

TWO NEW SPECIES OF *RINOREA* AUBLET (VIOLACEAE) FROM BORNEO

A. Latiff

Department of Biological Science and Biotechnology, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia

pakteh48@yahoo.com

Submitted November 2021; accepted June 2022

Two new species of *Rinorea* Aublet (Violaceae), *R. linearifolia* Latiff sp. nov. from Sabah and *R. jacobsii* Latiff sp. nov. from Sarawak, Borneo are described and illustrated. The former differs from the more widespread *R. bengalensis* by its almost linear leaves and smaller globose fruits. The latter is also similar to *R. bengalensis* but differs from it by its shorter stipules, blades elliptical to oblanceolate, shorter petioles and smaller capsules.

Keywords: *Rinorea*, Violaceae, Borneo

INTRODUCTION

Rinorea Aublet (Violaceae) is a pantropical genus of forest shrubs, treelets and trees. It is the second most species-rich genus in the family after the herbaceous *Viola* L., with an estimated total of 225–275 species throughout the tropics (Wahlert & Ballard 2012). In Malesia, a total of 11 species are recognised (Jacobs & Moore 1971) with six species attributed to Borneo. Fernando et al. (2014) argued that Jacobs and Moore (1971) had taken a very broad circumscription of a few taxa in their taxonomic revision and many taxa were embedded in a few of them such as *R. bengalensis* and *R. longiracemosa*. Since then a few new species were described, including *R. congesta* Forman, *R. belalongii* Stevens, both from Brunei, *R. crassa* from Kalimantan and *R. cinerea* from Borneo was resurrected and *R. niccolifera* Fernando from the Philippines, making a total of 16 species for the region (Forman & Ahmad 1996, Jarvie & Stevens 1998, Stevens 2000, Fernando et al. 2014). In the course of preparing the taxonomic revision of the family for the Tree Flora of Sabah and Sarawak, two new species were discovered, one each from Sabah and Sarawak and published herein, thus making the total number of species in Malesia at 18 and 11 attributed to Sabah and Sarawak.

MATERIALS AND METHODS

Key to *Rinorea* species in Borneo

- 1a. Flowers large, 9 × 3.5 mm; petals 9 × 3.5 mm long..... *R. macrantha*
- 1b. Flowers comparatively smaller, less than 9 mm long; petals less than 9 mm long..... 2
- 2a. Fruits clothed in hair-like appendages.....
..... *R. anguifera*
- 2b. Fruits not clothed in hair-like appendages
..... 3
- 3a. Fruits ovoid or ellipsoid or subellipsoid... 4
- 3b. Fruits globose or subglobose 5
- 4a. Fruits ellipsoid or subellipsoid..... 7
- 4b. Fruits ovoid 9
- 5a. Fruits large, 3.2–4.1 cm across; leaves elliptical to oblanceolate; inflorescence stalked 6
- 5b. Fruits smaller, 0.7 cm across; leaves somewhat linear, narrowly lanceolate or narrowly elliptical; inflorescence almost sessile
..... *R. linearifolia*
- 6a. Stipules 8–16 mm long; blades elliptical; petioles 1–3 cm long; fruits 1.1–1.5 cm across; seeds 3–7 mm long *R. bengalensis*
- 6b. Stipules *c.* 7 mm long; blades elliptical to oblanceolate; petioles 0.3–1.1 cm long; fruits 3.2–4.1 cm across; seeds *c.* 25 mm long..... *R. jacobsii*

- 7a. Stipules long, 12–15 mm, persistent; inflorescence rachis short, 2–3 cm long; Fruits large, 3–4 cm across; ovary and seeds 9 *R. iliaspaei*
- 7b. Stipules shorter, less than 12 mm, deciduous; inflorescence rachis longer, 6–10 cm long; ovary and seeds less than 9 8
- 8a. Stipules 4–14 mm long; leaves blade elliptical to obovate; petals 4 × 2 mm; *R. macropyxis*
- 8b. Stipules 3–7.5 mm long; leaves blades subobovate to oblong; petals 9 × 3.5 mm;... *R. belalongii*
- 9a. Fruits large, 1.0 cm or more across 10
- 9b. Fruits smaller, less than 1.0 cm across *R. congesta*
- 10a. Fruits 1.0–1.5 mm across; Inflorescence fasciculate *R. horneri*
- 10b. Fruits 2.0–3.5 mm across; inflorescence on a peduncle 11
- 11a. Fruits very large, 3.5 cm across or more *R. cinerea* ssp. *malyari*
- 11b. Fruits smaller, 2.0–3.0 cm across 12
- 12a. Fruits without visible veins on the surface, thick-walled; inflorescence 1–8 m long; tertiary nerves prominently scalariform *R. sclerocarpa*
- 12b. Fruits with visible veins on the surface, thin-walled; inflorescence not exceeding 2 cm long; tertiary nerves vaguely scalariform *R. javanica*

Note: *R. macrantha* was unable to be keyed-out herein using fruits characters as the specimens observed in both SAN and SAR lacked them. We have attempted to use the size of flowers as according to Jacobs (1967 & 1971), where the flowers of *R. macrantha* were the largest in the genus and the thin petals were *c.* 9 mm long. However, *R. horneri* also had comparatively large flowers as its petals were 6–8 mm long. However, the twigs in *R. macrantha* were angular.

