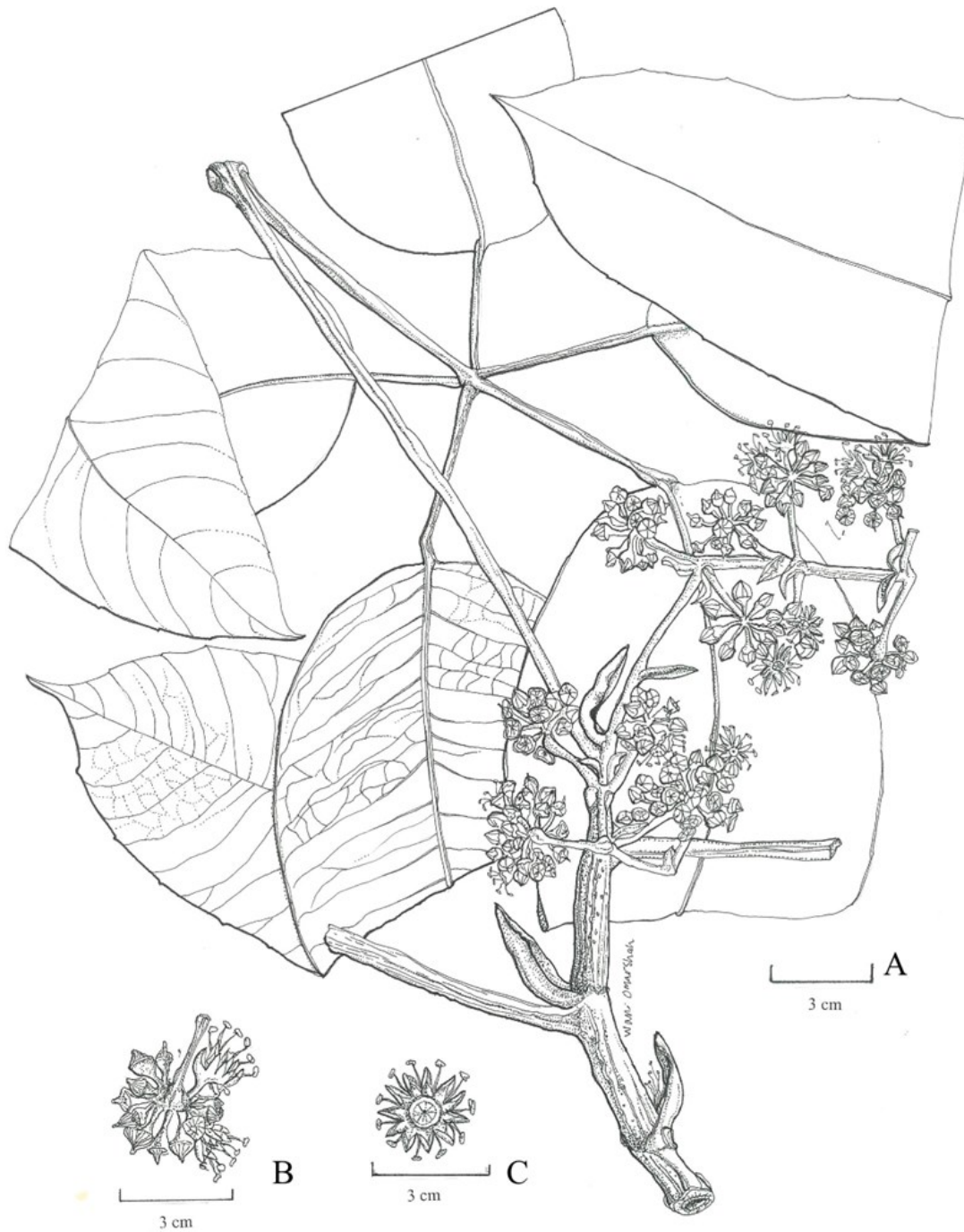


Fig. 1. *Heptapleurum connatum* N.Ramnor, A.Puad & D.G.Frodin. A. Habit. B. Inflorescence. C. Top view of flower. Drawings by Wan Omarshah.

