



# A new species of *Goniothalamus* (Annonaceae) from the Western Ghats of Tamil Nadu, India

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**ABSTRACT:** *Goniothalamus sericeus* is described as a new species from southern Western Ghats of India. The species shares some common morphological traits between *G. keralensis* E. S. S. Kumar, Shaju, P. E. Roy & Raj Kumar and *G. wightii* Hook.f. & Thomson, which are endemic to the southern Western Ghats. The photographs, illustrations and conservation status of the species are provided here for easy identification and to formulate better conservation and management strategies.

**KEY WORDS:** Annonaceae, *Goniothalamus sericeus*, India, Kanyakumari wildlife sanctuary, new species, Tamil Nadu.

## INTRODUCTION

Annonaceae is a species-rich angiosperm family consisting of 107 genera and c. 2400 species forming an important component of tropical lowland forest ecosystem (Guo *et al.*, 2017). *Goniothalamus* (Blume) Hook.f. & Thomson is one of the largest paleotropical genera with 134 species (Guo *et al.*, 2017). The genus is widely distributed in lowland and submontane forests of tropical South-East Asia, with a centre of diversity in Western Malesia, Sumatra and Peninsular Malaysia (Saunders, 2002; Saunders and Chalermglin, 2008; Tang *et al.*, 2013). The species of the genus, as with most Annonaceae members, consists of one whorl of three sepals and two whorls of three petals each. The outer petals are larger than the inner whorl. The inner petals are clawed, connivent, arching over the reproductive organs forming a mitriform dome. The flowers are hermaphroditic with numerous free stamens and carpels. Stamens possess flat-topped connectives that extend over the theca. Monocarps are either sessile or stipitate. In India, the genus *Goniothalamus* is represented by 13 species and 1 variety (Turner, 2015; Alister *et al.*, 2017). Among them *G. cardiopetalus*, *G. keralensis*, *G. rhynchantherus*, *G. thwaitesii*, *G. wightii* and *G. wynaadensis* are found in southern part of Western Ghats of South India.

As part of the survey and documentation of flowering plants of Kanyakumari wildlife sanctuary, the authors collected a species of *Goniothalamus* with wider outer petals (15–16 mm), numerous carpels (20–24) per flower and yellow monocarps at maturity. Detailed morphological studies and its comparison with herbarium materials including type specimens of the genus deposited at ASSAM, CAL, CALI, K, MH, TBGT and thorough scrutiny of protologues and relevant literature (Hooker and Thomson, 1872; Huber, 1985; Mitra, 1993; Saunders, 2003; Mohanan, 2005; Saunders

and Chalermglin, 2008; Kumar *et al.*, 2013) it is evidenced that the present collection does not match with any of the known species of *Goniothalamus*. Herein it is described as a new species with illustration and photographs.

