

***Pittosporum ridleyi* (Pittosporaceae), a new name for the 'rusty-leaved' pittosporum in Malaysia**

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ABSTRACT. The poorly understood 'rusty-leaved' pittosporum, *Pittosporum ferrugineum* W.T.Aiton has been comprehensively revised as part of the ongoing revision of the family Pittosporaceae across its range. Aiton's *Pittosporum ferrugineum* s.s. has been found to be a different species to the species currently known as *P. ferrugineum* in the Malay Peninsula, Borneo and the Andaman Islands (India). Hence the common coastal species in these areas needs a new name and is presented here as *Pittosporum ridleyi* L.Cayzer & G.Chandler, a new name for an old species.

Keywords. Apiales, *Pittosporum ferrugineum*, Thailand, Singapore

Introduction

Pittosporaceae is a little known, largely Australian flowering plant family in the Apiales (Plunkett et al., 2004; Chandler et al., 2007). All nine genera, and about 90 species, are found in Australia. Only the genus *Pittosporum* Gaertn. ex Banks is found naturally across the paleotropics: East Africa, Southeast Asia, China, India and the Pacific as far as Hawaii. The family is not found in the Americas. Pittosporaceae is currently being revised across its range, the first comprehensive revision since Pritzel (1930).

There are 18 *Pittosporum* species in mainland Australia and until recently only three of these were thought to have ranges extending to (or from) Indonesia and Papua New Guinea (Cooper, 1956; Cayzer et al., 2000). One of these species is *Pittosporum ferrugineum* W.T.Aiton, the 'rusty-leaved' pittosporum, which was traditionally thought to occur from Queensland coastal areas, north to Thailand and east to the Solomon Islands (Cooper, 1956; Bakker, 1957; Schodde, 1972). The subject of this paper is to clarify the circumscription, range and taxonomy of the taxon currently known as *Pittosporum ferrugineum*, the 'common Malayan form' of Bentham (1863) and the 'common' coastal taxon of Ridley (1922) in the Malay Peninsula.

Materials and methods

This revision is based on morphological examination of large numbers of specimens held at BRI, CANB, DNA, MEL, and NSW in Australia, as well as K, BM, P, L, BO, KEP and SING, over the last decade, and on a morphological phylogenetic analysis of this group and other *Pittosporum* species in Malesia that will be presented in (Cayzer & Chandler, unpublished data).

Taxonomic issues

The original confusion with the rusty-leaved pittosporum was the result of the brief protologue in *Hortus Kewensis* (Aiton, 1811) which stated: leaves elliptic, acuminate, glabrous, petioles ferruginously tomentose. This protologue can and has been mistakenly applied to a number of superficially similar taxa, including *Pittosporum moluccanum* (Lam.) Miq. (e.g. Sims, 1819; Pritzel, 1930). The resulting taxonomic confusion with this latter species was not resolved until 1957 when Bakker (1957) revised the genus in Malesia. Compounding this confusion, the type specimen of *Pittosporum ferrugineum* (ex. hort Kew dated 1795) is an unremarkable specimen with immature inflorescences.

George Bentham (1863) had seen ‘... old specimens preserved from the cultivated shrubs’ when describing his concept of *Pittosporum ferrugineum*. He discussed the differences between the ‘common Malayan form’ of this taxon to those of the Australian ‘form’, with the latter having ‘rather larger flowers and narrower pointed sepals’. However, Bentham also found that ‘in this respect, the Malacca specimens are very variable’.

In the *Flora of the Malay Peninsula*, Ridley (1922) described and illustrated Bentham’s ‘Malayan form’, the taxon commonly found in ‘dry gravelly spots usually near the sea...Common...’. The Malayan taxon has thin, narrow elliptic leaves, with prominent drip tips, unremarkable leaf venation, and corymbose panicles of nodding, unisexual flowers (Fig. 1A–B). The dry coastal Queensland form (now *P. tinifolium* A.Cunn. – reinstated in Cayzer & Chandler, 2017) has thicker, leathery, blunter leaves with slightly impressed, areolate venation on the upper leaf surface which becomes more prominent as the leaf ages and thickens. The inflorescences are aggregated stalked umbels with unisexual flowers on nodding, rather wispy pedicels (Fig. 2).