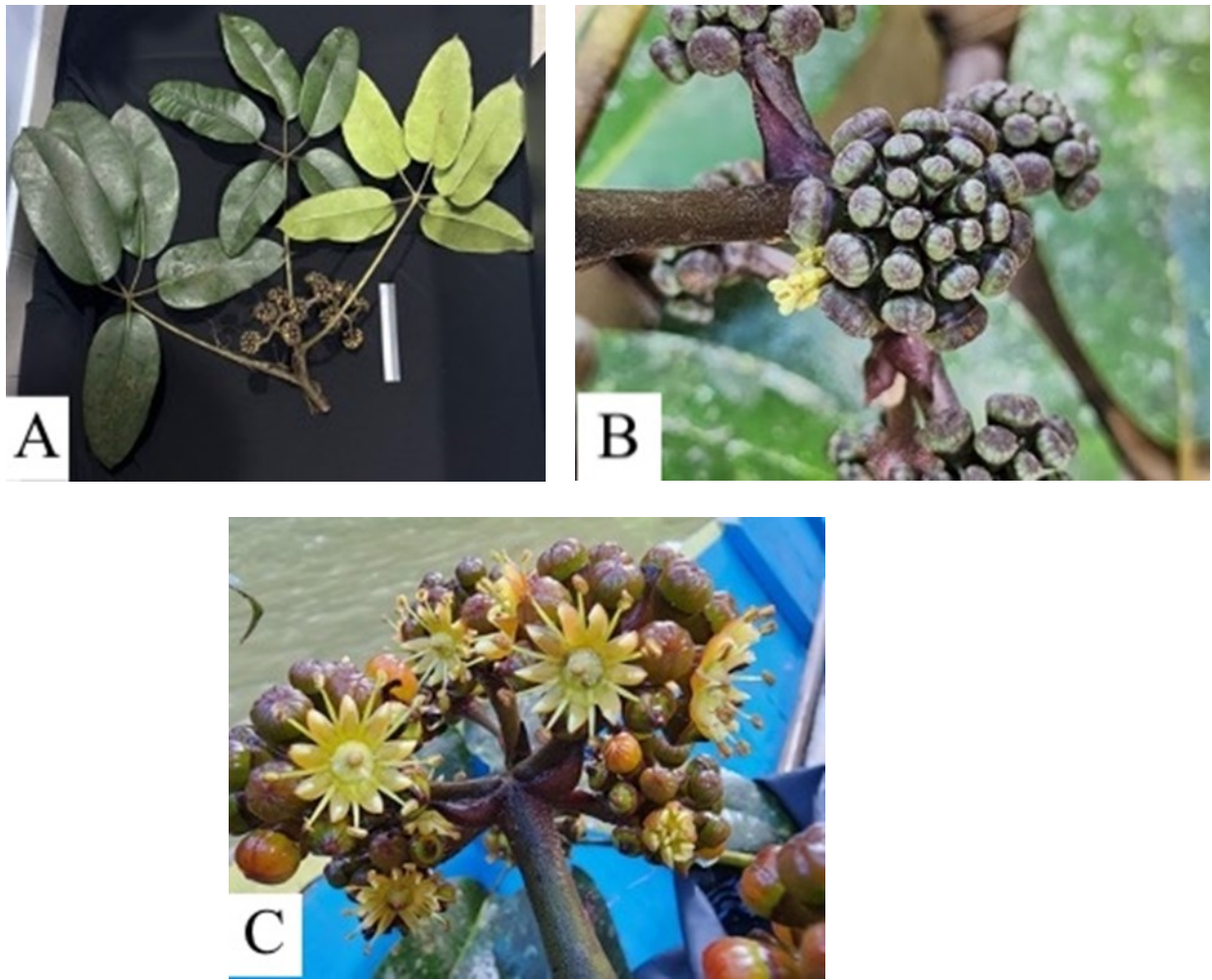


Fig. 2. *Heptapleurum connatum* N.Ramnor, A.Puad & D.G.Frodin. A. Leaves and inflorescences. B. Flower buds. C. Individual flowers opened. Photos by Aida Shafreena.

al., 2020), there remains a considerable gap in our understanding of the genus diversity in the region. The most recent comprehensive study within Borneo was conducted in Sabah by Puad *et al.* (2018). Building on this foundation, we present *Heptapleurum connatum*, a new species identified in the Kapit Division of Sarawak, Borneo, contributing to the ongoing efforts to catalogue and understand the region's botanical diversity.

