



## REVIEW ARTICLE

# Synopsis of the genus *Cinnamomum* Schaeffer (Lauraceae) in India

M P Geethakumary<sup>1\*</sup>, S Deepu<sup>1</sup> & A G Pandurangan<sup>2</sup>

<sup>1</sup>Plant Systematics and Evolutionary Science Division, Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Palode, Thiruvananthapuram, Kerala – 695 562, India

<sup>2</sup>Centre for Innovation in Science and Social Action, Thiruvananthapuram, Kerala – 695 010, India

\*Email: [geethatbgt@gmail.com](mailto:geethatbgt@gmail.com)

## ARTICLE HISTORY

Received: 13 November 2020

Accepted: 07 January 2021

Published: 08 February 2021

## KEYWORDS

distribution; endemism;  
nomenclature; IUCN Red List  
category

## ABSTRACT

A checklist of the genus *Cinnamomum* in India is presented including nomenclature, a brief description, details of the publications where the detailed description and illustration of the species appeared, phenology, distribution of the species within and outside India and IUCN threat status. A total of 45 taxa (43 species and two infraspecific taxa) have been recorded here based on available information. Twenty-four taxa are found to be endemic to India. Kerala in Peninsular India records the largest number of 24 taxa and may be considered as hotspot area for this genus. The genus possesses the greatest phytogeographical affinity to China with 13 species.

## Introduction

The family Lauraceae, commonly known as laurel or avocado family, is one of the most common and ecologically important woody plant families in moist tropical and subtropical forests worldwide (1). The family comprises about 56 genera and nearly 2700 species (2). The genus *Cinnamomum* Schaeffer is the well-known source of the cinnamon of commerce. The genus is assumed to be represented by about 250–300 species (3, 4). The species of this genus have long been acknowledged for their economic importance as the sources of camphor and other essential oils (mainly cinnamaldehyde, eugenol and safrole) and spices present in the bark, twigs, leaves, roots, flowers and fruits, phytomedicines, high-quality wood, perfume, sacrificial material, for embalming etc. (5–9). In addition, as conspicuous elements of tropical and subtropical evergreen broad-leaved forests, *Cinnamomum* species are ecologically important (10–12), as the majority of the species are trees. In India, the genus is mostly distributed in the lush vegetation in the North-eastern region and the Western Ghats. *Cinnamomum* has an ample and pervasive fossil record, and there have been reports from the Upper Cretaceous of Asia, Europe, North America and

Australasia (13–27), which makes the geographical origin ambiguous (28). However, Tropical Asia is regarded as the most important centre of species diversity for *Cinnamomum*, ensued by the Neotropics (29). There are records way back to 484–425 BC. on the collection and transportation of cinnamon. The oldest tropical herbarium material of this genus bought in the 16<sup>th</sup> century (1573–75) by Rauwolff, is at Leiden.

The genus was divided into sections differently by different workers. Blume (30) divided it into three sections: Sect. *Cinnamomum*, Sect. *Caryophyllea* and Sect. *Camphora*, which was done based on the smell of bark and leaves. Meissner (31) recognized two sections: Sect. *Malabathrum* and Sect. *Camphora*, which was followed by Kostermans (9). The placement of Neotropical species was always a point of debate. These were initially being described in *Phoebe* Nees but were transferred to *Cinnamomum* by Kostermans (32). Molecular studies (28, 33–36) expressed doubts about the present circumscription of *Cinnamomum*. Phylogenetic analyses recaptured solidly endorsed monophyletic *Cinnamomum* group containing three well-supported subclades. It is also formulated that the formation and eventual breakup of now-extinct boreotropical paleoflora during the

Cenozoic helped to shape the biogeographic history of the *Cinnamomum* group (28). However, the study disowned the previous treatment and concluded that neither the genus *Cinnamomum* (*Cinnamomum sensu lato*) nor sections *Camphora* and *Cinnamomum* are monophyletic as the analyses suggests strongly that the *Cinnamomum* group consists of three clades: sect. *Camphora*, sect. *Cinnamomum* and the Neotropical species respectively. The Paleotropical and Neotropical species did not constitute a monophyletic group, but these were placed in different clades comprising exclusively of either Paleotropical or Neotropical species. Forty-four Neotropical species included in *Cinnamomum* and the only species of *Mocinnodaphne* were recently transferred to *Aiouea* (37).

The first significant work on the family Lauraceae, which can also be treated as a revision of this genus is by Meissner (31), and that for erstwhile British India is by C. B. Clarke in Flora of British India (38). It included 29 species, and out of which only 19 species were reported from the present political boundary of India. Subsequently, a large number of works have been carried out either at global or regional levels (3, 9, 29, 39–72), making significant changes in identification, taxonomic positions, nomenclature circumscription and affinities. However, there is no separate account of the Indian species of the genus except some scattered works (73–75). Later on, several taxa have further added to the genus *Cinnamomum* in India (76–93). Based on the observations made and available information, a comprehensive list of the genus *Cinnamomum* from India is provided here, together with a short description, phenology, distribution, conservation status as per IUCN Red List, notes if any and references for full description and illustration.

## Materials and Methods

The research is based on substantial literature and herbarium examination as well as our own field surveys. The taxa have been enumerated alphabetically. For each species currently accepted name followed by basionym and important synonyms arranged chronologically along with a nomenclatural citation, brief description, phenology, distribution of the species within and outside India, and conservation status as per IUCN Red List are provided. For easy identification, details of the reference where the detailed description and illustration of a species are available is also mentioned.

