

## A synopsis of *Jarandersonia* (Malvaceae: Brownlowioideae)

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**ABSTRACT.** A revision of *Jarandersonia* was conducted as part of a study of Malvaceae: Brownlowioideae for the Tree Flora of Sabah and Sarawak Project. Six species of *Jarandersonia* are recognised for Borneo, of which *J. pentaceoides* R.C.K.Chung & H.S.Tan, endemic to central Kalimantan, is new to science. A complete list of exsiccatae, nomenclatural and taxonomic notes, geographical distribution and conservation status of the recognised species, are provided.

**Keywords.** Borneo, Brownlowioideae, *Jarandersonia*, Kalimantan, Malvaceae, tree flora

### Introduction

*Jarandersonia* was first described by Kostermans in 1960 based on the Sarawak species, *J. paludosa* (now a synonym of *J. purseglovei* (Kosterm.) Kosterm.). In the past fifty years, the genus had been included in the family Tiliaceae. Recently, molecular evidence has supported the inclusion of *Jarandersonia* in the subfamily Brownlowioideae of the expanded family Malvaceae *s.l.* based on *ndhF*, *atpB* and *rbcL* data (Alverson et al. 1999; Bayer et al. 1999; Nyffeler and Baum 2000; Bayer and Kubitzki 2003). In Malaysia, Brownlowioideae consists of five genera, namely *Berrya*, *Brownlowia*, *Diplodiscus*, *Jarandersonia* and *Pentace*, and has about 55 species. The genus *Jarandersonia* can be easily distinguished from *Brownlowia*, *Diplodiscus* and *Pentace* by its elliptic or obovate leaves, densely hairy fruit spines and a combination of micromorphological characters.

*Jarandersonia*, locally known as *baru baran* (Iban) in Sarawak, was named after J.A.R. Anderson, a forest botanist working in Sarawak and Brunei from 1951 to 1970. Kostermans (1962, 1970) described three more species and transferred *Brownlowia clemensiae* Burret to the genus, making a total of five known species of *Jarandersonia*. In our recent revision of the genus for the Tree Flora of Sabah and Sarawak Project, an additional new species, *J. pentaceoides* R.C.K.Chung & H.S.Tan, from central Kalimantan was discovered. In an assessment of the conservation status of the five species, one was found to be critically endangered, two endangered, one vulnerable, and one of least concern.

### Synopsis of species

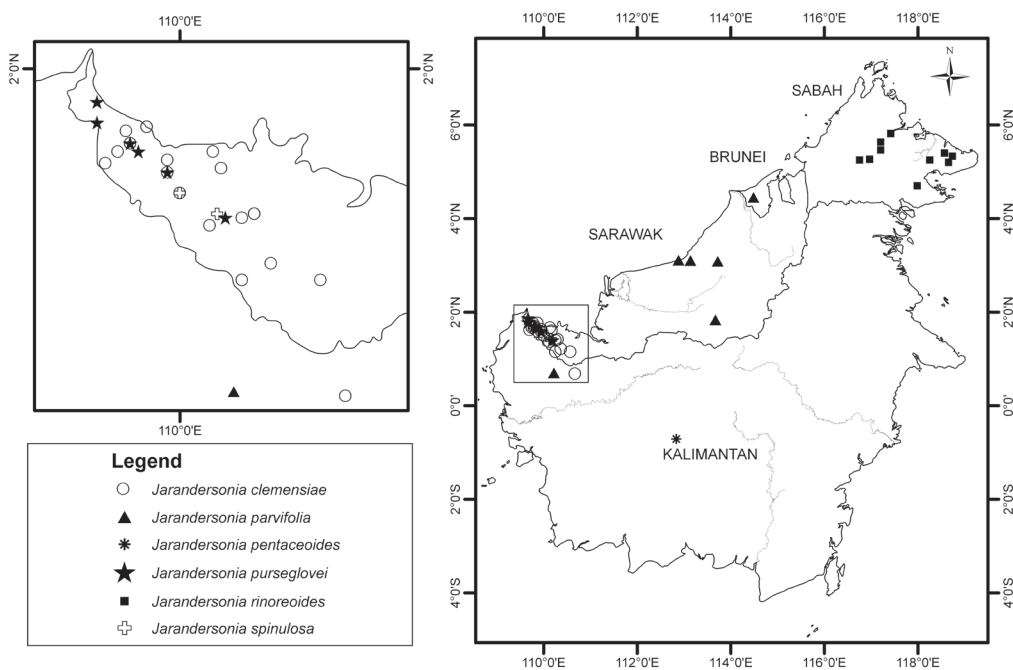
***Jarandersonia*** Kosterm., Reinwardtia 5 (1960) 319, Reinwardtia 8 (1970) 17; Hutchinson, Gen. Flow. Pl. 2 (1967) 491; Ashton, Man. Non-Dipt. Trees Sarawak 2 (1988) 448; Bayer & Kubitzki in Kubitzki (ed.), Fam. Gen. Vasc. Pl. 5 (2003) 258; LaFrankie, Trees of Tropical Asia (2010) 479. TYPE SPECIES: *Jarandersonia paludosa* Kosterm. [= *Jarandersonia purseglovei* (Kosterm.) Kosterm.].

