

## ***Cratoxylum cochinchinense* (Hypericaceae): A New Record for Sulawesi, Indonesia**

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***Cratoxylum* is a small genus of plants belonging to the Hypericaceae family with six species known at present. The first record for *Cratoxylum cochinchinense*, a mainland Southeast Asia and West Malesian tree species, is presented for Sulawesi. This record adds the number of *Cratoxylum* in Sulawesi to three species. A key to *Cratoxylum* in Sulawesi is also presented.**

Keywords: Malpighiales, taxonomy, tree species, Wallacea

The family Hypericaceae consists of six genera, with the total number of species perhaps as many as 590 (Christenhusz and Byng 2016). In Malesia, this family has been revised a long time ago by Robson (1974). According to Robson (1974), two genera have been reported from the region, *viz.* *Hypericum* Tourn. ex L. with 15 species and *Cratoxylum* Blume with six species. According to Robson (1974) and Li *et al.* (2007), *Hypericum* is a widely distributed genus in the world, while *Cratoxylum* can only be found in southern Asia east to southern China, and southeast to Malesia as far as Sulawesi and the Lesser Sunda Islands. The highest diversity of the genus *Cratoxylum* can be found in Sundaland with a total number of six species. Two of them can be found in the east of Wallace's line named *C. formosum* (Jack) Dyer and *C. sumatranum* (Jack) Blume.

Wallacea is a biogeographical region situated between the Sunda and Sahul shelf. This area has a unique diversity of plants and animals, involving the combination of Sunda and Sahul origin. Sulawesi is the largest island in this area and has a complex geological origin (Hall 2002). For

plants, one of the most comprehensive lists was prepared by Kessler *et al.* (2002). However, as they said in that account, the knowledge of the plant diversity in Sulawesi is poor. Therefore, it is not surprising that within the last two years, many new species have been described from Sulawesi (*e.g.* Argent and Mambrasar 2019; Mustaqim and Ardi 2019).

*Cratoxylum cochinchinense* is a shrub to tree species known from various regions in mainland Southeast Asia and most of West Malesia (see "Distribution" below). In Sundaland, this species has been reported from Sumatra, Peninsular Malaysia, and Borneo, but absent from Java (Robson 1974). The species was recently collected on the southern arm of Sulawesi for the first time, representing the first record of the species east of Wallace's line. Morphological descriptions, a local distribution map, notes, and photographs are provided along with a key to species of *Cratoxylum* in Sulawesi.

During the field survey in 2018, at least 14 individuals of *C. cochinchinense* were found from four locations in Bulo-Bulo Village, Pujananting District, South Sulawesi Province. One of them was bearing flower, which was collected and one more with fruit (the latter not vouchered but with a clear photograph).

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*Cratoxylum cochinchinense* (Lour.) Blume, Mus. Bot. Lugd. Bat. 2: 17 (1852).

**Specimen examined.** INDONESIA. Sulawesi: South Sulawesi, Barru Regency, Pujananting District, Bulo-Bulo Village, c. 528 masl, Amboupe D SARTIKA 12 (FIPIA!).

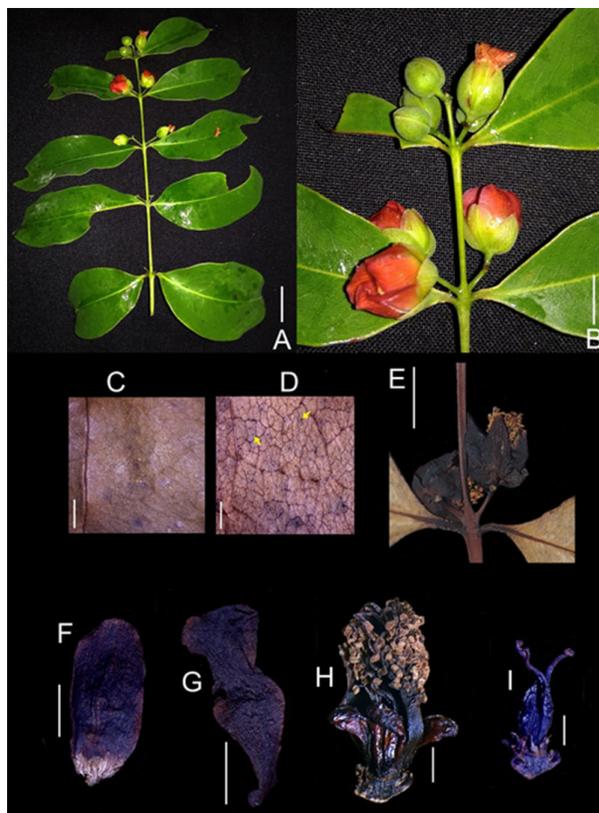
Shrub up to 3 m tall. Bark smooth, scaly, grey-brown. Young twigs flattened, interpetiolar scar interrupted to continuous. Leaves simple, opposite, blades elliptic, sometimes slightly obovate, 2.5–7 × 1.4–2.95 cm, chartaceous, base attenuate, apex acutely acuminate, the acumen to 2.5 mm long, rarely obtuse, margin entire, lower surfaces glaucous, lateral veins curved, 5–8 on each side of the midrib, uniting but not forming intramarginal veins, tertiary venation reticulate, glabrous on both surfaces, minutely and sparsely blackish punctate beneath (under the microscope), petiole 1.75–2.5 mm long. Inflorescence 3-flowered, from the leaf axils or terminal, 1–2 flowers well-developed, much shorter than the subtending leaves,