## Results and Discussion

In the present study, 45 taxa (43 species and two varieties) of *Cinnamomum* have been recorded from India. Even though distributed throughout the country, the primary areas with the highest species diversity are the Western Ghats and the Eastern Himalayas (Fig. 1). Out of the 45 taxa distributed in India, 24 are endemic with 13 exclusive endemics in the Western Ghats. Across

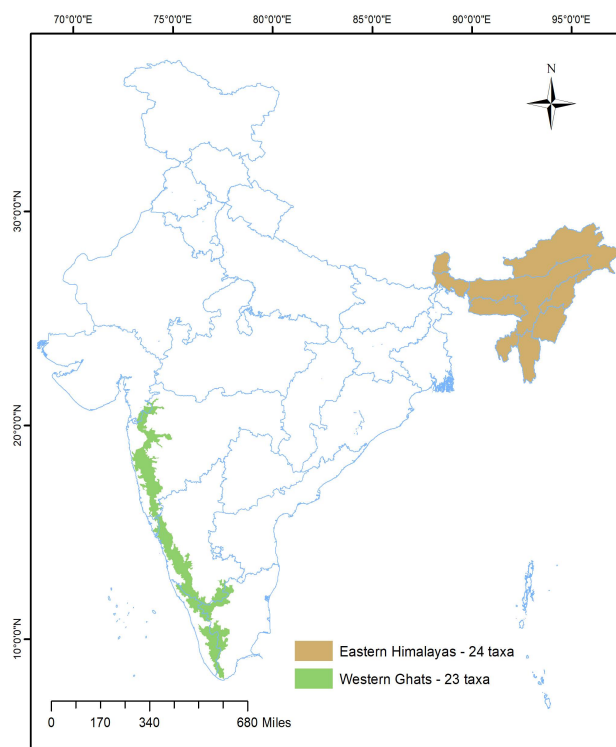


Fig. 1. Map of India showing Eastern Himalayas and the Western Ghats with the number of taxa of *Cinnamomum* found.

all the Indian provinces, Kerala in Peninsular India records the largest number of taxa 24 taxa and may be considered as hotspot area for this genus, which is followed by Tamil Nadu with 18 taxa. Assam records the highest number of taxa, fifteen, in the Eastern Himalayas. As noted by the majority of workers on the affinity of Indian flora with Chinese elements, this genus has 13 species common to China. The circumscription of some species in sect. *Malabathrum* needs to be addressed in a more detailed way as this genus is highly polymorphic. Also, some of the taxa are lacking later collections. Hence, a thorough revision of the genus in India is considered necessary.

## Taxonomic Treatment

### CINNAMOMUM

Schaeff., Bot. Exped. 74. 1760, *nom. cons.*

1. *Cinnamomum agasthyamalayanum* Robi, Sujanalpal & Udayan in Int. J. Adv. Res. 2(10): 1012. 2014.

Trees c. 8 m high. Leaves 7–14 × 2–5 cm lanceolate to elliptic-lanceolate, base acute, apex attenuate or subacuminate; petioles c. 1 cm long. Panicles 5–10 cm long. Flowers 1–1.2 cm long, greenish-yellow; pedicels c. 7 mm long. Fruits not known.

Description & Illustration (90)

Phenology:—Flowering and fruiting is observed from January to May.

Distribution:—India [Kerala]; 800–1000 m; endemic to the Western Ghats.

2. *Cinnamomum aromaticum* Nees in Wall., Pl. Asiat. Rar. 2: 74. 1831.

Trees. Leaves narrowly elliptic to sublanceolate, 8–16 × 4–5.5 cm; petiole, 1.2–2 cm long. Panicle 8–16 cm long. Flowers white, c. 4.5 mm long; pedicels 3–6 mm, yellowish-brown tomentellous. Fruits ellipsoid, c. 10 × 7–8 mm.

Description & Illustration (46)

Phenology:—Flowering and fruiting is recorded from June to December.

Distribution:—India [Cultivated], Bangladesh, Cambodia, Guatemala, Hainan, Honduras, Indonesia, Laos, Malaysia, Myanmar, Sumatera, Taiwan, Thailand, Trinidad-Tobago, Vietnam. A native of China.

3. *Cinnamomum asomicum* S.C. Nath & Baruah in J. Econ. Taxon. Bot. 33(3): 711. 2009. *C. assamicum* S.C. Nath & Baruah in J. Econ. Taxon. Bot. 25(1): 29. 2001., *auct. non* Lukman., 1889.

Trees, 6–8 m high. Leaves elliptic to oblong-lanceolate, 6.5–14 × 2.5–5.5 cm; apex acute to acuminate, base acute to obtuse; petioles 0.5–1.3 cm long. Panicles 2–8 cm long. Flowers 4–5 mm long; pedicels 1–1.5 mm long. Fruits not known.

Description & Illustration (78)

Phenology:—Flowering is recorded from February to April.

Distribution:—India [Assam]; endemic.

4. *Cinnamomum bejolghota* (Buch.-Ham.) Sweet, Hort. Brit. 344. 1826. *Laurus bejolghota* Buch.-Ham., Trans. Linn. Soc. London 13(2): 559. 1822.

*Cinnamomum sikkimense* Lukman., Nomencl. Icon. Cannel. 12. 1889.

Trees, 5–25 m high. Leaves elliptic-oblong, 12–30 × 4–9 cm, base subrounded or attenuate, apex obtuse, acute, or acuminate; petioles 1–1.5 cm long. Panicles 13–16 cm long; peduncles 7–11 cm. Flowers yellow, c. 6 mm; pedicels 4–6 mm long. Fruits ellipsoid, c. 1.3 × 0.8 cm.

Description & Illustration (46)

Phenology:—Flowering and fruiting is recorded from March to July.

Distribution:—India [Andaman Islands, Arunachal Pradesh, Assam, Himachal Pradesh, Madhya Pradesh, Meghalaya, Nicobar Islands, Orissa, Punjab, Sikkim, West Bengal, Tamil Nadu (cultivated), Tripura], Bangladesh, Bhutan, Cambodia, China, Laos, Myanmar, Nepal, Thailand, Vietnam; 600–1800 m. IUCN Red List Category:—Least Concern (95).

5. *Cinnamomum bejolghota* var. *jarainum* Baruah & S.C. Nath in Nordic J. Bot. 21(6): 572. 2002.

Trees, 6–8 m high. Leaves narrowly oblong to oblong-elliptic-lanceolate or ovate-lanceolate, 4.5–14 × 1.8–5 cm, base cuneate to the decurrently acute, apex obtusely acute to rarely acute. Panicles c. 13.5 cm long; peduncles 7–11 cm. Flowers yellowish-green, 5–6 mm long. Fruits not known.