## TAXONOMIC TREATMENT

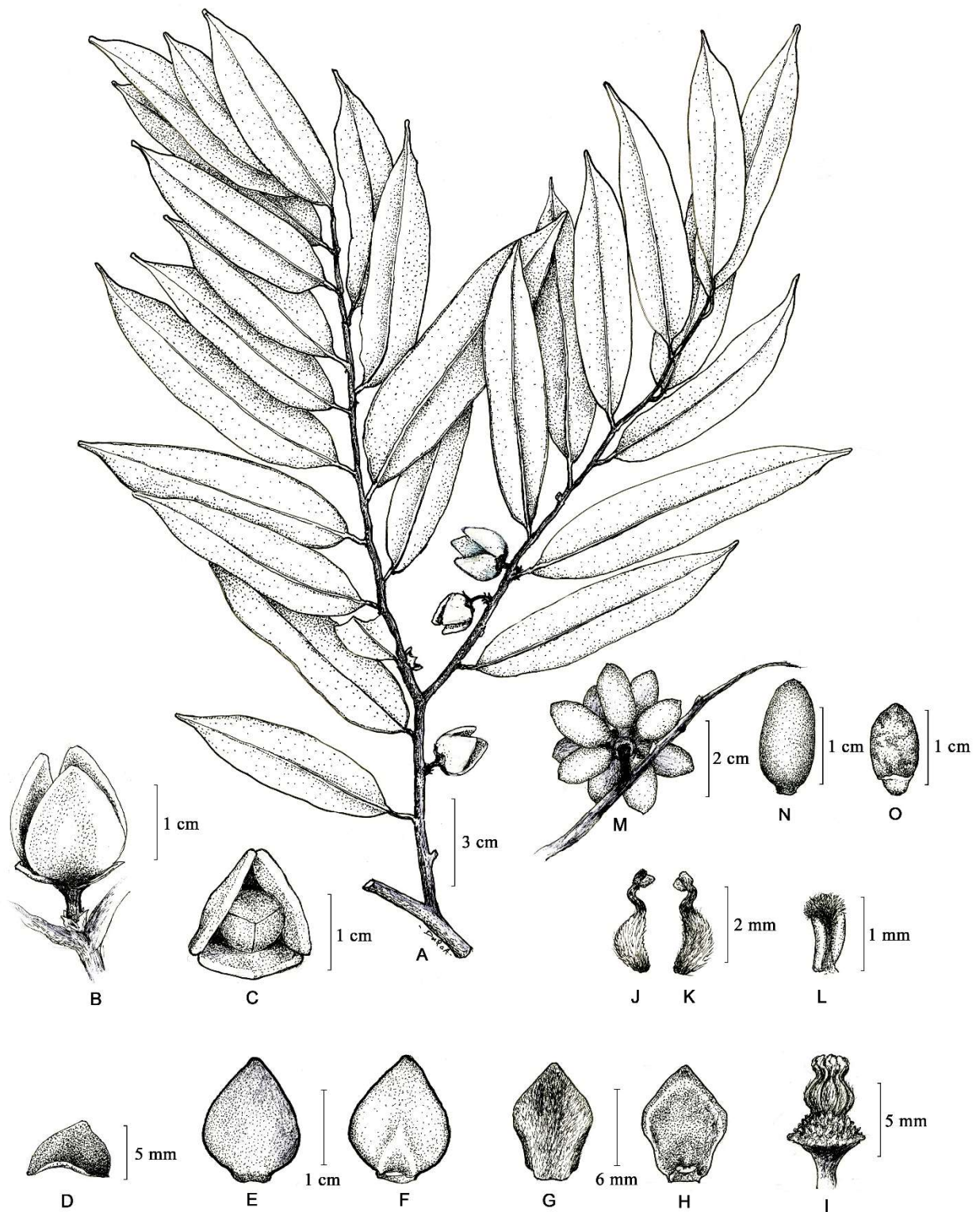
*Goniothalamus sericeus* Sujana & Vadhyar, *sp. nov.*

**Figs. 1 & 2**

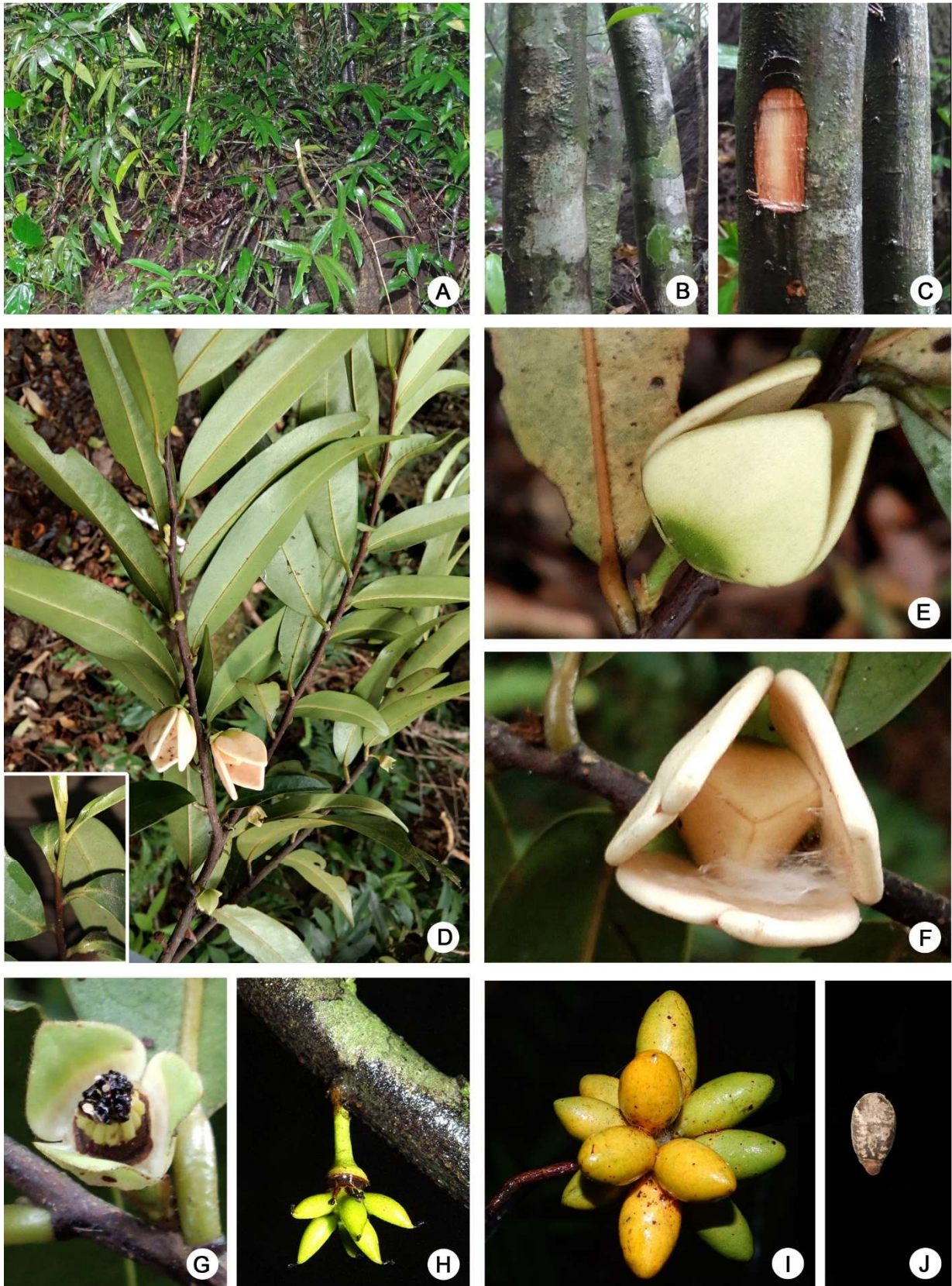
*Goniothalamus sericeus* is morphologically similar to *G. wightii*, which is also endemic to the southern Western Ghats. But differs from it in having smaller leaves (8–11 × 1.8–2.1 cm), deciduous sepals in fruits, rhomboid inner petals with densely sericeous abaxially and glabrous adaxially. The connective of the anther is papillate, rounded at apex and densely hairy. Ripen carpels are sessile, yellow in color with black strigose hairs basally. The new species is having some affinities with *G. keralensis* by having sessile monocarps and caducous sepals (Kumar *et al.*, 2013). But *G. keralensis* differs from the new species by having much longer leaves (up to 28 cm), funnel shaped stigma and orange-brown ripen carpels. The distinguishing characters of *G. sericeus* from its allied taxa are given in Table 1.