*Vernacular name.* Baru baran (Iban, Sarawak).

*Distribution.* The genus comprises six species endemic to Borneo (2 are in western Sarawak, 1 Sabah, 1 Sarawak and Kalimantan, 1 Sarawak, Brunei and west Kalimantan, 1 central Kalimantan). (Fig. 1)

*Ecology.* Mainly found in mixed dipterocarp forest and peat swamp forest.

*Notes.* The terminology used for trichome types mainly follows Webster et al. (1996). Three main trichome types were observed in *Jarandersonia*, namely, subentire-lepidote (radii webbed 80–100%), dentate-lepidote (radii webbed 50–80%) and stellate-lepidote (radii webbed 30–50%).



**Fig. 1.** Known distribution of *Jarandersonia* species in Borneo (right). Species distributions in the south-western part of Sarawak are shown in magnified view (left).

**1. *Jarandersonia clemensiae*** (Burret) Kosterm., Reinwardtia 8 (1970) 18; Anderson, Checkl. Trees Sarawak (1980) 339; Ashton, Man. Non-Dipt. Trees Sarawak 2 (1988) 448; Whitmore et al., Tr. Fl. Indonesia Checkl. Kalimantan 2, 1 (1990) 356; Rantai & Chai, New Checkl. Trees Sarawak (2007) 333. *Brownlowia clemensiae* Burret, Notizbl. Bot. Gart. Berl.-Dahl. 13 (1936) 252; Kostermans, Communic. For. Res. Inst. Bogor 73 (1961) 29, fig. 23; Ashton, Man. Non-Dipt. Trees Sarawak 2 (1988) 432. TYPE: *J. Clemens* & *M.S. Clemens* 22202, Borneo, Sarawak, Mt Gading (holo B†; iso BO, K, NY barcode 00415382, SAR). (Fig. 2A)

*Vernacular names.* *Baru baran* (Iban), *nginjoaja* (Bidayuh Padawan, Sarawak).

*Distribution.* Endemic to Borneo (Sarawak and Kalimantan). In Sarawak, known from Lundu, Kuching, Bau, and Serian districts. Also occurring in Kalimantan.

*Conservation status.* Least concern. Most of the populations are found in protected areas.

*Ecology.* In lowland mixed dipterocarp forest, in riparian and secondary forests. Very local, usually along small stream banks on clay-rich alluvium, to 200 m altitude.

*Notes.* *Jarandersonia clemensiae* is closely related to *J. purseglovei*. The former, however, differs from the latter in having a subcordate leaf base (vs. acute to rounded), 12–16 pairs of lateral veins (vs. 18–23 pairs), flattened lateral veins above (vs. sunken above), rounded midrib (vs. square) and unbranched fruit spines with stellate-lepidote and dentate-lepidote trichomes (vs. short-branched with branch tips bearing simple or 2-armed setose hairs).

**2. *Jarandersonia parvifolia*** Kosterm., Reinwardtia 8 (1970) 18; Anderson, Checkl. Trees Sarawak (1980) 339; Ashton, Man. Non-Dipt. Trees Sarawak 2 (1988) 448; Whitmore et al., Tr. Fl. Indonesia Checkl. Kalimantan 2, 1 (1990) 356; Rantai & Chai, New Checkl. Trees Sarawak (2007) 333. TYPE: *Ilias S* 15561, Borneo, Sarawak, Bintulu, Segan FR (holo BO; iso A, SAN, SAR, SING). (Fig. 2B)

*Vernacular name.* *Baru baran mit* (Iban, Sarawak).

