

Studies on Dipterocarpaceae of Borneo, I. *Shorea peltata*, a new record for Sarawak (Malaysian Borneo), with a revised conservation assessment

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Shorea peltata (Dipterocarpaceae), categorized according to IUCN classification as Critically Endangered, is reported for the first time from Sarawak, NW Malaysian Borneo. New data on its distribution, locations' geological characteristics, and the first published description of shoot innovations are presented. Plants from ultrabasics in NE Sabah were excluded from *S. peltata* as an undescribed taxon for which better material is required to enable formal description. Although conservation status of Peninsular Malaysian populations of *S. peltata* is Critically Endangered, on Borneo *S. peltata* is considered Endangered, and its Sumateran populations require conservation reassessment.

Shorea peltata is a highly distinctive small dipterocarp species with leaf blades conspicuously peltate in mature individuals. Originally described from Johor, Peninsular Malaysia (Symington 1941; see also Symington 1943, 1974), *S. peltata* is known also from eastern Sumatera, Kalimantan, Indonesian Borneo and Brunei, and is presently considered Critically Endangered (A1cd, C2a; cf. <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T31973A9671665.en>) throughout its known range.

In late 2015 during fieldwork in the Moi-Adis catchments and watersheds (Kuching Division, Sarawak), the second author encountered scattered patches of a highly distinctive peltate

leaf-bladed seedling with blades deep red-purple below and with glossy scarlet innovations and which, based on venation, clearly belonged to *Shorea*. A search revealed that on the hillslope there were in excess of 100 seedlings and saplings ranging in height from 20 cm (considered to be that year's germination) to a little over 3 m (seemingly 3–4 years old), and a considerable quantity of fallen leaves that while strongly peltate clearly originated from the canopy, suggesting that the peltate leaf blades of the juveniles were also typical for adult trees. Comparisons with specimens of potential candidates for the species, of which there were very few, established beyond any reasonable doubt that the

mystery saplings were those of *S. peltata*, the leaf blades from the canopy and twigs and leaves of the saplings being an excellent match for Symington's (1941) type material, and a new species record for Sarawak State.

In early 2016, a more exhaustive survey found about 40 mature trees in the area, suggesting a noteworthy new population given the conservation status of Critically Endangered. Thus inspired we set about recording data additional to, as it turned out, the little that had been published. One notable feature of the Sarawak plants, indeed one of the aspects of the saplings that initially captured our attention, is the deep red-purple under-surface of the seedling leaf blades, and especially the glossy scarlet innovations (Fig. 1), a characteristic not previously highlighted in any published description. Additionally, given the dearth, not to say as it was subsequently revealed, discrepancies, in the published ecological data, the Sarawak population provided a convenient source of verified ecological data.

Interpretation of the complex geology of Borneo relies on Tate (2001), and that of Peninsular Malaysia is based on Hutchison and Tan (2009). Sumatera soils and geology are verified using Barber *et al.* (2005).

***Shorea peltata* Symington (Fig. 1)**

J. Mal. Br. Roy. As. Soc. 19: 158. 1941. — TYPE: Peninsular Malaysia. Johor, Jemaluang F.R., Compt. 2, 23 May 1939 *Abdul Jaffar F.M.S. 49356* (holotype KEP!).

Sub-canopy or canopy tree to 40 m tall but often about half this size, bole to 30 cm in diam., hardly buttressed. Bark smooth or shallowly knobbly/warty, brown with lighter patches, producing copious yellowish dammar from warty patches; cut exposing thin brown outer bark; inner bark ca. 0.5 cm thick, light brown to colourless with a pellucid layer at cambium boundary; sap wood pale, resinous; heartwood not observed. Innovations glossy bright scarlet, twigs later greenish pale yellow (fresh), drying reddish-brown. Branchlets slender, lenticellate, glabrous except for very young tips, terete, smooth, ca. 2 mm in diam. distally. Leaf buds ovoid-acute, minute. Stipules minute, triangular, soon cadu-

cous. Leaves with blades conspicuously peltate, thinly stiffly coriaceous (fresh), drying stiffly chartaceous, oblong, ovate, or ovate-elliptic, 8–18 × 4–9 cm, glabrous, apex caudate-acuminate to cuspidate to 1 cm, base rounded, margin frequently slightly revolute, emerging glossy bright scarlet, maturing to glossy medium green above, seedlings often with blades deep glossy purple-red beneath, adult leaves somewhat paler beneath (fresh), drying greenish-grey above, yellow-brown below. Primary lateral veins in 8–10 pairs of which first 3–4 pairs arising from petiole insertion, arched, slender, visible on both surfaces but fainter on upper surface, distinctly raised beneath; secondary venation sub-reticulate, somewhat elevated on both surfaces; mid-rib neither elevated nor markedly depressed on upper surface, raised beneath; petiole 1.5–3 cm long, inserted about 0.6 to 1.6 cm from basal margin of blade, slender, upper portion rugose, drying dark red-brown. Inflorescences paniculate, parts of petals exposed in bud and nut persistently densely buff stellate-puberulent or sericeous, calyx indumentum outside caducously so; parts otherwise glabrescent. Panicles to ca. 14 cm long, terminal and sub-terminal axillary in axils of terminal two or three leaves; racemes solitary, 4–8 cm long, pale stellate-tomentose; branchlets solitary or paired, simple or forked, markedly zig-zag when mature, up to 1.5 cm. long, each bearing 4–8-flowered sub-second yellow flowers ca. 2 mm apart; bracteoles minute, ovate, caducous; buds lanceolate, ultimately ca. 6 mm long pre-anthesis, sub-sessile. Sepals subequal, sub-ovate, blunt or pointed, buff stellate-puberulent outside. Petals linear, sericeous on exposed portion in bud, yellow on opening. Stamens 15, in pairs alternating with single stamens, of three heights; anthers 2-celled; filaments 2–3 times as long as anthers, broad at base, narrow in upper half; appendage to connective awn-like, about up to twice as long as anthers, minutely ciliate or scabrous in upper half. Ovary ovate-conical, glabrous on lower portion, minutely pubescent to sericeous on upper half, stylopodium lacking; style cylindrical, rather shorter than to equaling ovary, glabrous; stigma minute, simple. Fruits sessile to sub-sessile; calyx lobes subequal, imbricate, ovate, acute or blunt at apex, bases tuberculate-incrassate forming a short