Bakker (1957) reduced a large number of *Pittosporum* taxa in Malesia into just eleven *Pittosporum* species. This included Bakker’s concept of *Pittosporum ferrugineum* into which he synonymised about ten other taxa based on rather plastic characters (including leaf and fruit shape and size) commonly used to delineate taxa at that time (Schodde, 1972). Bakker’s concept of *Pittosporum ferrugineum* s.l., then ranged from ‘SE Asia to Australia... Melanesia (Bismarck and Solomon Islands), throughout Malaysia, also from the SW Philippines’ (Bakker, 1957). This species was also apparently to be found ranging from sea level on isolated islands in both the Pacific and Indian Oceans, to the central mountains in New Guinea above 2500 m alt. (Cayzer & Chandler, unpublished data).



Fig. 1. *Pittosporum ridleyi* L.Cayzer & G.Chandler. **A.** Habit, showing the whorled leaves and exserted inflorescences. **B.** Compound female inflorescence. (Photos: A, R. Tan [WildSingapore]; B, W.F. Ang)).



Fig. 2. Female inflorescence of *Pittosporum tinifolium* A.Cunn. (Photo: M. Fagg [Australian Plant Image Index No. dig 28347])

Bakker's (1957) treatment of *Pittosporum ferrugineum* was the settled taxonomic status for the rusty-leaved pittosporum until the Flora of Australia treatment of Cayzer et al. (2000). These authors considered the purported range of *Pittosporum ferrugineum* unlikely, given the emerging evidence of the family propensity for narrow endemism in Australia (Cayzer, unpublished data) and other Pacific regions such as New Caledonia (Tirel & Veillon, 2002), Hawaii (Haas, 1977; Gemmill et. al., 2001) and Malaysian Borneo (Sugau, 1994, 1995). Further Cayzer et al. (2000) recognised another distinct 'form' of this taxon in Australia along the Northern Territory coastline and in Queensland's Cape York Peninsula, north of Cooktown (Cayzer et al., 2000; Cayzer, unpublished data). This was not investigated further pending clarification of the status of *Pittosporum ferrugineum* more widely.

The authors have recently investigated the rusty-leaved pittosporum complex throughout its known range as part of a larger revision of the family in Australia and the Malesian region. True *Pittosporum ferrugineum* has a unique and consistent reproductive strategy (androdioecy), which is also clearly evident in the immature inflorescences present in the type specimen. Further, comprehensive morphological cladistic analyses of the taxa in this region and the wider Pacific area (with and without locality data included) have suggested that *Pittosporum ferrugineum* is a distinct, eastern Malesian species.

The Malaysian species is closer to a species in Papua New Guinea's Bismarck Archipelago and the Solomon Islands than to *Pittosporum ferrugineum*. These two

species (the Malaysian and Solomon Islands taxa) are probably more closely related to *Pittosporum linearifolium* Sugau, a recently described Mt Kinabalu ultramafic endemic, than either is to *P. ferrugineum*.

The coastal Queensland species *Pittosporum tinifolium* is more closely related to other Australian species than to any Malesian taxon, including *P. ferrugineum*, confirming similar results from molecular analyses (Chandler et al., 2007). *Pittosporum ferrugineum* s.str. is now known to range from Java in Indonesia to Morobe and Central Provinces in Papua New Guinea, south to the Torres Strait Islands and far northern Australia. It does not occur in Peninsular Malaysia nor in the Philippines.

