

# **ARGOSTEMMA CONDENSUM (RUBIACEAE), A NEW RECORD FROM NORTHERN PENINSULAR MALAYSIA**

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A new record of *Argostemma condensum* Craib was reported from the state of Kelantan in the northern part of Peninsular Malaysia. A detailed description, illustration, and a regional conservation assessment of the species as Near Threatened (NT) for Peninsular Malaysia were provided.

Keywords: *Argostemma*, conservation status, Kelantan, northern province, Gentianales

## **INTRODUCTION**

*Argostemma*, with about 168 species (POWO 2022) is a large genus of herbaceous plants in the tribe Argostemmateae (Rubiaceae–Rubioidae). The genus is distributed in the Old World tropics and mainly confined to South-East Asia (Robbrecht 1988) but with two species in tropical West Africa (Sridith & Puff 2000, Mabberley 2017). Of the 168 species, 43 species were reported for Peninsular Malaysia. Of these, two species previously known from southern Thailand were recorded for the first time in Peninsular Malaysia as far south to Langkawi Islands by Sridith (2007); *Argostemma neurocalyx* Miq. (Miquel 1869) with a wide distribution and *Argostemma puffii* Sridith (1999) which was previously known only from Peninsular Thailand (Sridith 2007). However, there were two other species found endemic to the Thai peninsula; *Argostemma condensum* Craib (1931) and *Argostemma dispar* Craib (1931) for which they were disputed of their occurrence across the border (Sridith 1999).

While examining the *Argostemma* reference materials for identification purposes in the National Herbarium of the Forest Research Institute Malaysia (KEP), the author came across four unidentified specimens of the genus. Comparison with specimen images and the description of *Argostemma* species in Thailand, revealed that the unidentified taxon was consistent with *Argostemma condensum*, a species that has never before been recorded in Malaysia. Thus, this species was reported here for the first time for Peninsular Malaysia.