pedicels 1 mm long. Sepals light green, elliptic, oblong, or subovate, 5.75 × 2.8 mm, apex obtuse or rounded in outline and shallowly notched, glabrous. Petals orange-red, obovate, 8.5 × 3.5 mm, apex rounded, glabrous. Stamens congested, fascicles 4.8 mm long, stamens per fascicle c. 50; staminodial fascicle oblong-obovate, 1.75–2 mm long, cucullate. Ovary 2.1 mm long, style 2, 1.25–1.5 mm long. Fruit capsules, 1 per infructescence, ellipsoid, length and width not measured, c. 1.3–1.6 times as long as wide (from photographs). Seeds not seen (Figure 1).

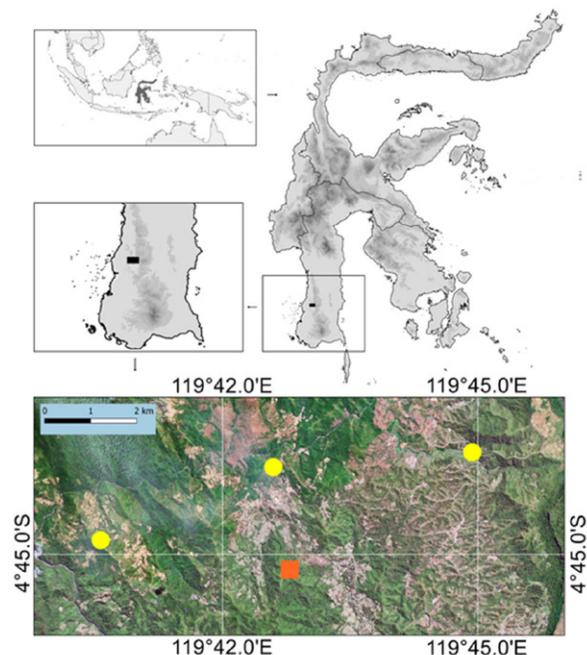
**Distribution.** Burma, Indochina, South China to West Malesia (Sumatra, Peninsular Malaysia and Borneo), and The Philippines (Robson 1974; Byrne *et al.* 2018); newly recorded in Sulawesi from the southern arm (Figure 2).

**Remarks.** The collected specimen matches well with the description of *C. cochinchinense* by Robson (1974). Morphological comparisons for some characters with small variations or not mentioned in that literature are presented in Table 1. This species can be recognized by the curved lateral veins, these uniting but not forming intramarginal veins, inflorescence 1–5 flowered cymules, terminal inflorescences present, and flowers with cucullate or recurved staminodial scales.

In the study site, this species is known as “jampu romang” (Bentong language). According to the local people, “jampu” is a name refer to many species – including “jampu batu” for *Psidium guajava*, “jampu ere” for *Syzygium*



**Figure 1.** Morphology of *Cratoxylum cochinchinense* from Sulawesi: A) flower-bearing twig; B) close up of inflorescence; C) adaxial side of the leaf; D) abaxial surface of the leaf (glands shown by arrows); E) flowers (dried); F) one of the sepals; G) petal; H) flower with perianths removed; and I) pistil. Scale bar: A) 2 cm; B) 1 cm; C–D) 1 mm; E) 5 mm; F–G) 2 mm; and H–I) 1 mm. All from Amboupe D SARTIKA 012. Photos: A–B by Dewi S. Amboupe; C–I by Wendy A. Mustaqim.



**Figure 2.** Distribution of *Cratoxylum cochinchinense* in Sulawesi (■: locality of Amboupe D SARTIKA 12; ●: other individuals).

