

Biodiversity Record: *Litsea ferruginea* in the Central Catchment Nature Reserve

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Subjects: *Litsea ferruginea* (Angiospermae: Laurales: Lauraceae).

Subjects identified by: Chong Kwek Yan and Parusuraman Athen.

Location, date and time: Three locations on Singapore Island —

- 1) Undisclosed restricted area nearby the Central Catchment Nature Reserve; May 2018.
- 2) Central Catchment Nature Reserve, MacRitchie Reservoir Park, Lornie Trail; 18 May 2022.
- 3) Central Catchment Nature Reserve, Chestnut area; 15 June 2022, around 1530 hrs.

Habitat: Secondary forest.

Observers:

- 1) Ng Xin Yi, Lua Hock Keong and Reuben Lim.
- 2) Parusuraman Athen, Paul Leong, Lim Wei Hao, Derek Liew and Koh Sin Lan.
- 3) Chan Pin Jia, Karl Png, Tammy Teong and Chong Kwek Yan.

Observations:

- 1) A non-flowering specimen was collected as part of a plant survey and rescue effort before vegetation clearance.
- 2) A tree of about 12–14 m in height was observed. It had brownish foliage and sub-opposite leaf arrangement (Fig. 1).
- 3) One mature tree about 15 m tall was found flowering and fruiting along a trail. The flowers were yellowish cream in colour (Fig. 2). There were several green aborted fruits on the floor surrounding the tree; the fruits did not contain any seed (Fig. 3).

Remarks: Lindsay et al. (2022) assessed *Litsea ferruginea* (Blume) Blume as Nationally Extinct in Singapore. However, there was a recent photograph in the paper by de Kok (2021: Fig. 10B) which corresponds to observation 1 above. There is also a flowering specimen collected by Y. S. Yeoh SING 2012-284 (SING [SING 017386]) on 21 June 2012 from MacRitchie forest along Lornie Road, which is close to the location of observation 2 above.

There appears to be some inconsistency in the characters used to distinguish *Litsea ferruginea* from *Litsea erectinervia* Kostermans in the literature. In Kostermans' (1970) delineation of his species from *Litsea ferruginea*, he used three characters (Table 1): (1) leaf arrangement, (2) whether the midrib was impressed (=sunken) or not on the upper surface of the leaf lamina and (3) the depth of the perianth cup (sometimes referred to as the cupule) relative to the fruit that sits on it. Kostermans (1970) based his description of *Litsea ferruginea* on the protologue and a specimen collected by Blume with opposite arrangement. While Gamble (1912) and Ridley (1924) differentiated *Litsea griffithii* Gamble from *Litsea ferruginea* based on usually opposite leaves in the former and usually alternate leaves in the latter, Kostermans (1970) suggested that Gamble's and Ridley's *Litsea ferruginea* is actually *Litsea erectinervia*—although he also acknowledged that the impressed midrib in Gamble's description of *Litsea ferruginea* was consistent with his own. In Kochummen's (1989) account of Lauraceae in the Tree Flora of Malaya, while he stated that he largely followed Kostermans' delineation of species, for these species Kochummen (1) formally considered *Litsea griffithii* Gamble as a synonym of *Litsea ferruginea* (Blume) Blume, and (2) curiously inverted the description of the midrib in *Litsea ferruginea* as raised instead of sunken, and in *Litsea erectinervia* as sunken instead (see Table 1). De Kok (2021) accepted the synonymy and his description of the midrib for *Litsea ferruginea* and *Litsea erectinervia* is the same as

Kochummen's, but additionally inverted the differences in the depth of the perianth cup relative to the fruit compared with Kostermans (1970) (Table 1).

Table 1. Comparisons of descriptions of *Litsea ferruginea* (and *Litsea griffithii*) with *Litsea erectinervia* in key literature.