Description & Illustration (79)

Phenology:—Flowering is recorded from March to May.

Distribution:—India [Meghalaya]; c. 390 m; endemic.

6. *Cinnamomum bhaskarii* M. Gangop. in Bull. Bot. Surv. India 48(1–4): 106. 2006.

Trees. Leaves ovate, rarely ovate-oblong, 15–19 × 4.2–7 cm, obtuse and then cuneate at base, subacuminate at apex; petioles 8–12 mm long. Panicles axillary, 9.5–11 cm long; peduncles 5–5.5 cm long. Flowers c. 11.5 × 5.5 mm; pedicels 6–7 mm long. Fruits not known.

Description & Illustration (82)

Phenology:—Flowering is recorded in April.

Distribution:—India [Arunachal Pradesh]; endemic.

7. *Cinnamomum bishnupadae* M. Gangop. in Bull. Bot. Surv. India 48(1–4): 108. 2006.

Trees, c. 13 m high. Leaves usually narrow-oblong, sometimes narrow ovate-oblong, 12–16 × 2–3.5 cm glabrous, equally or subequally acute to obtuse at base, slightly decurrent at the extreme base, acuminate at apex; petiole 8–15 mm long. Panicles axillary, 7–18 cm long; peduncles 4–7.3 cm long. Flowers greenish-yellow, c. 7.5 × 2.6 mm; pedicels c. 4 mm long. Fruits not known.

Description & Illustration (82)

Phenology:—Flowering is recorded in March.

Distribution:—India [Meghalaya]; c. 1500 m; endemic.

8. *Cinnamomum blandfordii* M. Gangop. in Bull. Bot. Surv. India 48(1–4): 110. 2006.

Trees, 10–20 m high. Leaves obovate, c. 11 × 4 cm, unequally acute to cuneate or acute to obtuse or obtuse to cuneate at base, decurrent to extreme base, acuminate at apex; petioles c. 25 mm long. Panicles 5–8 cm long; peduncles 3–4 cm long. Flowers greenish-white, c. 8.5 × 4.5 mm; pedicels c. 4 mm long. Fruits not known.

Description & Illustration (82)

Phenology:—Flowering is recorded from March.

Distribution:—India [Arunachal Pradesh]; Myanmar; c. 180 m.

9. *Cinnamomum burmannii* (Nees & T. Nees) Blume, Bijdr. Fl. Ned. Ind. 569. 1826. *Laurus burmannii* Nees & T. Nees, Cinnam. Disp. 57 (-58; t. 4). 1823.

*Cinnamomum chinense* Blume, Bijdr. Fl. Ned. Ind. 569. 1826.

Trees, c. 14 m high. Leaves ovate or oblong to lanceolate, 5.5–10.5 × 2–5 cm, base broadly cuneate, apex shortly acuminate; petioles 0.5–1.2 cm long. Panicles 2–6 cm long. Flowers greenish-white, c. 5 mm long; pedicels 4–6 mm long. Fruits ellipsoid, c. 8 × 5 mm.

Description & Illustration (46)

Phenology:—Flowering and fruiting is recorded from March to November.

Distribution:—India [West Bengal—introduced], China, Indonesia, Myanmar, Philippines, Vietnam; 100–1400 m (2100 m in China).

10. *Cinnamomum camphora* (L.) J. Presl, Prir. Rostlin, 2: 47. t. 8. 1825. *Laurus camphora* L. Sp. Pl. 1: 369. 1753.

Trees c. 10 m high. Leaves ovate, 4.5–7.5 × 2.5–4.6 cm, pitted at nerve axils, base acute, apex shortly acuminate; petioles c. 25 mm. Flowers c. 2.5 mm across. Fruits globose, c. 7 mm in diam.

**Description & Illustration (46)**

Phenology:—Flowering and fruiting is observed from February to December.

Distribution:—India [Andhra Pradesh, Andaman Islands, Assam, Karnataka, Kerala, Nicobar Islands, Maharashtra, Tamil Nadu, Tripura, West Bengal—widely cultivated], China, Japan (Native), Korea, Vietnam and widely cultivated all over the world.

11. *Cinnamomum champokianum* Barua & S.C. Nath in Nordic J. Bot. 25: 281. Sep., 2008 [and in J. Econ. Taxon. Bot. 32(3): 526. Oct., 2008].

Trees, 6–7 m high. Leaves narrowly elliptic-obovate-lanceolate, rarely broadly elliptic-lanceolate, 8.5–25 × 4–9 cm, base cuneately acute to rarely obtuse or rounded, apex obtusely acute to shortly acuminate; petioles 0.7–1.5 cm long. Panicles c. 25 cm long. Flowers 6–7 mm long, pale yellow; pedicels 3–4 mm long. Fruits c. 1 cm long, ellipsoid to oblong.

**Description & Illustration (80)**

Phenology:—Flowering and fruiting is recorded from March to September.

Distribution:—India [Assam]; c. 83 m; endemic.

IUCN Red List Category:—Critically Endangered (96).

12. *Cinnamomum chemungianum* M.Mohanan & A.N.Henry in J. Bombay Nat. Hist. Soc. 88: 97. 1991.

Shrubs, 3–4 m high. Leaves ovate, 3–7 × 2–4 cm, rounded at base, caudate-acuminate at apex; petioles stout, 0.6–1 cm long. Panicles much reduced; peduncle 1.5–2 cm long, reddish. Flowers 1–1.2 cm long, dark red; pedicels 4–6 mm long. Fruits ellipsoid, c. 1.4 × 1 cm.

**Description & Illustration (77)**

Phenology:—Flowering and fruiting is observed from August to April.

Distribution:—India [Kerala, Tamil Nadu]; 800–1100 m; endemic to the Western Ghats.

IUCN Red List Category:—Critically Endangered (97).

13. *Cinnamomum curvifolium* (Lour.) Nees, Syst. Laur. 80. 1836. *Laurus curvifolia* Lour., Fl. Cochinch. 252. 1790.