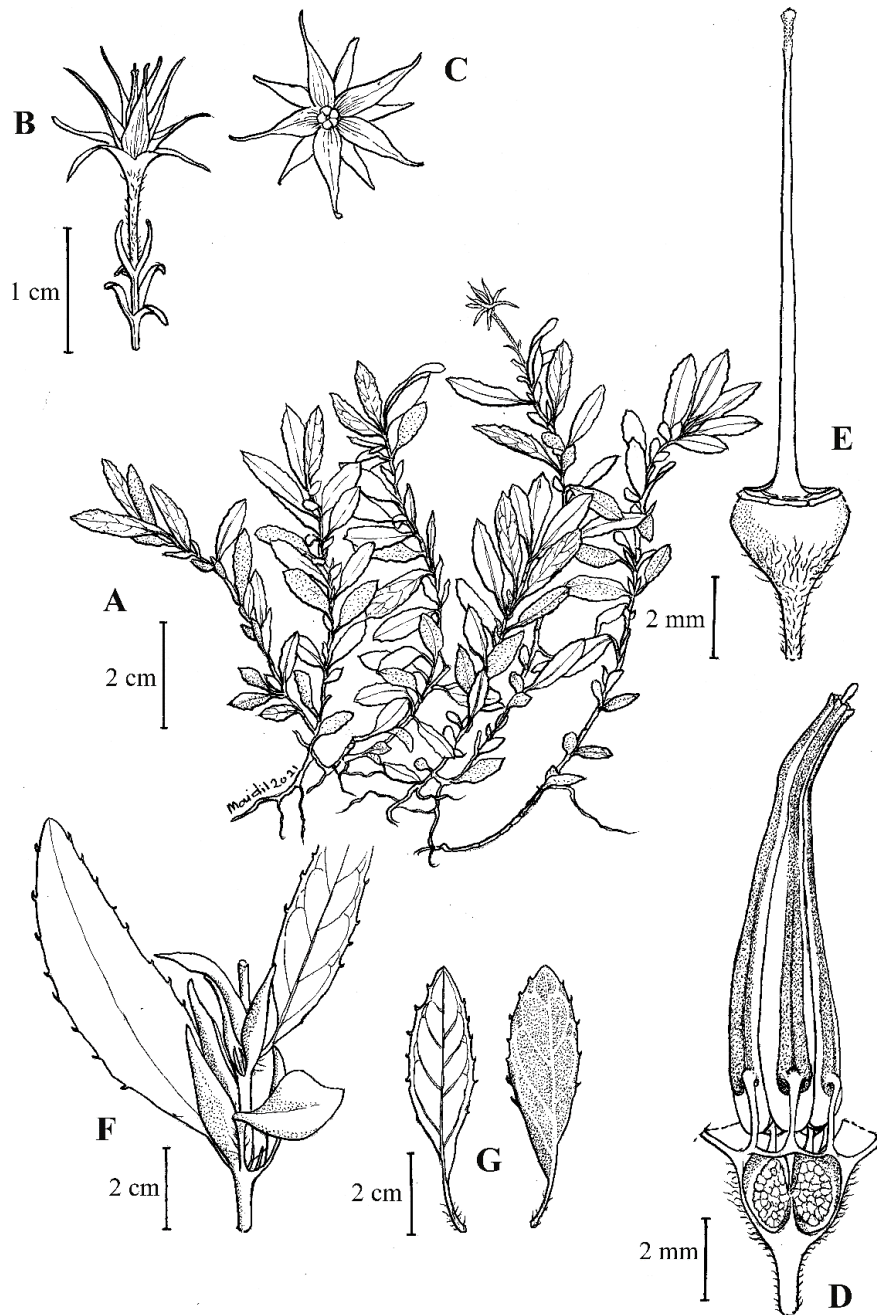
## **MATERIALS AND METHODS**

This study was based on examination of herbarium specimens at Kepong Herbarium (KEP) in Forest Research Institute Malaysia and the relevant taxonomic literatures (Craib 1931, Bremer 1989). In addition, specimen images from JSTOR Global Plants (<http://plants.jstor.org/>), Kew Herbarium Catalogue (<http://apps.kew.org/herbcat/gotoHomePage.do>) and Plants of the World Online (POWO: <http://www.plantsoftheworldonline.org/>) were also consulted. The description below is based on dried specimens from Peninsular Malaysia as cited under specimens examined. The measurement of floral parts was from the rehydrated plant materials. The conservation assessment of the species was determined using the IUCN categories of threat (IUCN 2012, IUCN 2016) following the guidelines and procedures developed at Forest Research Institute Malaysia for the Malaysia Plant Red List (Chua & Saw 2006).

## **RESULTS**

### **Taxonomy**

The new records were shown in Figure 1 and Figure 2. *Argostemma condensum* Craib, Bull. Misc. Inform. Kew 1931(4): 212. 1931. Type: Thailand. Satul Province: Klawng Ton, 200 m alt., 10 March 1928 (fl.), *Kerr 14440* (holotype K, barcode