Character	Source	Description		
		<i>Litsea ferruginea</i> (Blume) Blume	<i>Litsea griffithii</i> Gamble	<i>Litsea erectinervia</i> Kosterm.
Leaf arrangement	Gamble (1912)	Alternate or sometimes subopposite	Opposite or subopposite or rarely alternate	
	Ridley (1924)	“Mostly alternate, few sub-opposite” in key, simply “alternate” in description of species	“All opposite” in key, “opposite, occasionally alternate” in description of species	
	Kostermans (1970)	Opposite		Spiral (=alternate)
	Kochummen (1989)		Opposite	Alternate (in key)
	De Kok (2021)		Opposite	Alternate
Midrib on the upper surface of the leaf lamina	Gamble (1912)	Impressed	“Flat or slightly impressed above”	
	Kostermans (1970)	Impressed		“Less or not impressed”
	Kochummen (1989)		Raised	Sunken
	De Kok (2021)		Raised to flattened	Flat to sunken
Perianth cup depth relative to fruit	Gamble (1912)	“...when young nearly quite surrounded” by the perianth cup which eventually “becomes a shallow... cup”	Fruit “half-immersed” in the perianth cup	
	Ridley (1924)	Perianth cup “saucer-shaped”, depth about one quarter of the fruit	Perianth “cup-shaped”, depth about half of the fruit	
	Kostermans (1970)	Perianth cup “very shallow”		Fruit “for the greater part embedded” in perianth cup
	Kochummen (1989)		Fruit “seated on 1.5 cm deep... perianth cup”	Fruit “seated on perianth cup”
	De Kok (2021)		Perianth cup “covering almost the entire fruit”	Perianth cup “covering up to half of fruit”

We checked all the specimens filed as either *Litsea ferruginea* or *Litsea erectinervia* in the Singapore Botanic Gardens Herbarium that had fruits. Setting aside the character on whether the midrib is sunken or raised on the upper side of the leaf lamina, we found no clear association between the leaf arrangement and the depth of the perianth cup relative to the fruit (Table 2).

Table 2. Leaf arrangement and perianth cup depth relative to fruit size in specimens at the Singapore Botanic Gardens Herbarium.

Locality	Year	Collector	Collection No.	SING barcode	Leaf arrangement	Perianth cup depth relative to fruit
Singapore	1894	H. N. Ridley	6151	SING0013227	Alternate/spiral	< 0.5
Singapore	1894	H. N. Ridley	5854	SING0013228	Alternate/spiral	< 0.5
Johor	1958	Kiah	SF 32085	SING0324854	Alternate/spiral	< 0.5
Kalimantan	1948	Kostermans	2204	SING0363937	Opposite	> 0.5 (almost whole fruit)
Pahang	1967	T. C. Whitmore	FRI 3678	SING0324855	Opposite	> 0.5
Selangor	1900	s.n.	s.n.	SING0324859	Opposite	> 0.5
Selangor	1908	Hamid	s.n.	SING0324858	Opposite	< 0.5
Sabah	1960	W. Meijer	SAN 22802	SING0363932	Opposite	< 0.5
Sabah	1980	Aban & Toru	SAN 92480	SING0363933	Opposite	~ 0.5

If the depth of the perianth cup relative to the fruit size is simply a matter of the relative stage of development of the fruit as suggested by Gamble (1912), then the leaf arrangement appears to be all that remains to differentiate between *Litsea ferruginea* (opposite) and *Litsea erectinervia* (alternate/spiral). (Note: there was an error in the caption for Figure

10B in de Kok [2021], which should have been opposite rather than alternate leaf arrangement [de Kok, personal communication].) Further studies, e.g., examination of leaf arrangement within individuals and over development from sapling to adult, molecular studies, etc., are needed to conclude if *Litsea erectinervia* is really a different species from *Litsea ferruginea*.



Fig. 1. *Litsea ferruginea* observed at Lornie Trail. (Photograph by: Parusuraman Athen).

Regardless, given that *Litsea ferruginea* is the earlier published name, our three observations will still clarify that *Litsea ferruginea* is not extinct in Singapore. Given the few individuals and locations known (of oppositely arranged individuals like what we feature here), and so long as *Litsea erectinervia* (currently listed as nationally Critically Endangered and so far, in terms of spirally or alternately arranged specimens, only collected from the Nee Soon

catchment; Chong et al. 2016) continues to be considered a separate species, we propose that *Litsea ferruginea* should be nationally Critically Endangered.



Fig. 2. Specimen collected from observation 3 at the Chestnut area. (Photograph by: Chan Pin Jia).

Fig. 3. Flowers (bottom) and aborted fruits collected from observation 3 at the Chestnut area. (Photograph by: Chan Pin Jia).

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