MATERIALS AND METHODS

The description of vegetative and reproductive characteristics of the species is based on the observation of both fresh and dried plant specimens. Dried specimens were examined from the collections housed in the Sarawak Herbarium (SAR). A total of 28 specimens were observed in this study. Measurements were conducted in accordance with the methods described by Ahmad Puad *et al.* (2018), utilizing both measuring tape and a Vernier

caliper. Small plant parts were observed under a stereo microscope, specifically using the Olympus DP72 model. For the distribution map, all specimens were georeferenced using Google Maps or the Sarawak Gazetteer (Mohizah *et al.*, 2006), based on the locality names provided on the herbarium labels as well as the locations of the fresh specimens collected in the field. The map was constructed using ArcMap software, version 10.3. The type specimen is deposited in SAR, with herbarium codes following the guidelines established by Thiers (2022).

RESULTS AND DISCUSSION

Heptapleurum connatum N.Ramnor, A.Puad & D.G.Frodin *spec. nov.* Figs. 1 & 2. — TYPE: MALAYSIA, East Malaysia, Sarawak, Kapit, Sut, Sungai Bena, 1°54'3"N 113°9'58"E, 70 m, 10 July 2023, Norazira *et al.*, SB14 (Holotype: SAR!)

Table 1. Diagnostic morphological characteristics of *H. connatum* and *H. truncatifructum*.

Character	<i>H. connatum</i>	<i>H. truncatifructum</i>
Habitat	By riverbank, limestone forest, remnant forest, on hill and peat swamp forest at elevation from 10 m to 1,219 m asl.	In mixed dipterocarp forest or low swampy forest over ultramafic rocks at elevation about 122 m asl.
Growth form	Epiphyte or treelet	Epiphyte or climber
Stipule free portion	2.2–4.5 cm	0.5–0.6 cm
Petiole	10.5–33 cm long × 0.32–0.70 cm diam.	9–13.5 cm long × 0.20–0.27 cm diam.
Petiolule	0.6–8.5 cm long × 0.2–0.5 cm diam.	1.8–5 cm long × 0.15–0.20 cm diam.
Leaf blade	Broadly elliptic, obovate, oval or ovate, 9–32.6 cm long × 3.2–13.1 cm wide	Broadly elliptic, 9–15 cm long × 3.5–7.2 cm wide
Leaf apex	Broadly acuminate to caudate, 0.5–2.5 cm long	Obtuse to rounded but narrowly passing into acuminate, 0.8–1.5 cm long
Second-order venation	12–18 pairs, closely spaced	5–6 pairs, widely spaced
Branching zone	0–5.5 cm long	0.05–0.07 cm long
Peduncle	1.0–4.7 cm long	0.3–0.7 cm long
Pedicel	0.2–0.5 cm long	0.16–0.18 cm long
No. of flowers per umbel	25–30 flowers	4–5(–8) flowers
Flower buds	3–5 mm long × 2.5–4 mm diam.	3 mm long × 2 mm diam.
Stigmata	9–11, on style at 2–4 mm long	5 and sessile
Fruits	4–10 mm long × 2.5–6.5 mm diam., glabrous; prominent fused style in dried state. (Fig. 3)	2.4 mm long × 1.8 mm diam., sparsely hairy

The species differs from *H. truncatifructum* (Puad, T.J.Barkman & Frodin) Puad, T.J.Barkman, G.M.Plunkett & Lowry by having longer stipule, petiole, petiolule; bigger leaf blades, a greater number of second-order venations with narrower spacing between them; a longer branching zone, peduncle and pedicel, more flowers per umbel, bigger flowers and fruits and more stigmata on fused style (Table 1).