**Table 1.** Morphological comparison of the Sulawesi's *Cratoxylum cochinchinense* material to Robson (1974).

Characters	Robson (1974)	Amboupe D SARTIKA 012
<b>Habitus</b>	Shrub or tree to 30 m tall	Shrub to 3 m tall
<b>Leaves</b>		
Petiole length	2–5 mm long	1.75–2.5 mm long
Blade shapes	Elliptic to ovate-lanceolate or lanceolate	Elliptic or sometimes slightly obovate
Blade length	3–10.5 cm	2.5–7 cm
Texture	Herbaceous to chartaceous	Chartaceous
Base	Broadly cuneate to attenuate	Attenuate
Apex	Obtuse to acutely acuminate	Acutely acuminate, rarely obtuse
Lower surface	Nearly always glaucous	Glaucous
Lateral veins	n/a	5–8 pairs
<b>Inflorescence</b>	1–5 flowered, axillary, usually terminal cymules	3-flowered, cymules, 1–2 well-developed
<b>Flowers</b>		
Sepals color	n/a	Light green
Sepals shape	n/a	Elliptic, oblong or subovate
Petals color	Dark red to pink or orange	Orange-red
Petals shape	n/a	Obovate
Staminodial fascicles (length)	Oblong to obovate, cucullate (up to 3 mm long)	Oblong-obovate, cucullate (1.75–2 mm long)
<b>Fruits</b>		
Capsule per cymes	n/a	1
Capsules shape	Ellipsoid cylindric	Ellipsoid (photographs)
Length per width	c. 1–1.5 times	c. 1.3–1.6 times
<b>Ecology</b>		
Habitat	Primary or secondary forest, open woodland, grassland, river banks	Roadside, near the entrance to a secondary forest
Elevation (masl)	0–500 m in Malesia	Up to 528 m

*aqueum*, “jampu ere lompo” for *Syzygium malaccense*, and “jampu maso’o” for *Anacardium occidentale*. Meanwhile, this species is locally called “jampu romang.” “Jampu” is a name for the four previously mentioned species, while “romang” means forests. Therefore, “jampu romang” is the name of “jampu” from the forests. According to information from the local population near the collection sites, wood of *C. cochinchinense* is used as material for fences. However, wood quality is poor and the wood is, therefore, not used for construction purposes.

*Cratoxylum cochinchinense* has not been mentioned in Robson (1974), Kessler *et al.* (2002), and also in Plants of the World Online (2019) for Sulawesi. On this island, there are two species of *Cratoxylum* reported for the island named *C. sumatranum* and *C. formosum*. *Cratoxylum cochinchinense* differs from the two latter by the few-flowered inflorescence (*vs.* many-flowered in *C. sumatranum*) and the absence of nectary scales in the petal (*vs.* present in *C. formosum*) (Gogelein 1967; Robson 1974).

The current record represents the easternmost distribution of the species. With three species known so far, Sulawesi contains half of the total species known in *Cratoxylum* (Robson 1974). This finding also revealed that most of the *Cratoxylum* species are all widespread relative to the geographical distribution of the genus. From a phytogeographical point of view, our finding of *C. cochinchinense* is not surprising since the southern arm of Sulawesi is a part of the Sundaland, as shown by Hall (2002).

In Sulawesi, this species was collected from the roadside near the entrance to a secondary forest at an elevation of about 528 masl (see Figure 2). In terms of ecology, this record is slightly higher than the elevational range previously reported for Malesia (0–500 masl; Robson 1974, Gogelein 1967). However, the species is known to occur at higher elevations in Thailand (up to 1100 masl; Byrne *et al.* 2018) and China (up to 1200 masl; Robson 1974).

We did not collect any fruit or seed from Sulawesi and, in February 2019, the local people provided us the photographs of the plant in a fruiting stage. We are still unable to visit the area until the present. The local people categorized the species as a forest tree (see vernacular names). The locals said that the plants are abundant in the forests and they directly harvest the wood from there when they need it. Because of that, we are confident to conclude that the plant we found is not a result of cultivation. Therefore, this finding represents a new record of *C. cochinchinense* as a native species of Sulawesi.

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## NOTES ON APPENDIX

The complete appendices section of the study is accessible at <http://philjournsci.dost.gov.ph>.

### Key to the Species of *Cratoxylum* in Sulawesi [modified from Robson (1974)]

- |     |   |   |
|-----|---|---|
| 1a. | Petals with nectary scales and with punctate glands; leaves with lateral veins arched and uniting.....  | <i>C. formosum</i>                            |
| 1b. | Petals without nectary scales and with linear glands; leaves with lateral veins not arched or uniting.....  | 2   |
| 2a. | Abaxial leaf surfaces usually glaucous; inflorescence a 1–5-flowered cymule, terminal, and axillary or axillary only; columella basal.....                            | <i>C. cochinchinense</i>                      |
| 2b. | Abaxial leaf surfaces usually not glaucous; inflorescence paniculate, many flowered, terminal, and sometimes also axillary; columella up to ½ as long as capsule..... | <i>C. sumatranum</i> subsp. <i>sumatranum</i> |

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## APPENDIX

A field study to collect the specimen and other field data was carried out by the second author in November 2018 in Pujananting District, Barru Regency, South Sulawesi. The morphological description was done based on the examination of dried herbarium materials using a ruler and a light microscope. Identification was done using literature – mainly from Robson (1974) and Byrne *et al.* (2018); and the type specimens (including types of the synonyms) were accessed from Kew Herbarium Catalogue (<http://apps.kew.org/herbcat>), Leiden (<http://bioportal.naturalis.nl>), and Natural History Museum (<http://data.nhm.ac.uk>).