*Distribution.* Endemic to Borneo (Sarawak, Brunei and Kalimantan). In Sarawak, known from Bintulu, Tatau and Kapit districts. Also occurring in Brunei and Kalimantan.

*Conservation status.* Critically endangered A2c. Two localities had been converted to oil palm plantations. Details for the remaining localities are scanty.

*Ecology.* In mixed dipterocarp forest, on leached yellow clay soils, to 700 m altitude.

*Notes.* *Jarandersonia parvifolia* can be easily distinguished by its small elliptic to broadly elliptic leaves,  $4\text{--}11.5 \times (1.4\text{--})2\text{--}5$  cm and square midrib in cross-section.

**3. *Jarandersonia pentaceoides*** R.C.K.Chung & H.S.Tan, Syst. Bot. (in press). Proposed Type: *J.K. Jarvie & A. Ruskandi 5769*, Borneo, Kalimantan, Kalimantan Tengah, Samba (holo KEP; iso A, BO, K, SAN, SING). (Fig. 2C)

*Distribution.* Known only from the type, recorded in Samba, central Kalimantan.

*Ecology.* Primary forest, hilly terrain on red clay soil with slope, at attitudes to 300 m.

*Notes.* *Jarandersonia pentaceoides* is most similar to *J. rinoreoides*, having cuneate leaf base, rounded midrib, slender and unbranched fruit spines. However, *J. pentaceoides* is distinct in having densely stellate-lepidote and dentate-lepidote trichomes along the edges of tertiary veins and honeycomb-like quaternary veins on the lower leaf surface, a kneed petiole that is swollen at both ends, and a sparsely stellate-lepidote and tufted hairy seed coat, whereas in *J. rinoreoides* the quaternary veins are absent, the petiole is straight and not swollen at both ends and the seed coat is glabrous. The leaves of *J. pentaceoides* are similar to those of some common *Pentace* and *Mallotus* (i.e., *M. leucodermis* Hook.f. and *M. muticus* (Müll.Arg.) Airy Shaw) in shape, number of secondary veins, and its kneed petiole that is swollen at both ends. However, the morphological characters of *J. pentaceoides* do not match the features of both *Pentace* and *Mallotus*, because the new species have distinct quaternary veins (vs. absent in both *Pentace* and *Mallotus*) and spiny fruits (vs. winged fruits in *Pentace* and shortly stiff spiny in *Mallotus*). The fruit spines of *J. pentaceoides* are similar to *Commersonia bartramia* (L.) Merr. but the former can be easily distinguished by its cuneate leaf base (vs. cordate) and indehiscent fruit (vs. splitting open fruit into 5 valves).

**4. *Jarandersonia purseglovei*** (Kosterm.) Kosterm., Reinwardtia 6 (1962) 299; Anderson, Checkl. Trees Sarawak (1980) 339; Ashton, Man. Non-Dipt. Trees Sarawak 2 (1988) 449; Whitmore et al., Tr. Fl. Indonesia Checkl. Kalimantan 2, 1 (1990) 356; Rantai & Chai, New Checkl. Trees Sarawak (2007) 333. *Brownlowia purseglovei* Kosterm., Gard. Bull. Singapore 17 (1958) 1, Communic. For. Res. Inst. Bogor 73 (1961) 28, fig. 22. TYPE: *J.N. Purseglove P 4662*, Borneo, Sarawak, Mt Pueh (holo SING barcode 0050678; iso BO). (Fig. 2D)

*Jarandersonia paludosa* Kosterm., Reinwardtia 5 (1960) 319. TYPE: *J.A.R. Anderson S 6554*, Borneo, Sarawak, Lundu district (holo K; iso BO, L, SAR, SING barcode 0050679).

*Vernacular names.* *Baru baran kasar, baru barun daun kasar* (Iban, Sarawak).

*Distribution.* Endemic to Borneo (W Sarawak). Recorded from Lundu, Kuching and Bau districts.

*Conservation status.* Endangered A2c, due to loss of natural habitat and its population size having been reduced by more than 50%.

*Ecology.* Lowland mixed dipterocarp forest, on shallow peat and ground-water podsols near sea-level.

*Notes.* The leaves of *Jarandersonia purseglovei* are very similar to those of *Durio oblongus* Mast. (Malvaceae: Helicterioideae/Durioneae). However, the species can be distinguished from *D. oblongus* by the cuneate leaf base (vs. rounded), rounded midrib (vs. ridged) and prominent intermediate veins (vs. inconspicuous). This species is also closely related to *J. clemensiae* (see note under *J. clemensiae*).