Trees, 3–14 m high. Leaves ovate or ovate-lanceolate, 3.5–6.5 × 1.2–2.5 cm, base broadly cuneate to subrounded, apex shortly acuminate; petioles c. 12 mm. Panicle corymbose, 2.5–5 cm long; peduncle 1.5–4 cm long. Flowers yellow-white, 4–5 mm long; pedicels 5–7 mm long. Fruits ellipsoid, c. 11 × 5–5.5 mm.

**Description & Illustration (46)**

Phenology:—Flowering and fruiting is recorded from March to October.

Distribution:—India [Assam, Meghalaya], China, Nepal; 400–1800(–2200) m.

14. *Cinnamomum dubium* Nees in Wall., Pl. Asiat. Rar. 2: 73. 1831; Geethakum. et al. in Ind. J. For. 30(1): 73. *Laurus dubia* (Nees) Wall., Numer. List No. 2571. 1830.

*Cinnamomum multiflorum* (Roxb.) Wight, Icon. Pl. Ind. Orient. 1: t. 131. 1839. *Laurus multiflora* Roxb. [Hort. Bengal. 89. 1814, nom. inval.], Fl. Ind., ed. Carey 2: 298. 1832.

*Cinnamomum thwaitesii* Lukman., Nomencl. Icon. Cannel. 14. 1889.

*Cinnamomum villosum* Wight, Icon. Pl. Ind. Orient. 1: t. 127. 1839.

Trees, c. 15 m high. Leaves ovate or ovate-lanceolate, 1.8–8.5 × 1.3–3.5 cm, base acute to rounded, apex acute or gradually acuminate; petioles c. 0.7 cm long. Flowers dark pink; pedicels c. 7 mm long. Fruits ellipsoid, 9–1.3 × 6–10 mm.

**Description & Illustration (41)**

Phenology:—Flowering and fruiting is observed from October to April.

Distribution:—India [Kerala, Tamil Nadu], Sri Lanka, Myanmar; 750–1500 m.

IUCN Red List Category:—Least Concern (98).

15. *Cinnamomum filipedicellatum* Kosterm. in Bull. Bot. Surv. India 25: 93. 1985.

*Cinnamomum gracile* Hook.f., Fl. Brit. India. 5: 133. 1886.

Small trees or shrubs, c. 4 m high. Leaves lanceolate to linear-lanceolate or sub-ovate, 1.7–13 × 0.5–5.7 cm; apex broadly obtusely acuminate; base cuneate to acute; petioles c. 12 mm long. Panicles axillary or pseudo-terminal. Flowers 2–2.5 mm long; pedicel filiform, c. 7 mm long. Fruits ellipsoid, c. 9 × 5 mm.

**Description & Illustration (73)**

Phenology:—Flowering and fruiting is observed from December to May.

Distribution:—India [Kerala, Tamil Nadu]; 950–1300 m; endemic to the Western Ghats.

IUCN Red List Category:—Endangered (99).

16. *Cinnamomum gamblei* Geethakum., Deepu & Pandur. in Phytotaxa 326 (4): 252. 2017. *Cinnamomum macrocarpum* auct. non Hook. f., 1889; Kosterm. in Bull. Bot. Surv. India 25 (1–4): 100. 1983.

Trees, 8–14 m high. Leaves ovate to broadly elliptic to lanceolate, 5–16.7 × 2.2–8.5 cm; base cuneate or obtuse, apex acute; petioles 1–1.8 cm long. Panicles terminal or from the axils of terminal leaves or extra-axillary; main peduncle thickened, 3–13.5 cm long. Flowers yellowish-green, 7–12 × 3–3.5 mm; pedicels 3–7 mm long. Fruits ellipsoid, c. 2.5 cm long.

**Description & Illustration (88)**

Phenology:—Flowering and fruiting is observed from March to October.

Distribution:—India [Kerala, Tamil Nadu]; 850–1300 m; endemic to the Western Ghats.

IUCN Red List Category:—Endangered (100).

17. *Cinnamomum glanduliferum* (Wall.) Meisn. in DC., Prodr. 15(1): 25. 1864. *Laurus glandulifera* Wall. in Act. Soc. Med. Phys. Calc. 1: 45. 1825.

Trees c. 20 m high. Leaves elliptic to ovate-elliptic or lanceolate, 6–15 × 4–6.5 cm; petiole 1.5–3 cm long. Panicles 4–10 cm long; peduncles 2–4 cm long. Flowers c. 3 mm long, yellowish; pedicels 1–2 mm long. Fruits black, globose, c. 1 cm in diam.

**Description & Illustration (46)**

Phenology:—Flowering and fruiting is recorded from March to September.

Distribution:—India [Assam, Meghalaya, Tripura], Bangladesh, Bhutan, China, Malaysia, Myanmar, Nepal, Tibet; 1500–2500 (–3000) m.

IUCN Red List Category:—Least Concern (101).

18. *Cinnamomum glaucescens* (Nees) Hand.-Mazz in Oesterr. Bot. Z. 85: 214. in obs. 1936. *Cecicodaphne glaucescens* Nees in Wall., Pl. Asiat. Rar. 2: 70. 1831.

*Cinnamomum cecicodaphne* Meisn. in DC., Prodr. 15(1): 25. 1864.

A medium to large-sized tree with spreading crown. Leaves alternate, elliptic-lanceolate or broadly elliptic, 5–10 × 2–5 cm. Panicles 4–6 cm long. Fruits ellipsoid or oblong, 1.5–3.0 cm long.

Description (75)

Phenology:—Flowering and fruiting is recorded from February to November.

Distribution:—India [Assam, Manipur, Sikkim, West Bengal], Bangladesh, Bhutan, Laos, Myanmar, Nepal, Vietnam.

19. *Cinnamomum goaense* Kosterm. in Bull. Bot. Surv. India 25: 94. 1985.

Trees, 6–9 m high. Leaves sub-ovate or ovate-oblong or ovate-lanceolate, 7–26 × 5.2–7.3 cm, acute at base, gradually acuminate at apex; petioles c. 1.6 cm long. Panicles axillary or pseudo-terminal, many-flowered; main peduncle slender, 8–18 cm long. Flowers pale yellow, 5–8 × c. 5 mm. Fruits ellipsoid, c. 10 × 6 mm.