**Type:** India, Tamil Nadu, Kanyakumari district, Kanyakumari wildlife sanctuary, Balmore Forest Beat, Muthukuzhivayal, 08°28.418'N; 077°23.883'E, 1194 m, 6 Feb 2019, Sujana K. A. & Rakesh G. Vadhyar 144672 (Holotype: CAL; Isotype: MH).

Small trees, c. 8 m tall, 28 cm DBH; bark surface rugulose, greyish-brown with greenish-white blotches; inner bark pale orange; young innovation terete, green, hairy; hairs strigose, black; mature branchlets lenticellate, glabrous, blackish. Leaves linear-lanceolate, 8–11 × 1.8–2.1 cm, cuneate-attenuate at base, acute or shortly acuminate at apex, margin entire, thickened, recurved, glabrous adaxially, puberulent abaxially, coriaceous, drying



**Fig. 1.** *Goniothalamus sericeus*. **A:** Flowering branch. **B:** Lateral view of flower. **C:** Apical view of flower. **D:** A sepal **E:** Abaxial view of an outer petal. **F:** Adaxial view of an outer petal. **G:** Abaxial view of an inner petal. **H:** Adaxial view of an inner petal. **I:** Receptacle with carpels. **J & K:** Carpels. **L:** A stamen. **M:** Mature monocarp. **N:** Monocarp. **O:** Seed. – Drawn by A. T. Durgadas



**Fig. 2.** *Goniotalamus sericeus*. **A:** Habit. **B:** Bark. **C:** A slash showing inner bark. **D:** Flowering twig, young innovation (in sight). **E:** Lateral view of a flower. **F:** Dorsal view of a flower. **G:** Receptacle with sepals and carpels. **H:** Immature carpels. **I:** Mature carpels. **J:** Seed.