In Peninsular Malaysia (and neighbouring parts of Thailand and Singapore) the plant currently referred to as *Pittosporum ferrugineum* does not have a name. In view of Ridley's keen interest in these taxa, and his outstanding contribution generally to the floristics in this region, it seems appropriate that this largely Malaysian species should be named for him.

Key to the rusty-leaved *Pittosporum* species

- 1a. Adult leaves with prominent drip tips; inflorescences multiflowered corymbose panicles (mounds) of unisexual flowers held well above the level of the leaves; fruit bases rounded, not stipitate; Peninsular Thailand, Peninsular Malaysia, Singapore ... *P. ridleyi*
- 1b. Adult leaves with acute to slightly acuminate apices; inflorescences aggregated umbels of either male or female/bisexual flowers held within or barely past the level of the leaves; fruit bases not rounded, +/- narrowly stipitate; eastern Indonesia (Java) to Papua New Guinea and the far north of Northern Territory and Queensland, Australia ... *P. ferrugineum*

Taxonomy

***Pittosporum ridleyi* L.Cayzer & G.Chandler, sp. nov.**

Although similar to *Pittosporum ferrugineum*, *P. ridleyi* differs in being functionally dioecious with unisexual flowers in multiflowered, corymbose panicles held well past the surrounding leaves (*Pittosporum ferrugineum* is androdioecious with +/- unisexual flowers in lax umbels held at the level of the surrounding leaves). The fruits of both species are slightly wider than long (up to about 10 mm in diam.) but in *Pittosporum ridleyi* the fruit bases are rounded (in *Pittosporum ferrugineum* they are stipitate and lobed/fluted). – TYPE: Peninsular Malaysia, Johor, Muar, Gn. Ledang F.R., Roadside up to Telecommunication Tower, 2°22'N 102°38'E, 28 January 2016, A.R. Ummul-Nazrah, K. Imin, M.Y. Chew, H.L. Kueh & Y.Y. Sam FRI 83568 (holotype KEP; isotypes BKF, K, L, SAN, SAR, SING). (Fig. 1A–B)

Pittosporum ferrugineum auct. non W.T.Aiton: Ridley, Fl. Malay Penins. 1: 137 (1922); Pritzel, Nat. Pflanzenfam. 2, 18a: 265 (1930) p.p.; Cooper, Ann. Missouri Bot. Gard. 43: 177 (1956) p.p.; Bakker, Fl. Males. Ser. 1., 5:355 (1957) p.p.; Cayzer et al., Austral. Syst. Bot. 17: 88 (2000); Ummul-Nazrah & Kiew, Fl. Penins. Malaysia 1: 167 (2010).