Description & Illustration (73)

Phenology:—Flowering and fruiting is observed from March to September.

Distribution:—India [Karnataka, Kerala, Maharashtra]; c. 600 m; endemic to the Western Ghats.

IUCN Red List Category:—Endangered (102).

20. *Cinnamomum heyneanum* Nees in Wall., Pl. Asiat. Rar. 2:76. 1831.

*Cinnamomum burmanni* forma *heyneanum* (Nees) H.W. Li in Acta Phytotax. Sin. 16(2): 90. 1978.

*Cinnamomum linearifolium* Lecomte in Nouv. Arch. Mus. Hist. Nat. sér.5, 5: 79. 1913.

Trees, 5–7 m high. Leaves linear-oblong or linear-lanceolate, 9–13 × 1.2–2.5 cm, base attenuate-acute, apex attenuate-acuminate. Panicles c. 6.5 cm long; peduncle 4–5 cm long. Flowers c. 4 mm long; pedicels 1–5 cm long. Fruits ellipsoid, c. 12 × 7 mm.

Description & Illustration (73)

Phenology:—Flowering and fruiting is observed from November to March.

Distribution:—India [Karnataka, Kerala], China, Vietnam; 200–600 m.

IUCN Red List Category:—Endangered (103).

21. *Cinnamomum impressinervium* Meisn. in DC., Prodr. 15(1): 21. 1864.

*Cinnamomum albiflorum* Hook.f. & Thomson ex Meisn. in DC., Prodr. 15(1): 21. 1864.

*Cinnamomum cacharensense* R.Parker in Repert. Spec. Nov. Regni Veg. 31: 126. 1932.

Trees, c. 15 m high. Leaves opposite or sub-opposite; elliptic or ovate-elliptic, 8–20 × 3–5 cm, base cuneate,

apex acuminate; petioles 7–12 mm. Panicles 6–10 cm long, pubescent. Flowers whitish-yellow, 2–3 mm long; pedicels 3–4 mm long. Fruits ellipsoid, 10–12 mm long.

Description (75)

Phenology:—Flowering and fruiting is recorded from July to December.

Distribution:—India [Assam, West Bengal, Sikkim], Bangladesh, Bhutan, Myanmar, Nepal.

IUCN Red List Category:—Vulnerable (104).

22. *Cinnamomum iners* Reinw. ex Blume, Bijdr. Fl. Ned. Ind. 570. 1826.

*Cinnamomum eucalyptoides* Nees in Wall., Pl. Asiat. Rar. 2: 73. 1831.

*Cinnamomum rauwolfii* Blume in Rumphia 1: 36. 1836.

*Cinnamomum aromaticum* Zoll. in Syst. Verz. Ind. Archip. 2: 112. 1854, *nom. illeg.*

*Cinnamomum griffithii* Meisn. in DC., Prodr. 15(1): 19. 1864.

*Cinnamomum curtisii* Lukman., Nomencl. Icon. Cannel. 19. 1889.

*Camphora lanceolata* Lukman., Nomencl. Icon. Cannel. 22. 1889.

Trees, c. 20 m high. Leaves ovate or elliptic, 12–35 × 5.5–8.5 cm, base broadly cuneate to suborbicular, apex obtuse or emarginate; petioles 1–3 cm long. Panicles 6–26 cm long; peduncles 3–10 cm long. Flowers greenish, 4–5 mm long; pedicels 2.5–5 mm long. Fruits ovoid, 9–10 × c. 7 mm, apiculate.

Description & Illustration (46)

Phenology:—Flowering and fruiting is recorded from March to June.

Distribution:—India [Assam, Tripura], Bangladesh, Cambodia, China, Jawa, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Sumatra, Thailand, Tibet, Vietnam; 100–1000 m.

IUCN Red List Category:—Least Concern (105).

23. *Cinnamomum keralaense* Kosterm. in Bull. Bot. Surv. India 25: 98. 1983 (1985).

*Cinnamomum litseaefolium* auct. non Thwaites, 1861: Gamble, Fl. Madras 1224. 1925.

Trees, c. 10 m high. Leaves opposite and subopposite, elliptic to lanceolate-elliptic, base cuneately decurrent into the petiole, apex obtuse; petioles 1–1.8 cm. Panicle axillary and terminal, 7–11 cm long; peduncle 2–4.5 cm long. Flowers c. 1.2 cm long; pedicel 7 mm long. Fruits ellipsoid, c. 15 × 9 mm.

Description & Illustration (73)

Phenology:—Flowering and fruiting is observed from April to December.

Distribution:—India [Kerala, Tamil Nadu]; endemic to the Western Ghats.

IUCN Status:—Endangered (106).

24. *Cinnamomum litseaefolium* Thwaites, Enum. Pl. Zeyl. 253. 1861. (“litseaefolium”); Geethakum. *et al.* in Rheedeia 22(2). 2012.

*Cinnamomum willdenowii* Lukman., Nomencl. Icon. Cannel. 15. 1889.

Trees, c. 20 m high. Leaves opposite, ovate-oblong to ovate-lanceolate, 4–9 × 2–4 cm, base rounded or

subacute, apex blunt or subacute; petioles 1.2–1.8 cm long. Panicles 5.5–8 cm long; peduncle 1.7–3.5 cm long. Flowers greenish-white, c. 1.2 cm long; pedicels c. 5 mm long. Fruits ellipsoid, 0.8–2 cm long.

Description & Illustration (41)

Phenology:—Flowering and fruiting is observed from March to October.

Distribution:—India [Kerala, Tamil Nadu], Sri Lanka; c. 1100 m.

IUCN Red List Category:—Vulnerable (107).

25. *Cinnamomum lohitensis* M.Gangop. in Bull. Bot. Surv. India 48(1–4): 112. 2006.

Trees, c. 30 m high. Leaves oblong-lanceolate, oblong-elliptic or ovate, 13–18 × 3–4.3 cm, glabrous, base attenuate, apex appearing acuminate; petioles 10–15 mm long. Panicles pseudo-terminal, 6.5–8 cm long; peduncles 2.5–3 cm long. Flowers yellowish-green c. 7 × 3 mm; pedicels c. 4 mm long. Fruits not known.