**Table 1.** Diagnostic characters of *Goniothalamus sericeus* with allied species.

Character	<i>G. sericeus</i>	<i>G. wightii</i>	<i>G. keralensis</i>
Leaf laminas			
size	8–11 × 1.8–2.1 cm	7–16 × 2–4 cm	12–28 × 2–4 cm
abaxial surface indumentum	puberulent	glabrous	sparsely hairy along the nerves
Sepals			
size	5–5.2 × 6–6.3 mm	4–7 × 4–5 mm	4–4.5 × 3.8–4 mm
persistence	caducous in fruits	persistent in fruits	caducous in fruits
Outer petals			
size	15–22 × 15–16 mm	10–17 × 6–12 mm	15–18 × 8–12 mm
Inner petals			
shape	rhomboid	rhombic	rhombic
size	8–9 × 6.5–7 mm	5–8 × 4–5 mm	9–12 × 7–8 mm
abaxial surface indumentum	very densely sericeous	densely brown pubescent	densely pubescent
adaxial surface indumentum	glabrous	densely brown pubescent	densely pubescent
Connective of stamens			
apex shape	rounded	truncate	convex
indumentum	densely hairy	glabrous	glabrous
Number of carpels per flower	20–24	14–18	4–8
Pseudostyle	indistinct	distinct	indistinct
Monocarps			
stipe	sessile	stipitate	sessile
shape	ovoid	ellipsoid	ellipsoid
color	yellow	blackish-brown	orange-brown
indumentum	black strigose hairs basally	glabrous	glabrous
Seeds			
number per carpel	1 or 2	1	2
surface	slightly rugulose	smooth	smooth

olive green adaxially, dull yellow abaxially; midrib straight, channelled above, raised beneath, percurrent; veins 10–12 pairs, slightly distinct abaxially; petiole 0.4–0.5 cm long, channelled, drying black. Flowers solitary, axillary or on older branches, pendent, fragrant at maturity; pedicels subclavate, 0.6–0.8 cm long, pubescent, hairs brown; bracts 6, oblong, 1–1.3 mm long, sericeous, brown. Sepals 3, broadly ovate, acute at apex, 5–5.2 × 6–6.3 mm, basally connate, adaxially glabrous, white at base, green towards apex, abaxially sparsely hairy, green, deciduous in fruits. Petals (3+3); outer petals ovate, unguiculate, 15–22 × 15–16 mm, obtuse at apex, densely sericeous abaxially, arachnoid hairs adaxially, glabrous at base, fleshy, c. 1050 µm thick, venation distinct, greenish-yellow turns to beige with a tinge of green basally; inner petals forms a rhomboidal mitriform dome, rhomboid, unguiculate, 8–9 × 6.5–7 mm, very densely sericeous abaxially, glabrous adaxially except single line of hairs at apex, fleshy, c. 950 µm thick, yellowish-white. Stamens many, 0.9–1 mm long, linear-oblong, connective produced in to a round apex, papillate, apex densely hairy. Carpels 20–24, ovoid, 2.5 mm long; ovary c. 1.8 × 0.3 mm, densely hairy with long golden-brown hairs; style indistinct, c. 0.7 mm long, curved, greenish white; stigma bifid, black. Monocarps 6 – (11) – 13, sessile, ovoid, 1.7–1.8 × 1–1.1 cm, yellow when mature, black strigose hairs at base. Seeds 1 or 2 in each carpel, embedded in mucilage, 1.1–1.2 × 0.6–0.7 cm, flattened-ovoid, testa slightly rugulose, hairy, reddish brown, margin hyaline, endostome protruding.

**Phenology:** Flowering in January to March; fruiting

in June to August.

**Distribution:** So far known only from Kanyakumari wildlife sanctuary, Tamil Nadu, South India.

**Population structure and Conservation status:** A single population only observed in and around Kanyakumari wildlife sanctuary at an elevation between 1200–1400 m with about 6 individuals in flowering and 48 saplings in tropical wet evergreen forests occupying in less than 1 km<sup>2</sup>. Hence the conservation status of this plant is provisionally recommended as Critically endangered (CR B1ab(ii,iii)+B2ab(i,ii)). The taxon has been evaluated against the criteria as described in IUCN (2012). The area of occupancy is estimated to be less than 10 km<sup>2</sup> and its habitat is severely fragmented and known to exist only in a single location. Major threats to the population noted during the study period are forest fire, grazing and clearing of trekking path in the forest.

**Etymology:** The specific epithet 'sericeus' refers to the presence of dense sericeous hairs on petals.

**Note:** The vegetative features of new species show some similarities with the Sri Lankan species *G. salicinus* Hook.f. & Thomson and *G. salicinus* subsp. *reticulatus* (Thwaites) H. Huber in having young branches with strigose by purplish-brown or blackish hairs and leaves with scattered blackish-brown hairs. But the new species is distinctively differs in having wider ovate outer petals, abaxially sericeous inner petals and yellow colored sessile monocarps.

**Paratypes:** India, Tamil Nadu, Kanyakumari district, Kanyakumari wildlife sanctuary, Balmore Forest Beat, Muthukuzhivayal, 08°28.422'N; 077° 23.885'E, 1192 m, 5 July 2019, Sujana K. A. & Rakesh G. Vadhyar 146866 (MH).



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