Slender trees, occasionally to 15+ m; bark greyish, horizontally blotched; branchlets (Fig. 1A) smooth, dark olive-green, dark brown when dry, with prominent yellow-brown lenticels; new shoots and leaves initially with ferrugineous T-shaped hairs, the abaxial (lower) surface remaining visible, glabrescent. **Leaves** alternate but usually whorled towards the end of branches (Fig. 1B); petioles 1–2 cm long, marginally shorter than the drip tip; lamina thin, membranous to coriaceous, shape variable but mostly narrowly elliptic, apex acuminate with prominent drip tips; bases tapering; adult leaves 8–11.5 × 3.5–5.5 cm including the 2 cm drip tip; shade leaves are thinner, longer and narrower, c. 12 × 4 cm; margins puckering/undulate towards apices; initially ferrugineous-tomentose on both surfaces but soon glabrescent, adaxial (upper) surface glossy, deep green, smooth, areolate venation barely noticeable, adaxial (lower) surface of new leaves smooth, paler, duller, about 6–8 slightly raised secondary veins, both surfaces soon glabrescent. **Inflorescences** terminal and axillary, generally shortly stalked, corymbose to paniculate, about 25 mm long by anthesis; buds apically pointed and easily distinguishable from sepals and bracts; pedicels to 5 mm thin, flexible, nutant, sparsely pubescent with the undersurface of stalks always visible; bracts and bracteoles sepaline with margins pubescent to glabrous; male inflorescences paniculate with up to three levels of branching with flowers in threes and fives; female inflorescences more corymbose in shape with less branching and fewer flowers (Fig. 1B). **Flowers** numerous, aromatic, actinomorphic, hypocrateriform, parts in fives, regularly inserted around the single pistil. Sepals green, ovate to almost elliptic, apices acute, c. 1.5 mm long, cohering only at the thickened base, the lobes spreading star-shaped, recurving completely and then caducous as a unit; glabrous or with some ferrugineous hairs at the margins. **Petals** cream-green becoming yellower with age, 5–6 mm long, cohering to the middle, then free and recurving by less than a third to the tips of the anthers. **Male flowers:** stamens with yellow anthers just exerted at anthesis as the petals recurve; anthers not apiculate, more ovate than triangular, dehiscent golden pollen through longitudinal slits; filaments adnate to petal joins, about 4–5 times the length of anthers; pistillodes spindle shaped with little stigma development, slender style as long as the slightly wider ovary, more ferrugineously tomentose towards the basal nectary, not stipitate. **Female flowers:** staminodes with filaments adnate to sinuses between petals, anthers sagittate, yellow, barely reaching the base of the style; pistil with prominently lobed stigma, slender style as long as the thicker, rotund ovary, all ferrugineously tomentose, particularly towards the base. **Infructescences** with stalks that thicken and extend so overall length is c. 45 mm long, well clear of the surrounding leaves. **Fruits** wider than long, 8–10 × 10 mm, thin-walled, loculicidally dehiscent capsules; immature fruit green, older fruit orange, terminating in a wide, relatively smooth base, not stipitate; inner chamber transversely ridged, yellow, placental ridge thick, resinous

with funicles emerging like teeth from the resin, and inserted past the middle of the chamber. **Seeds** numerous, brick red, coated in resin, cohering and interlocking for easy predation.

Distribution. Southern Thailand, Peninsular Malaysia, Singapore. *Pittosporum ridleyi* does not occur in Papua New Guinea, the Philippines, nor Australia.

Ecology. Essentially a coastal, or low altitude equatorial species recorded mostly on limestone soils, and once probably common in the Malay Peninsula. Flowering in February in Singapore. Peak flowering is usually between April and July, but flowers can appear at most times of the year (Ummul-Nazrah & Kiew, 2010).

Etymology. The specific epithet honours Henry Nicholas Ridley CMG, MA, FRS, FLS, FRHS, an outstanding field botanist who was the first Director of the Singapore Botanic Gardens from 1888 to 1912. Ridley collected this plant across the region, as indicated in some of the specimens listed below.

Vernacular names. Betalang, Splay-Berry Tree, Giramong (National Parks Board, 2013)

Selected specimens examined. SINGAPORE: **Changi:** Feb 1889, *Ridley s.n.* (SING [SING0025009]); **Seletar:** 30 Oct 1889, *Ridley 1942* (SING [SING0025010]); **Corner of Kings & St Helena Road:** 1°27'30"N, 103°50'E, 9 Feb 2007, *Cayzer & Kuchlmayr LWC 933* (CANB, SING [SING0090225, SING0090226] (2 sheets)) **Woodlands:** 7 Feb 2007, *Ali LWC 934* (SING [SING0090227, SING0090228]) (2 sheets).
PENINSULAR MALAYSIA: **Pahang:** Pekan, May 1890, *Ridley 1087a* (BM); **Malacca:** Selandan, Oct 1893, *Goodenough 1517* (SING [SING0075405], BM).
THAILAND: **Chumphon:** 10°34'37"N 99°07"E, *Williams et al. 1258* (K). **Trang:** Thung Kai, 7°28'N 99° 37'E, *Gardner & Sidisunthorn* (K).

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