Description & Illustration (82)

Phenology:—Flowering is recorded in March.

Distribution:—India [Arunachal Pradesh]; endemic.

26. *Cinnamomum macrocarpum* Hook.f., Fl. Brit. India 5: 133. 1886.

Trees 15–25 m high. Leaves linear to linear-lanceolate, 10–35 × 2–4.5 cm, base acute, apex acute to obtuse; petioles c. 2 cm long. Panicles 8–14 cm long; pedicel slender. Flowers 0.9–1 cm; pedicel c. 2.8 mm long. Fruits oblong; c. 1.6 cm long.

Description & Illustration (73)

Phenology:—Flowering and fruiting is observed from November to May.

Distribution:—India [Goa, Karnataka, Kerala, Maharashtra, Tamil Nadu], Myanmar; 600–1000 m.

IUCN Red List Category:—Vulnerable (108).

27. *Cinnamomum malabattrum* (Burm.f.) J.Presl, Prir. Rostlin 2: 46. 1825. *Laurus malabattrum* Burm.f., Fl. Indica 92. 1768.

*Laurus malabathrica* Roxb. [Hort. Bengal. 30. 1814, nom. inval.] Fl. Ind., ed. Carey 2: 297. 1832, orth. var. *Cinnamomum malabathricum* (Roxb.) Lukman., Nomencl. Icon. Cannel. 8. 1889.

*Cinnamomum nicolsonianum* Manilal & Shailaja in Bull. Bot. Surv. India 28: 111. 1988.

Trees, c. 20 m high. Leave elliptic to oblong to sub-ovate elliptic, c. 30 × 5–8.5 cm, base acute to shortly attenuate, apex acute to shortly attenuate or caudate acuminate; petioles c. 1.5–2 cm long. Panicles c. 20 cm long. Flowers yellowish-green, 1–1.2 cm long; pedicels 3–5 mm long. Fruits ellipsoid, c. 1 cm long.

Description & Illustration (73)

Phenology:—Flowering and fruiting is observed from September to April.

Distribution:—India [Karnataka, Kerala, Tamil Nadu]; endemic.

IUCN Red List Category:—Least Concern (109).

28. *Cinnamomum mathewianum* Remya Kr., E.S.S. Kumar, Radhamany, Valsalad. & R. Jagad. in Int. J. Advanced Res. 2(7): 29. 2014.

Trees, c. 5 m high. Leaves ovate-elliptic, 11–15.5 × 4.5–6.2 cm, base acute or obtuse, margin undulate, apex gradually acuminate; petioles c. 1.5 cm long. Panicles 4.5–9 cm long. Flowers maroon, pedicels 1–1.5 cm long, light green. Fruits bluish-black, ellipsoid, c. 1 cm long.

Description & Illustration (92)

Phenology:—Flowering and fruiting is observed from November to February.

Distribution:—India [Kerala]; 700–1000 m; endemic to the Western Ghats.

Note:—This species is given as a synonym of *Cinnamomum verum* J. Presl (94). However, this species differed from the later in its floral characters and Betel scented leaves and treated in this list as a distinct species.

29. *Cinnamomum mathewianum* var. *ponmudianum* Remya K.R., E.S.S. Kumar, Radhamany & Valsalad. in Int. J. Bot. Studies 1(3): 40. 2016.

Trees. Leaves ovate to lanceolate, 4–12 × 1.5–5.0 cm, with strong smell of betel leaves, rounded to cuneate at base, long acuminate to caudate at apex; petioles 0.7–1.5 cm long. Panicles 2.5–5 cm long, peduncles slender, 2.0–3 cm, pink. Flowers c. 2.5–3 mm long, dark maroon; pedicels to 4.5 mm long. Fruits ellipsoid, 15 × 11 mm.

Description & Illustration (93)

Phenology:—Flowering and fruiting is observed from January to March.

Distribution:—India [Kerala]; c.700 m; endemic to the Western Ghats.

30. *Cinnamomum mohanianum* Gangapr., S.P.Mathew & R.Jagad. in Int. J. Advanced Res. 2(9): 611–612. 2014. (“mohanensis”).

Erect shrubs or small trees, c. 4 m high. Leaves 2–9 × 1–4 cm, ovate to lanceolate to elliptic, acuminate at apex, obtuse to cuneate at base, petioles 2–6 mm long. Panicles axillary or extra-axillary, 4–10 flowered; pedicels c. 4 cm long. Fruits oblong ovoid, 8–10 × 6–7 mm.

Description & Illustration (89)

Phenology:—Flowering and fruiting is observed from April to August.

Distribution:—India [Kerala]; c. 20 m; endemic.

31. *Cinnamomum nilagiricum* Geethakum., Pandur. & Deepu in Phytotaxa 224(3): 283. 2015.

Trees, 8–12 m high. Leaves ovate to elliptic to lanceolate, 7.5–12.5 × 2.6–4.3 cm; base shortly attenuate, apex acute to long acuminate to caudate; petioles 0.5–1.0 cm long. Panicles terminal or from the axils of terminal leaves or extra axillary; peduncle 3.5–7 cm long. Flowers greenish-white, 9–12 mm long; pedicels 4–5 mm long. Fruits ellipsoid, c. 8 mm long.

Description & Illustration (87)

Phenology:—Flowering and fruiting is observed from November to March.

Distribution:—India [Kerala, Tamil Nadu]; 100–1000 m; endemic to the Western Ghats.

32. *Cinnamomum ovalifolium* Wight, Icon. Pl. Ind. Orient. 1: t. 125. 1839; Robi *et al.* in Nelumbo 60(2): 111. 2018.

Trees, c. 12 m high. Leaves broadly ovate or orbicular, 4–8 × 1.5–3.5 cm, base acute, apex obtuse; petioles 6–10 mm long. Panicles c. 4 cm long, axillary, near apex of the branches. Flowers white; pedicels 1–2 mm long. Fruits ovoid or ellipsoid, c. 10 mm long.

Description & Illustration (41)

Phenology:—Flowering is reported during May.

Distribution:—India [Kerala], Sri Lanka; c. 1500 m.