**5. *Jarandersonia rinoreoides*** Kosterm., Reinwardtia 8 (1970) 17; Whitmore et al., Tr. Fl. Indonesia Checkl. Kalimantan 2, 1 (1990) 356. TYPE: *W. Meijer SAN 27885*, Borneo, Sabah, Sandakan, Tabin, W of Sulap (holo SAR; iso K, KEP barcode 76031, L, SAN). (Fig. 2E)

*Distribution.* Endemic to Borneo (Sabah). Recorded from Labuk Sugut, Sandakan, Kinabatangan and Lahad Datu districts.

*Conservation status.* Vulnerable B1ab(iii). The species is found in less than 10 locations that are not strictly protected.

*Ecology.* In mixed dipterocarp forest, usually near streams, to 700 m altitude.

*Notes.* *Jarandersonia rinoreoides* is closely related to *J. spinulosa* but differs in its midrib and lateral veins (glabrous vs. pilose hairy above), and its fruit spines (slender, tufted hairy intermixed with simple or 2(–3)-armed setose hairs, unbranched vs. stout, glabrous, branched with branch tips bearing simple or 2-armed setose hairs).

**6. *Jarandersonia spinulosa*** Kosterm., Reinwardtia 6 (1962) 300; Anderson, Checkl. Trees Sarawak (1980) 339; Ashton, Man. Non-Dipt. Trees Sarawak 2 (1988) 449; Whitmore et al., Tr. Fl. Indonesia Checkl. Kalimantan 2, 1 (1990) 357; Rantai & Chai, New Checkl. Trees Sarawak (2007) 333. TYPE: *H.N. Ridley s.n.*, Borneo, Sarawak, Mt Matang (holo K). (Fig. 2F)

*Distribution.* Endemic to Borneo (Sarawak). In Sarawak, known from Kuching and Bau districts.

*Conservation status.* Endangered B2ab(iii). The species is known from only two specimens with the latest collection made in 1985. No populations are known to occur in the network of protected areas and some of the forest reserves where this species occurs are small and fragmented. No ecological details were available.

*Ecology.* Lowland mixed dipterocarp forest, along rivers, to 50 m altitude.

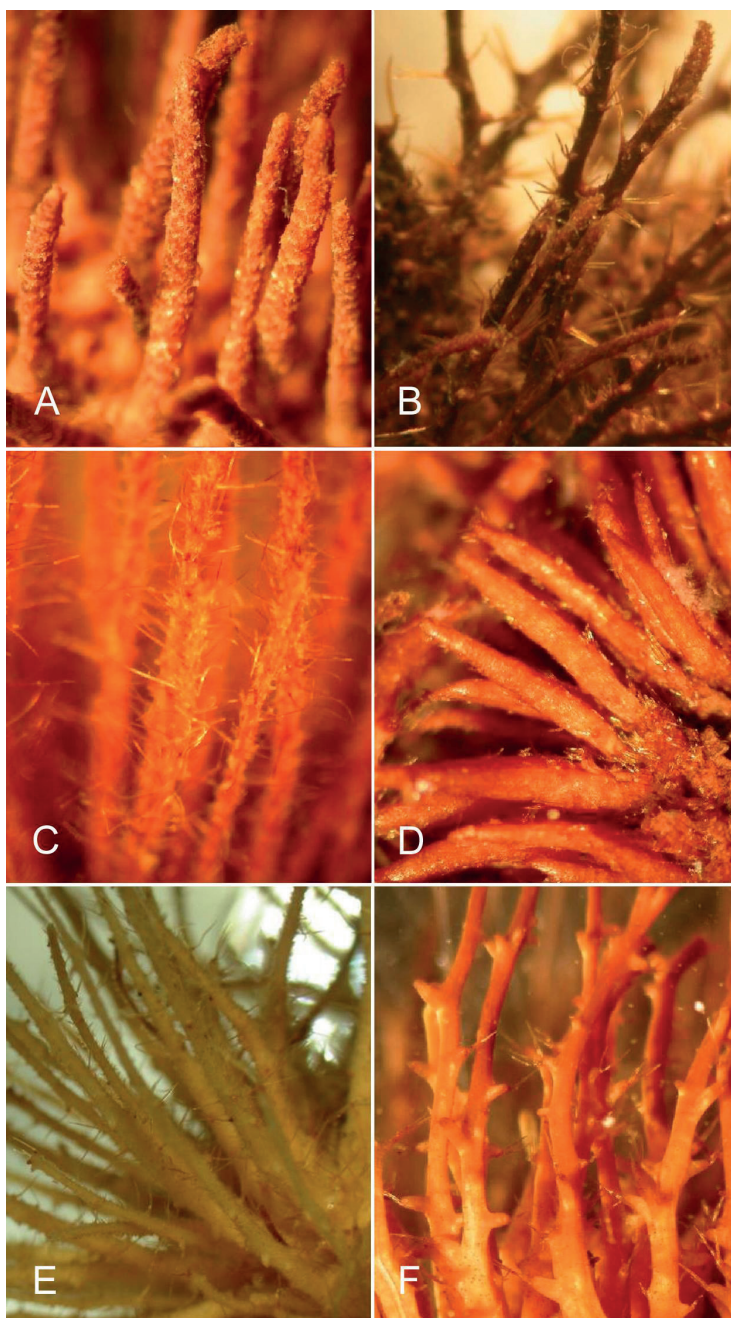
*Note.* This species is closely related to *J. rinoreoides* (See note under *J. rinoreoides*).

