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RESEARCH ARTICLE

A New Species of *Goniothalamus* (Blume) Hook. f. & Thomson (Annonaceae) from Kerala, India

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ABSTRACT: *Goniothalamus keralensis* E.S.S.Kumar, Shaju, Roy et Raj Kumar, a new species of *Goniothalamus* (Blume) Hook.f. & Thomson (Annonaceae) is described and illustrated. This species located in the forests of Idukki district in Kerala, India is similar to *G. wightii* Hook.f. & Thomson, but differs in having the longer leaves with acuminate or acuminate-caudate apex, the shorter pedicels of flowers, smaller sepals which are deciduous in fruits, stamens with glabrous and convex connective, fewer carpels with very short or indistinct style and funnel shaped stigma, and seeds are consistently two in each carpels.

KEY WORDS: Annonaceae, *Goniothalamus keralensis,* India, new species, Western Ghats.

INTRODUCTION

Goniothalamus (Blume) Hook.f. & Thomson is a large paleotropical genus of more than 130 species, has a wide distribution in southeast Asia, extending from southern India and Sri Lanka to New Caledonia (Turner and Saunders, 2008; Saunders and Chalermglin, 2008). The species of the genus are distinguished by the following key characters such as: colour and indumentum of the branchlets; length of petioles; shape and size of lamina; shape, size and indumentum of petals; external morphology of stamens and stigma; shape and presence or absence of stalk in monocarps; and the persistency or the deciduous nature of the bracts in the infructescence. Prior to the discovery of *G. keralensis,* 12 species were commonly recognized as occurring in India viz. *G. cardiopetalus* (Dalz.) Hook.f. & Thomson*, G. macranthus* (Kurz) Boerl*, G. malayanus* Hook.f. & Thomson*, G. meeboldii* Craib*, G. rhynchantherus* Dunn*, G. salicinus* Hook.f. & Thomson*, G. sesquipedalis* (Wall.) Hook.f. & Thomson*, G.shraddhae* S. R. Dutta & S. M. Almeida, *G. simonsii* Hook.f. & Thomson*, G. thwaitesii* Hook.f. & Thomson*, G. wightii* Hook.f. & Thomson and *G. wynaadensis* (Beddome) Beddome (Mitra, 1993; Dutta and Almeida, 1998; Nayar *et al*., 2006). Of these, *G. macranthus, G. malayanus* and *G. meeboldii* are recorded for India from Andaman and Nicobar Islands, whereas *G. sesquipedalis* and *G. simonsii* are distributed in North Eastern parts of India. *G.cardiopetalus, G. wightii* and *G. wynaadensis* are endemic to the southern part of India while *G. thwaitesii* and *G. salicinus* are extending into Sri Lanka. *G. gardneri* Hook.f. &Thomson, *G. hookeri* Thw., *G. thomsoni* Thw. and *G. reticulata* Thw. are the other species reported from Sri Lanka, of these *G. reticulatus* is now treated as a subspecies of *G. salicinus* (Huber, 1985). Kerala, the southern state of India, harbors six species viz. *G. cardiopetalus, G. rhynchantherus, G. salicinus, G. thwaitesii, G. wightii, G.wynaadensis* (Mohanan, 2005; Nayar *et al*., 2006).

As part of the survey and ex-situ conservation of the rare and threatened plants of the Western Ghats, the authors collected an interesting species of *Goniothalamus* from the evergreen forests of Idukki district in Kerala. On critical study, it was found different from all known species of the genus, hence it is described and illustrated as a species new to science.

TAXONOMIC TREATMENT

Goniothalamus keralensis E. S. S. Kumar, Shaju, Roy *et* Raj Kumar, ***sp. nov.*** Figs. 1 & 2

Type: India, Kerala, Idukki district, Anakkulam, alt. 1200 m, 18 September 2009, *E.S. Santhosh Kumar & P.E. Roy 69376* (Holotype: TBGT; Isotypes:(CAL, K MH,).

Medium-large shrubs or small trees, up to 4 m high; branchlets terete, black, minutely hairy when young and glabrous on maturity. Leaves linear-lanceolate, 12–28 × 2–4 cm, cuneate-attenuate at base, long acuminate or acuminate-caudate at apex, entire at margin, coriaceous, glabrous above, sparsely hairy along the nerves beneath; midrib straight, channeled above, raised beneath; lateral nerves 16–23 pairs, ± distinct, almost perpendicular to