33. *Cinnamomum parthenoxylon* (Jack) Meisn. in DC., Prodr. 15(1): 26. 1864. *Laurus parthenoxylon* Jack in Malayan Misc. 1(5): 28. 1820. *Camphora parthenoxylon* (Jack) Nees in Wall., Pl. Asiat. Rar. 2: 72. 1831.

*Laurus porrecta* Roxb. [Hort. Bengal. 30. 1814., *nom. nud.*] Fl. Ind., ed. Carey 2: 308. 1832. *Cinnamomum porrectum* (Roxb.) Kosterm., J. Sci. Res. (Jakarta) 1: 27. 1952.

Trees, c. 50 m tall. Leaves elliptic to elliptic-ovate or elliptic-obovate, 4–17 × 2–8 cm, base cuneate, apex acute to acuminate; petioles 1.5–3 cm long. Panicles 2.5–10 cm long; peduncles 3–5.5 cm long. Flowers cream to green-yellow, c. 3 mm long. Fruits globose, 4.5–8.5 mm diam.

Description & Illustration (46)

Phenology:—Flowering and fruiting is recorded from March to October.

Distribution:—India [Assam], Borneo, Cambodia, China, Bhutan, Indonesia, Jawa, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sumatera, Thailand, Vietnam; below 2000 m.

IUCN Red List Category:—Least concern (110).

34. *Cinnamomum perrottetii* Meisn. in DC. Prodr. 15(1): 22, 504. 1864. (“perrothetti”).

Trees c. 8 m high. Leaves ovate-elliptic to elliptic, 2.5–5.5 × 4–6 cm, base acute to rounded, shortly acuminate, apex obtuse, young leaves both sides with a dense fulvous, woolly indumentum, petioles 1–3.5 cm long. Panicles in the axils of upper leaves, 2–10 cm long; peduncle stout. Flowers c. 7 mm long; pedicels 2–3 mm long. Fruits ellipsoid, bluish-black.

Description & Illustration (73)

Phenology:—Flowering and fruiting is observed from March to September.

Distribution:—India [Kerala, Tamil Nadu]; 1600–2100 m; endemic.

IUCN Red List Category:—Endangered (111).

35. *Cinnamomum riparium* Gamble in Bull. Misc. Inform. Kew 1925: 128. 1925.

Trees, c. 6 m high. Leaves lanceolate to linear-lanceolate, 3–7 × 1–2 cm, base acute, both ends tapered; petioles 8–10 mm long. Panicles c. 8 cm long; peduncle slender. Flowers c. 5 mm long; pedicel 5–8 mm long. Fruits ovoid, 0.5–0.7 cm long.

Description & Illustration (73)

Phenology:—Flowering and fruiting is observed from December to March.

Distribution:—India [Karnataka, Kerala, Tamil Nadu]; 250–1400 m; endemic to the Western Ghats.

IUCN Red List Category:—Endangered (112).

36. *Cinnamomum sanjappae* M.Gangop. in Bull. Bot. Surv. India 48(1–4): 114. 2006.

Trees. Leaves broad ovate, 18–23 × 7.7–8.5 cm, base acute, slightly decurrent to extreme base; petioles 15–20 mm long. Panicles terminal, 3.8–8.5 cm long; peduncle 2–3.5 cm long. Flowers c. 9 × 6 mm; pedicels 4.5–5 mm long. Fruits not known.

Description & Illustration (82)

Phenology:—Flowering is recorded in April.

Distribution:—India [Arunachal Pradesh]; endemic.

37. *Cinnamomum sulphuratum* Nees in Wall., Pl. Asiat. Rar. 2: 74. 1831.

Trees, c. 10 m tall. Leaves ovate-elliptic to lanceolate-elliptic to elliptic, 4–13 × 3.2–5.5 cm, base cuneate to obtuse, apex shortly tapered to shortly obtusely acuminate; petioles c. 1.2 cm long. Panicles c. 15 cm long, lax, densely, minutely fulvous sub-tomentellous. Flowers 7–8 mm long; pedicels, c. 5 mm long. Fruits ellipsoid, c. 1.5 × 1 cm.

Description & Illustration (73)

Phenology:—Flowering and fruiting is observed from January to October.

Distribution:—India [Assam, Karnataka, Kerala, Meghalaya, Tamil Nadu], Myanmar; 700–2000 m.

IUCN Red List Category:—Vulnerable (113).

38. *Cinnamomum suvrae* M.Gangop. in Bull. Bot. Surv. India 48(1–4): 116. 2006.

Branchlets terete, lenticellate. Leaves elliptic, obovate-elliptic or oblong-elliptic, 7–12 × 2.8–3.5 cm, base acute or acuminate, apex acuminate; petioles 10–15 mm long. Panicles pseudo-terminal, 3–6 cm long; peduncles 1.5–2 cm long. Flowers c. 6 × 3.2 mm; pedicels c. 2 × 1 mm. Fruits not known.

Description & Illustration (82)

Distribution:—India [Meghalaya]; endemic.

39. *Cinnamomum tamala* (Buch.-Ham.) T. Nees & Eberm. Handb. Med.-Pharm. Bot. 2: 426. 1831. *Laurus tamala* Buch.-Ham. in Trans. Linn. Soc. London 13(2): 555. 1822.

*Cinnamomum tamala* var. *elliptifolium* Baruah & S.C.Nath in Nordic J. Bot. 26: 203. 2008.

Trees, c. 20 m tall. Leaves ovate, oblong, or lanceolate, 10–15 × 2.5–6 cm, base acute or broadly cuneate, apex acuminate; petioles 7–13 mm long. Panicles 5–10 cm long; peduncles 1–4 cm. Flowers greenish-white, c. 6 mm long; pedicels 4–6 mm long. Fruits ellipsoid, 10–14 mm long.

Description & Illustration (46)

Phenology:—Flowering and fruiting is recorded from April to August.

Distribution:—India [Assam, Arunachal Pradesh, Meghalaya, Tripura, West Bengal], Bangladesh, Bhutan, China, Laos, Myanmar, Nepal, Vietnam; 1100–2000 m.

IUCN Red List Category:—Least concern (114).