### Identification list

Numbers after the collector numbers refer to the following *Jarandersonia* species: 1 = *J. clemensiae*; 2 = *J. parvifolia*; 3 = *J. pentaceoides*; 4 = *J. purseglovei*; 5 = *J. rinoreoides*; 6 = *J. spinulosa*. When collection numbers are not available, dates are given within brackets.

*Aban* SAN 97250: 5; *Anderson* S 25415: 1; S 26759: 1; S 6554: 4; *Awang Enjah* S 68042: 1. *Buxton* A 548: 1; *Bojeng* S 9355: 1. *Clemens & Clemens* 22202: 1. *Dewol* SAN 99462: 5. *Frodin & Othman* 2027: 1; *Fordin et al.* 2119: 1; *Fuchs* 21376: 2. *Guijing* SAN 45510: 5; SAN 45511: 5; SAN 45518: 5. *Ilias* S 15561: 2. *Jacobs* 5567: 1; *Jaamat & Tachun* FMS 39640: 2; *James* S 29846: 1; *Jarvie & Ruskandi* 5769: 3; *Jong* 904: 1; *Jugah* S 51590: 1. *Lakising* SAN 70168: 5. *Meijer* SAN 27885: 5; SAN 31016: 5; SAN 51237: 5; SAN 53222: 5; *Madani* SAN 61097: 5; *Munting* S 54250: 1. *Othman* S 37050: 1; S 37820: 4; S 40042: 1; *Othman et al.* S 49899: 1; S 63818: 1; *Othman & Munting* S 54348: 2; S 54349: 2. *Purseglove* P 4662: 4. *Rantai et al.* S 68437: 1; *Reto et al.* 506: 1; 508: 1; 511: 4; *Ridley* s.n. (1/1915): 6. *Sigin & Lidah* SAN 97197: 5; *Sinanggul* SAN 57101: 5; *Suah* SAN 37379: 5. *Tukirin & Partomihardjo* K 3319: 2. *Yahud et al.* S 93215: 1; S 93216: 1; S 93218: 1; S 93223: 4; S 93224: 1; S 93226: 1; S 93227: 1; S 93228: 4; S 93229: 4; S 93231: 1; S 93263: 1; *Yassin* s.n.(5/1969): 2; *Yii* S 51263: 6.

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**Fig. 2.** Fruit spines of *Jarandersonia* species. **A.** *J. clemensiae*, spines stout, stellate-lepidote and dentate-lepidote, unbranched. **B.** *J. parvifolia*, spines stout, tufted hairy, short-branched with the branch tips bearing simple or 2(–3)-armed setose hairs. **C.** *J. pentaceoides*, spines slender, stellate-lepidote with simple setose hairs, unbranched. **D.** *J. purseglovei*, spines stout, tufted hairy, short-branched with the branch tips bearing simple or 2-armed setose hairs. **E.** *J. rinoreoides*, spines slender, tufted hairy intermixed with simple or 2(–3)-armed setose hairs, unbranched. **F.** *J. spinulosa*, spines stout, glabrous, short-branched with the branch tips bearing simple or 2-armed setose hairs.

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