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the midrib; petiole 1–1.5 cm long, glabrous, black. Flowers solitary, axillary; pedicels subclavate, 4–5 mm long, pubescent with deciduous hairs; bracts 2–3 at base, 1–1.5 mm long, densely brown pubescent on both surfaces. Sepals 3, broadly ovate, 4–4.5 × 3.8–4 mm, shortly acuminate at apex, pubescent abaxially, deciduous in fruit. Petals (3+3), greenish-yellow to dark ivory coloured; outer petals broadly ovate, 1.5–1.8 × 0.8–1.2 cm, obtuse-acute at apex, densely pubescent with appressed fulvous hairs on either sides except the glabrous region at base of the adaxial surface; inner petals forming a cone, rhombic, unguiculate, 0.9–1.2 × 0.7–0.8 cm, densely pubescent with appressed fulvous hairs on either surfaces except the glabrous region at base of the adaxial surface. Stamens many, to 1.5 mm long, linear-oblong, connective convex, glabrous. Carpels 4-8, ovoid-oblongoid, to 3 mm long; ovary densely hairy; stigma funnel shaped. Monocarps 4–6, almost sessile, ellipsoid, 2–2.5 × 1–1.5 cm, acuminate at apex, yellowish-brown, glabrous. Seeds 2 in each carpel, each 1 × 0.5–0.6 × 0.5 cm, dark brown, glabrous.

Flowering and fruiting: August–December

Distribution: India (Kerala), endemic.

Habitat: *G. keralensis* is found as a low canopy plant in the evergreen and riparian forests at altitudes between 800–1200 m. In riparian vegetation, the plant often seen as a medium to large sized shrubs, whereas in evergreen forests, it grows to the size of a small tree. The common associated species are *Litsea floribunda* (Blume) Gamble*., Gomphandra coriacea* Wight*, Syzygium laetum* (Buch.-Ham.) Gandhi*, S. occidentale* (Bourd.) Gandhi*., Piper barberi* Gamble*, Coscinium fenestratum* (Gaertn.) Colebr.

Population structure and conservation status**:** There is only single population so far reported between the elevations of 800–1200 m, with about 60 mature individuals in the evergreen forests, occupying in less than 10 sq km area. The population is producing flowers and fruits on a regular interval evidently by the presence of many seedlings of different age. The number of seedlings estimated was less than 200 individuals and were prone to severe pest attacks. By following IUCN criteria (IUCN, 2001) for assessing the status of Rare and Threatened plants. *G. keralensis* is assessed as belonging to Endangered (CR) category [B2a].

Etymology: This new species is named after Kerala state, the type locality of the taxon belongs.

Note*: G. keralensis* is closely realted to *G. wightii* Hook.f. & Thomson, another endemic species in the southern part of India, by the similar habit, overall similarity of the leaf shapes and the size and colour of flowers, but differs from it by the much longer leaves with acuminate or caudate-acuminate apex. The sepals are shorter and deciduous in fruits. The anthers with convex and glabrous connective. The number of carpels

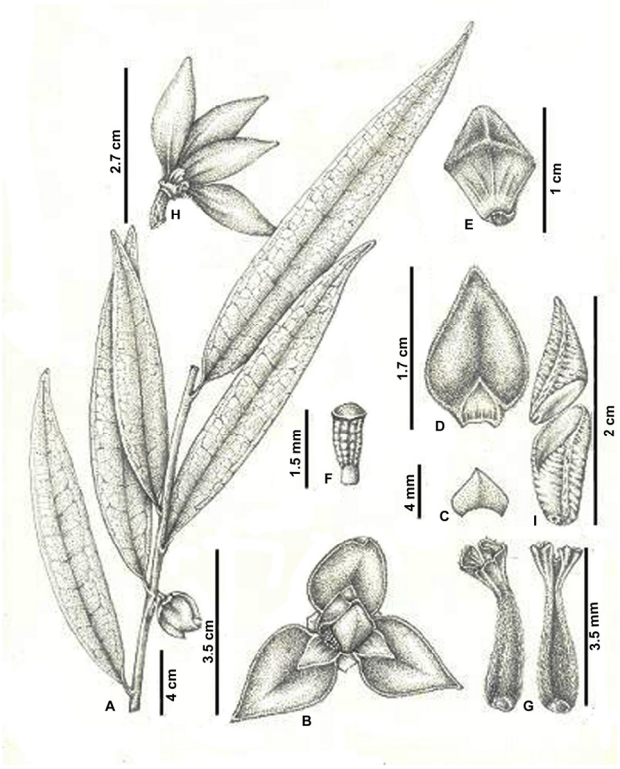


Fig. 1. Illustration of *Goniothalamus keralensis* E. S. S. Kumar, Shaju, Roy *et* Raj Kumar, *sp. nov*. A: A twig in flower. B: A flower. C: A sepal. D: Outer petal. E: Inner petal. F: A stamen. G: Pistils. H: Mature carpels. I: Seeds.

are fewer (4–8) and the ovary with very short or indistinct style and funnel shaped stigma are the unique characteristic feature distinguishing the taxon from its allies. Seeds are consistently two in each monocarp. The pleasant fruity smell of the ripe monocarps is a very discernible character to locate this species in the field. A comparative analysis of the characters among *G. keralensis* and *G. wightii* are given in Table 1.