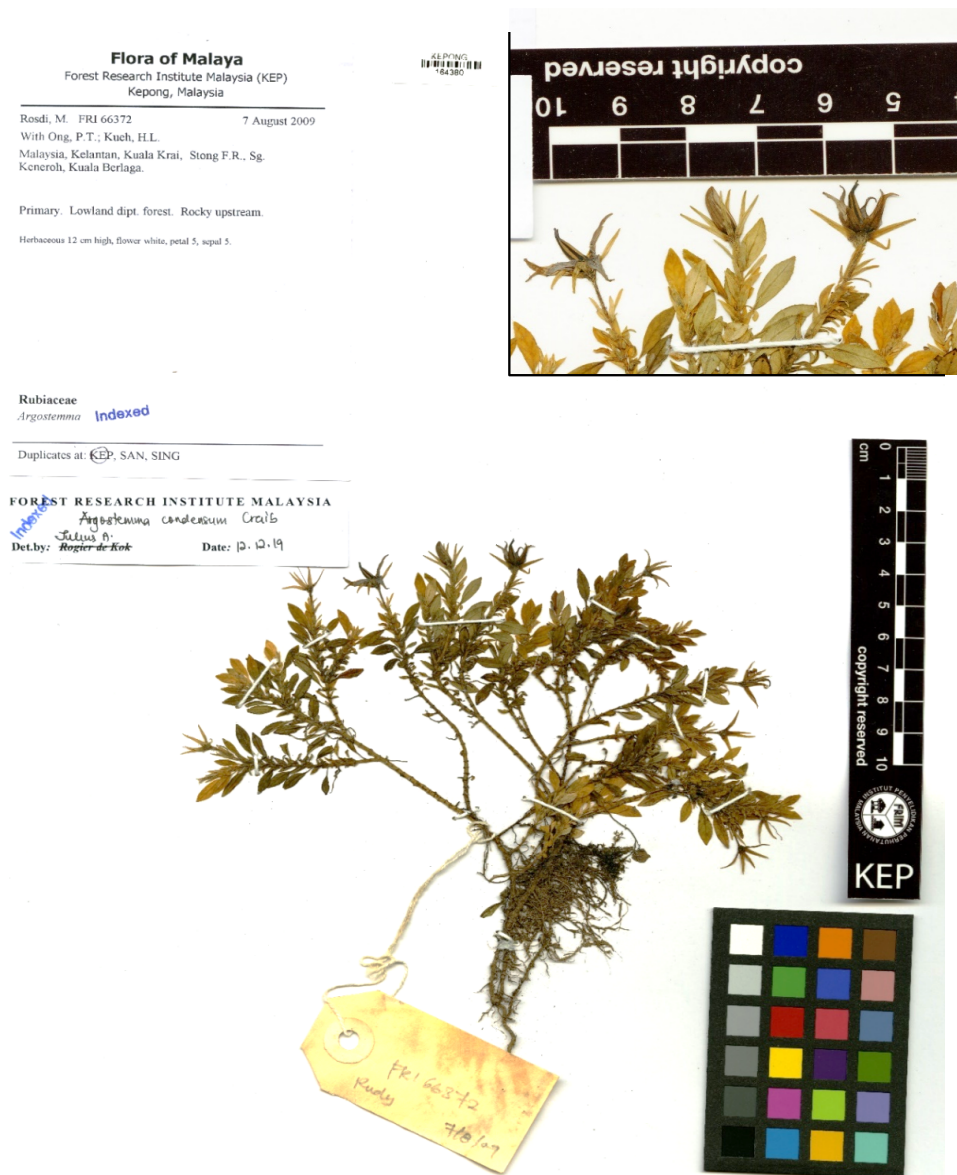
**Figure 1** *Argostemma condensum* Craib. (A) Habit, (B) Inflorescence with single flower, (C) Flower, aerial view, (D) Stamen and ovary in longitudinal section, (E) Pistil, (F) Leaf arrangement, (G) Leaves showing the venation on above (left) and below (right) surfaces. (Drawings by Mohamad Aidil Nordin).

K001067589, image; isotypes BM, barcode BM000028704, image BK, barcode BK257304, image).

### Description

A perennial, lithophytic herb with underground rhizome. *Stems* prostrate, branched, 9–11 cm long,

glabrous. *Leaves* opposite, in many pairs scattered along stem, distichous, strongly anisophyllous; lamina chartaceous, oblanceolate to elliptic, 1–1.5(–3.5) × 0.3–0.5(–1.2) cm (large leaves) or 2–3(–13) × 1–4 mm (small leaves), basally attenuate to cuneate with the lobes unequal, margin toothed with gland or segmented hairs at tip, apex obtuse, glabrous except on midrib



**Figure 2** The collection of *Argostemma condensum* from Sg. Keneroh [Kenerong], Kuala Beraga (Rosdi et al. FRI 66372, KEP).

above; midrib raised and prominent on both surfaces, sparsely pubescent above, glabrous beneath; lateral veins 4–6(–9) pairs, arching and looping near margin, more or less conspicuous on both surfaces; petioles 1–3 mm long, glabrous; stipules thinly chartaceous, lanceolate-oblong to elliptic, 2.5–5 × 1–2 mm, glabrous. *Inflorescence* uniflorous, terminal; pedicel 5–8 mm

long, densely hairy. *Flowers* 5-merous, slightly zygomorphic; calyx chartaceous, green, lobes linear triangular, 8–9 × 1 mm, suberect, glabrous, raphides conspicuous; corolla white, star-shaped, entirely glabrous, tube c. 2 mm long, lobes ovate-elliptic with prolonged tips, c. 8 × 3 mm, spreading; stamens 5, filaments free, c. 2 mm long, anthers coherent into a sometimes curved

anther cone, (pale) yellow, semibasifixed, oblong, *c.* 9 mm long, with apical appendages, opening by longitudinal slits; ovary obovoid, *c.* 2 mm in diam., 2-locular, many ovules, glabrous, style filiform, *c.* 1.2 mm long, shortly exerted from anther cone, glabrous, stigma capitate. *Fruit* not seen for Peninsular Malaysia.