Epiphyte or treelet. *Leaves* 4–6 foliolate. Petiole 10.5–33 cm long × 0.32–0.7 cm diameter, glabrous and subtended by a free persistent stipule, 2.2–4.5 cm long with free portion; petiolules vary in

length, 0.6–8.5 cm long × 0.2–0.5 cm diameter, glabrous. Blades broadly elliptic, obovate, oval, or ovate, minutely toothed margin, upper and lower surface glabrous, most blades have slightly unequal sides, thick or thinly coriaceous, 9–32.6 cm long × 3.2–14 cm wide; longest is not always widest. Adaxial surface dark green while abaxial surface light green. Apex broadly acuminate to caudate, 0.5–2.5 cm long. Base obtuse, sometimes slightly rounded. Second-order venation 12–18 pairs on each side, camptodromous, almost parallel and closely spaced. *Inflorescences* terminal, paniculate; primary axis above the last leaf about 1.5–9 cm long with a limitation zone of 1.5–3.5

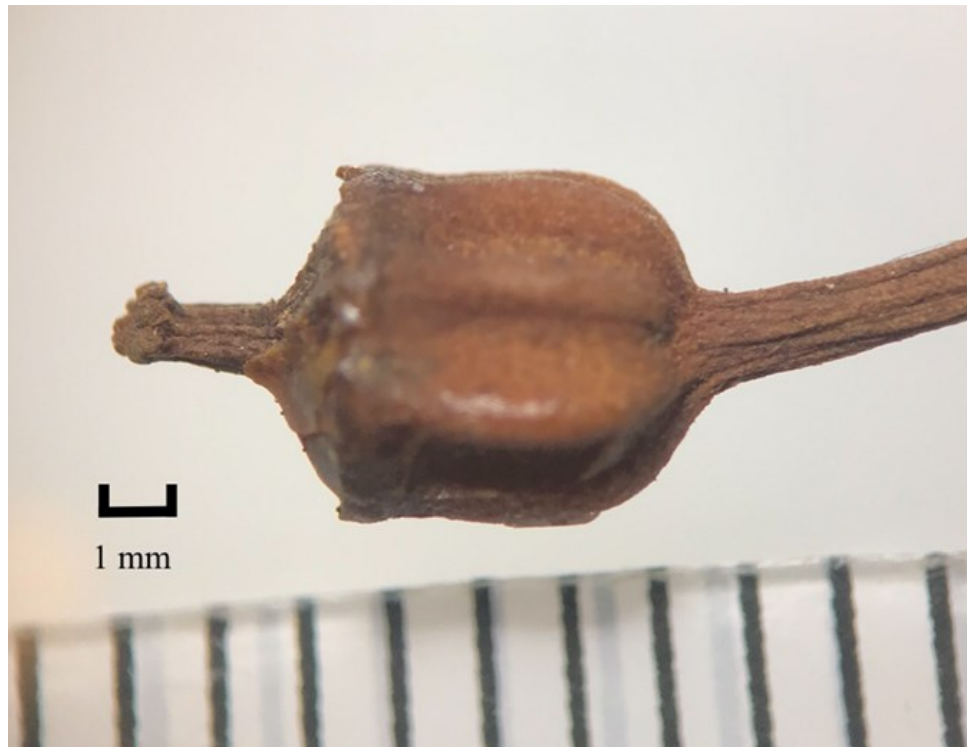


Fig. 3. Dried fruit of *H. connatum* showing truncate apex with united style (Specimen S. 30921). Photo by Norazira Ramnor.

cm long and branching fertile zone of 0–5.5 cm long. Lateral branches 2–4, 3.5–22.5 cm long \times 3–9 mm diam., covered with dense hairs, subtended at their base by large bracts 1–3.2 cm long with umbellules 6–9 per branch, arranged in clusters. Each cluster is widely spaced. Terminal cluster usually has more umbels than subsidiary cluster. Peduncle 1–4.7 cm long \times 0.15–0.5 cm diameter, densely hairy, each subtended by 0.7–1.5 cm long bracts. Pedicels 2–5 mm long and sparsely hairy. Flower buds 25–30 per umbel, green to purplish brown, obovoid with flattened apex, 3–5 mm long \times 2.5–4 mm. Cupule obconic with length 1–3 mm long, covered with hairs. Petals greenish yellow, 9–11 with length 5 mm long. Stamen 9–11, 6–8 mm long. Apex flat with stylar mound raised up to 1.5 mm high. Fruits semi globose to ellipsoid, 4–10 mm long \times 2.5–6.5 mm diameter, initially green turning orange upon maturity, glabrous and inferior. Apex truncate with stylar column extended up to 2–4 mm long. Stigmata 9–11.