RESULTS

The two new species

Rinorea linearifolia Latiff sp. nov. (Figure 1). (Latin lineari = linear, folia = leaves, referring to the almost linear leaves)

Type: Sabah, Ranau, *c.* 8 miles from Kg. Merungin, L. Madani & Saikah 15.11.75, SAN 82597 (Holo. SAN)

Small- to medium-sized trees of 2–15 m tall; girth *c.* 3 cm dbh; stems brown, smooth; twigs greyish to dark, minutely hairy, straight or slightly zig-zag, without distinct leaf scars. Stipules *c.* 7 mm long, narrowly triangular, dark brown, base semi-amplexicaul, persistent. Leaves blade linear to narrowly lanceolate or narrowly elliptical, base acute to somewhat rounded, apex dull acuminate, margin slightly undulate or minutely crenate with minute sharp teeth or subentire, glabrous,



Figure 1 Habit of *Rinorea linearifolia* sp. nov

sub-coriaceous to coriaceous, midribs distinct on both sides, nerves *c.* 15 on both sides, reticulation quite distinct on both sides, veins scalariform; 8.2–18.2 × 1.3–4.1 cm, the petioles 0.6–2.1 cm long. Inflorescence axillary, almost sessile or with stalks *c.* 2 mm long. Flowers manifestly fasciculate, 1–3 per cluster, the pedicels *c.* 2 mm; sepals striate, *c.* 2.5 mm long, ciliate, pubescent, triangular; petals *c.* 3 mm, strap-shaped, apex deflexed, glabrous. Fruits at the base with striate sepals, stalks *c.* 5 mm, quite rough, light green when dry straw-coloured, reticulate, dark, with thick valves, subglobose *c.* 7 mm across; pedicels *c.* 4 mm, 2 or 3 per infructescence, green, 3-seeded; seeds 3, polished, straw-coloured, *c.* 2.5 mm across, subglobose, becoming adpressed, with specks of purple dots.

Distribution

The discovered species were only known from Sabah and probably endemic

Ecology and habitat

Found near the streams and rivers especially near the cultivated areas and also on rocky hillsides

and riverbanks, including in secondary forest. The habit of the plants simulated the rheophytes as they had almost narrow or linear leaves.

Additional specimens examined

Borneo, Sabah, Ranau, Kilimu, Mansus et al. 27.8.87, SAN 122266 (SAN); Beluran, Sg. Meliau, Rahim et al. 1.8.83 SAN 99828 (SAN); Telupid, Bidu-bidu Forest Reserve, S. Suzana et al., 14.7.2006, SAN 14738 (SAN, SAR); Tongod, Pinangah Forest Reserve, D. Sundaling et al. 8.12.2004, SAN 113649 (SAN, SAR); Tongod, Gunung Tingkar Forest Reserve, D. Alviana et al., 5.4.2013, SAN 153342 (SAR); S. Suzana et al., 3.4.2013, SAN 150243 (SAR).

Note. *R. linearifolia* was most similar to the widely spread species, *R. bengalensis* by its fasciculate inflorescence and glabrous and smaller subglobose fruits with 3 seeds, but it differed by its very narrow and almost linear leaf-blades and smaller fruits (2.5 cm across).

***Rinorea jacobsii* Latiff sp. nov.** (Figure 2)
(Named in honour of late Dr. Marius Jacobs who revised the genus in Malesia)



Figure 2 Habit of *Rinorea jacobsii* sp. nov

Type: Borneo, Sarawak, mile 15, Tebedu, Abang Mohtar et al. S. 49223, 5.2.1985 (Holo. SAR)

Small trees of *c.* 5 m high, girth *c.* 15 cm; twigs greyish to dark, smooth, straight, without distinct leaf scars. Stipules small, *c.* 7 mm long, narrowly triangular, dark brown, base semi-amplexicaul, persistent. Leaves subtended by distinct axillary buds, blade elliptical to oblanceolate, base acute to somewhat obtuse, apex caudate, margin slightly undulate or minutely serrulate with minute sharp teeth or subentire, glabrous, subcoriaceous, midribs distinct on both sides, nerves *c.* 12 on both sides, parallel, not curving into an intramarginal vein, reticulation quite distinct on both sides manifestly scalariform, wrinkled; 6.2–15.3 by 2.1–6.4 cm, the petioles short, almost sessile, 0.3–1.1 cm long. Inflorescences axillary, panicle; stalks *c.* 2.4 cm long. Flowers manifestly fasciculate, 1–3 per cluster, the pedicels *c.* 2 mm; sepals striate, *c.* 2.5 mm long, ciliate, pubescent, triangular; petals *c.* 3 mm, strap-shaped, apex deflexed, glabrous. Fruits at the base with striate sepals, stalks *c.* 5 mm, quite rough, green when dry straw-coloured, reticulate, dark, with thick valves, subglobose, large, 3.2–4.1 cm across, 2 or 3 per infructescence, green, 3-seeded; seeds 3, polished, straw-coloured, *c.* 2.5 mm across, subglobose.