G. salicinus is represented by a single collection for India made by Rama Rao (Rao, 34 TBGT!) from Chemunji hills of Thiruvananthapuram district of Kerala in 1898. Mohanan (2005) however opined that there is no specimen in any of the herbaria in India and hence excluded from his study. During the present investigation, the authors located the original collection of Rama Rao in TBGT and convinced that *G. salicinus* is occurring in India. A key to the species of *Goniothalamus* occurring in India and Sri Lanka are given below:

Key to the species of *Goniothalamus* occurring in India and Sri Lanka:

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Table 1. Comparison of selected morphological characters of *Goniothalamus keralensis* E.S. S. Kumar *et al.* and *G. wightii* Hook. f. & Thomson.

Characters	*G. keralensis* E.S. S. Kumar *et al.*	*G. wightii* Hook.f. & Thomson
Leaf length	12–28 cm	7–13 cm
Lamina	Sparsely hairy along the nerves beneath	Glabrous
Leaf apex	Long acuminate or caudate-acuminate	Shortly acuminate
Pedicels	4–5 mm long	7–12 mm long
Sepals	4–4.5 × 3.8–4 mm, deciduous in fruits	4–7 × 4–5 mm, persistent in fruits
Connective of the stamens	Convex and glabrous	Rounded-truncate or slightly convex, minutely hairy
Number of carpels	4–8	14–18
Style	Indistinct	Distinct
Stigma	Funnel shaped	Bifid and flat
Ripe carpels	Orange-brown	Blackish-brown
Number of seeds per carpel	2	1

1.Young branches reddish or black in colour; monocarps distinctly ridged or furrowed when dry (except in *G. salicinus*) …….. 2
1.Young branches brown, grey, green or yellow in colour; monocarps not ridged or furrowed when dry …….. 3
2. Leaves oblong or narrowly oblong-lanceolate …..…… ***G. meeboldii***
2. Leaves ovate-lanceolate …….. ***G. shraddhae***
3. Connective of stamens apiculate at apex …….. 4
3. Connective of stamens flat or convex at apex ……..…… 8
4. Outer petals linear-lanceolate ……..…….. ***G. macranthus***
4. Outer petals ovate, ovate-lanceolate or oblong-lanceolate ……...… 5
5. Outer petals ovate-lanceolate, 3–8 cm long ……..….. ***G. malayanus***
5.Outer petals ovate or oblong lanceolate, 4 cm or less long …… 6
6. Stigma entire …….. ***G. rhynchantherus***
6. Stigma bifid ……..…….. 7
7. Outer petals broadly ovate, ca. 2 cm long ……..….. ***G. wynaadensis***
7. Outer petals oblong-lanceolate, 3–4 cm long …….. ***G. simonsii***
8. Outer petals never exceeding 2 cm in length ……..…… 9
8. Outer petals always exceeding 2 cm in length ……..…… 13
9. Leaves 25 cm or longer ……...… ***G. sesquipedalis***
9. Leaves below 25 cm long ……..…….. 10
10. Leaves oblong lanceolate, monocarps shortly stalked …….. ……..…….. ***G. cardiopetalus***
10. Leaves lanceolate, narrowly lanceolate to ovate or elliptical lanceolate, rarely obovate-lanceolate ……...…….. 11
11. Sepals persistent in fruits ……...…….…... ***G. wightii***
11. Sepals deciduous in fruits ……...…… 12
12. Stigma funnel shaped ……..….. ***G. keralensis***
12. Stigma bifid ……..……..…… ***G. salicinus***
13. Pedicels 0.3–1 cm long ……..……. 14
13. Pedicels 1–3 cm long ……..……. 15
14. Leaf blade 4–8 times as long as wide, acute at base. Stamen 1.8 mm long …….. ***G. gardneri***
14. Leaf blade 2–4 times as long as wide, obtuse at base. Stamens 2–2.5 mm long …….. ***G. hookeri***
15. Trees, 6–20 m tall. Sepals 8–13 mm long …… ***G. thwaitesii***
15. Treelets 0.3–1 m tall. Sepals 5–6 mm long …… ***G. thomsonii***

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Fig. 2. Photographs of *Goniothalamus keralensis* E. S. S. Kumar, Shaju, Roy *et* Raj Kumar, *sp. nov*. A: plant in the type locality. B: A twig with flowers. C: Lateral view of the flowers. D: Dorsal view of a flower. E: A twig with ripe carpels.

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來自印度喀拉拉邦的哥納香屬（番荔枝科）新種

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摘要：本文提供了對哥納香屬（番荔枝科）的新種*Goniothalamus keralensis*之描述及手繪圖。本種被發現於印度喀拉拉邦伊度基區的森林，本種與*G. wightii*相似，但不同處在於本種擁有較長的葉子，尖端或漸尖端的葉，較短的花梗，較小的萼片及結果時落葉，雄蕊具有光滑突起的葯隔，少數心皮具非常短或不明顯的花柱，柱頭呈漏斗狀，每個心皮內含兩顆種子。

關鍵詞：番荔枝科、*Goniothalamus keralensis*、印度、新種、西高止山脈。

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