Distribution. Borneo (Sarawak and Kalimantan) (Fig. 4).

Habitat. Generally at low elevations (between 10 m asl and 1,219 m asl), by the riverbank, limestone forest, on hills, and peat swamp forest.

Derivation of name. The specific epithet is derived from the Latin word *connatum*, meaning

“fused together”, referring to the styles that fused together.

Notes. During a fieldwork in July 2023 at Kapit, the specimen was found along the river at Sungai Bena. It was not the first collection at the river as Ilias Paie had collected the same plant in 1980. The last collection of the species was made in 2007 at the western part of Pulong Tau National Park, Miri. In Frodin’s file, he observed specimens of *H. connatum* in other herbaria and found that eight of them were recorded in Kalimantan, Indonesia, including the oldest specimen, which was collected in 1888.

Specimens examined. BORNEO. Kuching. Mt. Braang, Nov 1888, *G. D. Haviland, s. n.* (SING); Kalimantan Barat, Kapuas Hulu, Sg. Kenepai, Jan 1894, *J. G. Hallier, No. 2168* (BO, L); Kalimantan Barat, Kapuas Hulu, Mt. Liang Agang, 1894, *J. G. Hallier, No. 3038* (BO, L); Bau, Bkt. Krian [near Krian Dam], 50 m, Sep 1909, *C. J. Brooks, No. 1048* (BM); Kalimantan Timur, Kutai, Muarawahau, near Bolzet, Camp 31–32, 350 m, 4 Sep 1925, *F. H. Endert, No. 4018* (BO, K, L); Kalimantan Timur, Kutai, Kongkemul, Camp 37, 1,100 m, 4 Oct 1925, *F. H. Endert, No. 3795* (BO, K, L); Gat, Upper Rejang river, 1929, *J. & M. S. Clemens, 21867* (SAR); Seburan (Siburan), 4 Sep 1960, *J. A. R. Anderson, S. 29380* (SAR); Mt. Api, 1219 m, 12 Jul 1961, *J. A. R. Anderson, S. 4730*