Distribution

The discovered species were known from Sarawak, probably endemic

Vernacular name

Siku enseluai, Sikun seluai (Iban, Sarawak)

Ecology

Found at the foothill of the rocky limestone hill forest up to 300 m altitude, probably adapted to the limestone substrate.

Additional specimens examined

Sarawak, km 20, Jalan Serian-Tebedu, Payang, Bukit Sengadut, Rantai Jawa et al. S. 78898, 24.3.1999 (SAR); Kuching, Sematan, Gunung Pueh, Kg. Sebako, 30.8.1996, Rantai Jawa et al. S.

75151 (SAR); Kuching, Padawan, Bukit Manok, 1.3.1969, Erwin & Paul S. 27401 (SAR);

Note: Initially the author named this species in SAR as *Rinorea calcicola* as it was found at the foot of the limestone hill areas, but later he decided to honour the late Dr. Marius Jacobs who revised the genus *Rinorea* for Flora Malesiana. This species was also similar to the more widespread *R. bengalensis* but differed by its shorter stipules, blades elliptical to oblanceolate, shorter petioles and smaller capsules. It was readily distinguished by its leaves smaller, elliptical, oblanceolate to subobovate, margin wrinkled, serrulate, texture subcoriaceous, fruits corky; stipules small, short and persistent. In addition, it occurred on the limestone outcrops.

DISCUSSION

In Malesia, a total of 11 species was recognised with only six species attributed to Borneo, including Sabah and Sarawak (Jacobs & Moore 1971). Taking into account of what Fernando et al. (2014) argued that Jacobs and Moore (1971) had taken a very broad circumscription of a few taxa in their taxonomic revision and many taxa were embedded in a few of them, such as in *R. bengalensis* and *R. longiracemosa*-*R. cinerea* complex. Since then a few new species had been either described or resurrected from Borneo, namely *R. congesta*, *R. belalongii*, *R. crassa* and *R. cinerea*. In the course of preparing a taxonomic revision of the family Violaceae for the Tree Flora of Sabah and Sarawak, two new species had been discovered, *R. linearifolia* and *R. jacobsii* and described herein, thus making the total number of species known in Borneo 13 and Sabah and Sarawak 11. These new findings were significant additions to the native tree flora of Sabah and Sarawak, in particular and update the Malesian *Rinorea* taxonomy in general. *R. linearifolia* was most similar to the widely spread species, *R. bengalensis* but differed from it by its very narrow and almost linear leaf-blades, smaller fruits (2.5 cm across) and it was strictly a component of riparian vegetation. *R. jacobsii* was also similar to *R. bengalensis* but differed by its shorter stipules and petioles, blades elliptical to oblanceolate, and smaller capsules. In addition, it was a component of limestone hill forest.

ACKNOWLEDGEMENT

The author was grateful to the Curators of Herbaria of Forestry Department Sarawak (SAR) and Forestry Department Sabah (SAN) for allowing him to observe the specimens. The photographs of *R. linearifolia* were provided by Mr. John Sugau (SAN) and that of *R. jacobsii* by Dr. Qammil Muzzamil (HUMS) were appreciated. The author also thanked Dr. Francis S.P. Ng for his comments on the draft.

REFERENCES

- FERNANDO ES, QUIMADO MO & DORONILA AI. 2014. *Rinorea niccolifera* (Violaceae), a new, nickle hyperaccumulating species from Luzon island, Philippines. *PhytoKeys* 37: 1–13.
- FORMAN LL. & AHMAD JA. 1996. Violaceae. Pp 334 in Coode MJE, Dransfield J, Forman LL, Kirkup DW & Said IM (eds.). *A checklist of the flowering plants and gymnosperms of Brunei Darussalam*. Ministry of Industry and Primary Resources, Brunei Darussalam.
- JACOBS M. 1967. Florae Malesianae praecursores XLV. Notes on *Rinorea* (Violaceae) from Malesia and adjacent region. *Blumea* 15: 127–138
- JACOBS M & MOORE DM. 1971. Violaceae. In *Flora Malesiana* Series 1. 7: 179–212.
- JARVIE JK & STEVENS PF. 1998. New species and notes on Violaceae and Flacourtiaceae from Indo-Malesia. *Harvard papers in Botany* 3: 253–262
- STEVENS PF. 2000. *Rinorea belalongii* (Violaceae), a new species from Borneo. *Novon* 10: 153–155.
- WAHLERT GA & BALLARD HE. 2012. A Phylogeny of *Rinorea* (Violaceae) Inferred from Plastid DNA Sequences with an Emphasis on the African and Malagasy Species. *Systematic Botany* 37: 964–973.