### Phenology

Flowers were collected in February and August for Peninsular Malaysia.

### Habitat

*Argostemma condensum* grows in primary lowland dipterocarp forest along the rocky stream for Peninsular Malaysia.

### Conservation status

The conservation status at Near Threatened (NT) nearly met VU B1+B2a status. This species was rare and unlikely to be confused with others known from Peninsular Malaysia. Four specimens were collected from two sites as recently as 2010. Three of these were collected from a protected area in Gunung Stong State Forest Park in Kelantan. The habitat where the species was found was undisturbed. Despite the low population density, the species was still present in 2020 in a similar microhabitat near to the rocky stream in Gunung Stong State Forest Park where it was first collected in 1988. For this reason, it was assessed as Least Concern. However, another collection from Gunung Chamah was collected outside the forest reserve and non-protected area. In addition, it had small area of occupancy (< 20 km<sup>2</sup>) and there were less than five localities confined to the northern part of Peninsular Malaysia near the border of Thailand. Therefore, *Argostemma condensum* was assessed as Near Threatened (NT) according to the Malaysia Plant Red List (Chua & Saw 2006) and the IUCN Red List categories and criteria (IUCN 2012, IUCN 2016).

### Specimens examined

The specimens examined were from MALAYSIA. Peninsular Malaysia, Kelantan: Kuala Krai, Stong FR, Sg. Keneroh [Kenerong], Kuala Berlaga, 05°16.42' N, 101°52.29' E, *c.* 1000 m elev.,

7 Aug 2009 (fl.), Rosdi *et al.* FRI 66372 (KEP); Kuala Krai, Batu Hampar, 5°19' N, 101°56' E, *c.* 746 m elev., stream side, lightly shaded, 8 Feb 2007 (fl.), Yao *et al.* FRI 55787 (KEP); Dabong, Gunung Stong, 05°19' N, 101°57' E, rocks in stream, able to withstand water current, 16 May 1988, Kiew RK 2730 (KEP); Gua Musang, Gunung Chamah, Camp Viper, 05°12.37' N, 101°34.27' E, *c.* 1723 m elev., river bank, on slope, slightly shaded, 2 Aug 2010 (fl.), Imin *et al.* FRI 71779 (KEP).

### DISCUSSION

The discovery of this new record brought the number of *Argostemma* species known in Peninsular Malaysia to 44 species. In addition, this species was no longer endemic to Thailand as noted by Sridith (2007) with the discovery of *Argostemma condensum* from Kelantan near the Peninsular Malaysia-Southern Thailand border.

Economically, there was still no record on the medicinal or horticultural importance of this genus. However, *Argostemma* has great potential to function as an ecological indicators and as surrogate plant for species conservation because it occurred only in intact or undisturbed forests and was never been found in secondary or disturbed habitats (Sridith 2007). In addition, knowledge of this species is important not only in the documentation of biodiversity with respect to the revision of the family Rubiaceae for Flora of Peninsular Malaysia, but also for conservation purposes to the local authorities and management of Gunung Stong State Forest Park.

This newly discovered of species was characterised by smaller leaves and a single flower that did not match with any of the known species of the genus in Peninsular Malaysia. However, it was consistent with *Argostemma condensum* described from Thai Peninsular. The only differences were on the leaves which were slightly larger, 1–1.5(–3.5) × 0.3–0.5(–1.2) cm but smaller, 1–1.4 × 0.3–0.4 cm in Thai Peninsular material. Their calyx lobes were much longer, 8–9 mm long but about 2 mm long in Thai Peninsular material. When compared to the known species from Borneo, *Argostemma condensum* was closely related to *A. gracile*. Both species had smaller leaves in the same size range of 0.4–3.5 cm long and a solitary inflorescence with

a single flower. However, *A. condensum* differed in having star-shaped flower, pedunculate and coherent anthers whereas the flower of *A. gracile* was campanulate, non-pedunculate with free anthers.

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