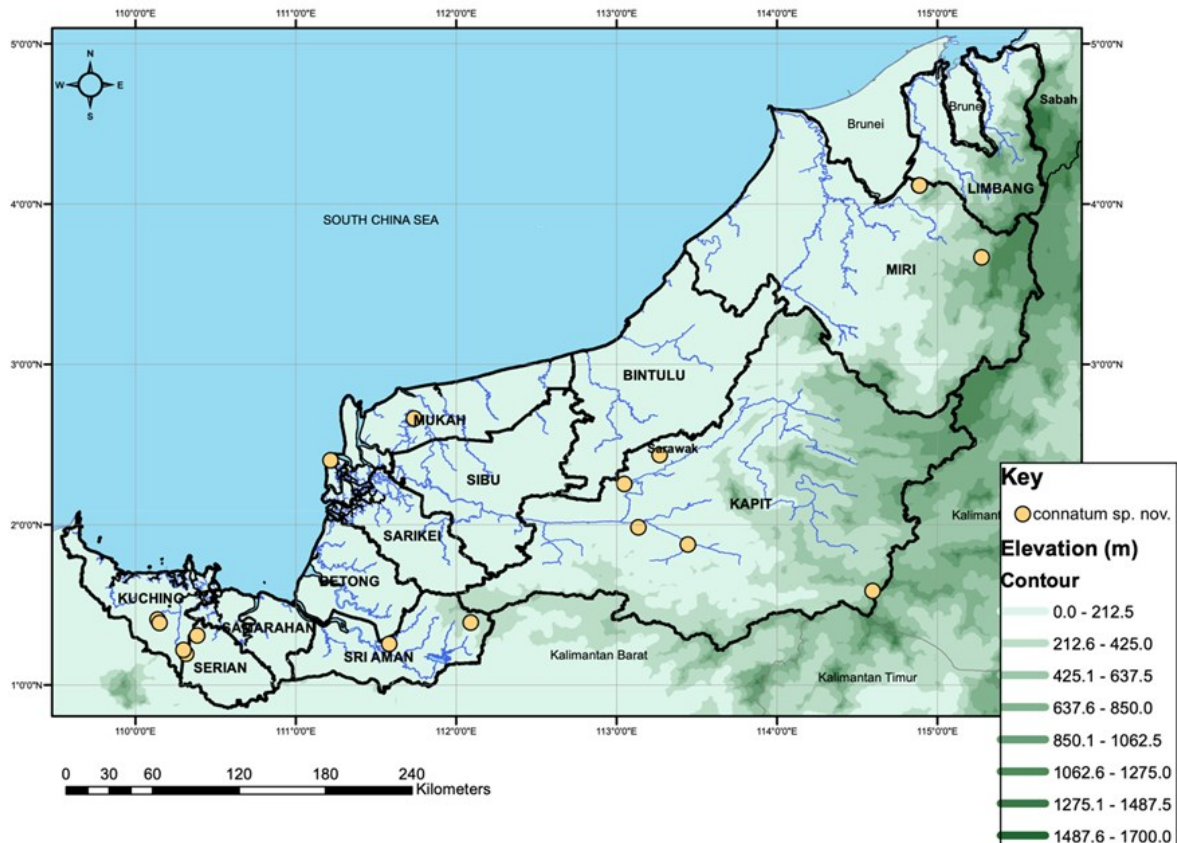


Fig. 4. The distribution of *H. connatum* in Sarawak.

(SAR); Lassa, Sg. Matalau, 28 Jan 1967, *J. A. R. Anderson*, S. 25552 (K, L); Padawan, Bkt. Pait, 152 m, 2 Mar 1969, *Erwin & Paul*, S. 27431 (CGE, L, K); Paloh Protected Forest, 17 Jul 1971, *Paul Chai et al.*, S. 26749 (K, L, SING, SAN, A); Sg. Bah (near Punan Bah), 21 Sep 1973, *S. Tong & Jugah*, S. 33263 (CGE, L, K, MO); Gunung Mulu N.P., Mt. Api, 1,700 m, 16 Apr 1978, *G. Argent*, No. 1034 (E, L); Mulu NP, Mt. Api, Pinnacles Camp, 1,200 m, 17 Apr 1978, *G. Argent & C. Jermy*, *Argent 1049* (SAR); Sg. Bena, Sut, 26 Apr 1980, *Ilias Paie*, S. 41712 (CGE, L, K); Kalimantan Tengah, Bkt. Katingan Raya, 130 m, 4 Dec 1982, *H. P. Nootboom*, No. 4150 (L); No. 4152 (BO, L); Sg. Tabut to Mujan, 10 Mar 1986, *Ilias Paie et al.*, S. 51987 (SAR); 3–4 km South of Serian to Tebakang, 25 m, 20 Dec 1989, *D. G. Frodin*, No. 2085 (SAR); Kalimantan Timur, Malinau, Kayan Mentarang NP, Sg. Bahau, 450 m, 10 Jul 1992, *J. A. McDonald*, No. 3555 (F, L, SING, BO, K); Bau (rocky limestone), 30 m, 15 Sep 1995, *J. W. Purseglove*, P. 4438 (SAR, CGE); Kalimantan Tengah, Katingan, Along Sg. Mahub, 150 m, 26 Oct 1996, *P. Kessler*, No. 1506 (L); Batang Ai N.P., Lubang Baya, Ulu Sg., Sg. Talangon, 200 m, 16 Mar 2000, *Rantai Jawa et al.*, S. 84180 (KEP); Mt. Payung, 23 Oct 2001, *Malcom et al.*, *SBC 853* (SBC); Pulong Tau N.P. (West), Kuala Sg. Buong,

14 May 2007, *Julia et al.*, S. 98294 (SAR); Kapit, Sut, Sg. Bena, 70 m, 10 July 2023, *Norazira et al.*, *SB14* (SAR); *SB17* (SAR).

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