40. *Cinnamomum tazia* (Buch.-Ham.) Kosterm. ex M.Gangop. in Nelumbo 53: 214. 2011. *Laurus tazia* Buch.-Ham., Trans. Linn. Soc. London 13(2): 557. 1822.

*Cinnamomum pauciflorum* Nees in Wallich, Pl. Asiat. Rar. 2: 75. 1831.

*Cinnamomum pauciflorum* Nees var. *tazia* (Buch.-Ham.) Meisn. in DC., Prodr. 15(1): 17,503. 1864.

*Cinnamomum pauciflorum* Nees var.  $\beta$  Nees in Wallich, Pl. Asiat. Rar. 2: 75. 1831.

Shrubs or small trees c. 4 m high. Leaves opposite, elliptic-lanceolate to broadly elliptic, 5–10 × 2.5–5 cm, base cuneate, apex acute; petioles 0.5–1 cm long. Panicles 4–6 cm long. Flowers yellow, 3–5 mm across. Fruits ellipsoid or oblong, 1.5–3 cm long, red.

#### Description (70)

Phenology:—Flowering and fruiting is recorded from March to October.

Distribution:—India [Assam, Meghalaya, Mizoram], Bangladesh, China, Myanmar, Nepal; 1000–1700 m.

41. *Cinnamomum tenuipile* Kosterm. in Reinwardtia 8(1): 74. 1970.

*Alseodaphne mollis* W. W. Smith in Notes Roy. Bot. Gard. Edinburgh 13: 153. 1921.

Trees, c. 16 m high. Leaves alternate, obovate or sub-elliptic, 7.5–13.5 × 4.5–7 cm, lateral veins 6 or 7 pairs, base broadly cuneate or subrounded, apex rounded or obtuse or shortly acuminate; petioles 1–1.5 cm long. Panicles 4.5–8.5(–12) cm long; peduncles c. 3 cm long, densely grey tomentose. Flowers yellowish, c. 3 mm long; pedicels 3–5 mm long. Fruits subglobose, c. 1.5 cm in diam., red-purple when mature.

#### Description & Illustration (46)

Phenology:—Flowering and fruiting is recorded from February to October.

Distribution:—India [Assam], China, Nepal, Thailand, Vietnam; 500–2100 m.

42. *Cinnamomum travancoricum* Gamble in Bull. Misc. Inform. Kew 1925: 128. 1925.

Trees, 5–6 m high. Leaves ovate or broadly ovate, elliptic or subovate-elliptic, 7.5–12 × 3–6.5 cm, base acute, apex acute or shortly acuminate; petioles c. 1.5 cm long. Panicles 3–9 cm long; peduncles slender. Flowers 3–5; pedicels c. 2 mm long. Fruits not known.

#### Description & Illustration (73)

Phenology:—Flowering is observed from January to March.

Distribution:—India [Karnataka, Kerala, Tamil Nadu]; c. 1200 m; endemic.

IUCN Red List Category:—Critically Endangered (115).

43. *Cinnamomum verum* J. Presl, Prir. Rostlin 2: 36. t. 7. 1825. *Laurus cinnamomum* L., Sp. Pl. 1: 369. 1753.

*Cinnamomum zeylanicum* Blume, Bijdr. Fl. Ned. Ind. 568. 1826.

Trees, c. 8 m high. Leaves elliptic or oblong or ovate or ovate-lanceolate, 4–13 × 2.2–6.8 cm, acute to shortly acuminate, base acute or rounded; petioles stout, c. 1–1.8 cm long. Panicles c. 18 cm long. Flowers yellowish-green or greenish-white, c. 1.2 cm long. Fruits ellipsoid or oblong-ovoid, c. 16 mm long.

#### Description & Illustration (41)

Phenology:—Flowering and fruiting is observed from December to June.

Distribution:—India [Widely cultivated], Brazil, Cambodia, China, Fiji, Myanmar, Philippines, Seychelles, Taiwan, Tanzania, Vietnam; also cultivated in many other countries in Asia, Native to Sri Lanka.

44. *Cinnamomum walaiwarensense* Kosterm. in Bull. Bot. Surv. India 25: 119. 1985.

Trees, c. 12 m high. Leaves ovate to oblong-lanceolate or elliptic, c. 18 × 8 cm, base acute, apex acuminate; petioles c. 1.5 cm long. Panicles axillary, c. 10 cm long. Flowers c. 5 mm long; pedicels c. 4 mm long. Fruits ellipsoid.

#### Description & Illustration (73)

Phenology:—Flowering and fruiting is observed from March to September.

Distribution:—India [Kerala, Tamil Nadu]; 800–1000 m; endemic to the Western Ghats.

IUCN Red List Category:—Critically Endangered (116).

45. *Cinnamomum wightii* Meisn. in DC., Prodr. 15(1): 11. 1864.

*Cinnamomum ovalifolium* Gardner ex Meisn. in DC., Prodr. 15(1): 11 1864, *auct. non* Wight, 1839.

Trees, c. 8 m high. Leaves broadly elliptic, elliptic to ovate, rarely sub-obovate, 2.5–7.5 × 2–3.5 cm, base conspicuously cuneate, apex obtusely shortly acuminate; petioles 1–2 cm long. Panicles 6–14 cm long; peduncles stout. Flowers 5 mm long; pedicel c. 5 mm long. Fruits ellipsoid; c. 1.5 × 1 cm.

#### Description & Illustration (73)

Phenology:—Flowering and fruiting is observed from October to May.

Distribution:—India [Karnataka, Kerala, Tamil Nadu]. 1500–2200 m; endemic.

IUCN Red List Category:—Endangered (117).

## Acknowledgements

The authors are grateful to the Director, Jawaharlal Nehru Tropical Botanic Garden and Research Institute for facilities and constant encouragement. Authors extend their gratitude to the authorities of herbaria—BO, E, G, GZU, K, L, LE, MEL, MO, P, S and CALI, HIFP, KFRI, MH, MSSRF, RHT, SUK, TBGT, UCT for providing access to herbarium specimens or images. The second author, thanks DST-SERB (PDF/2016/000371) for the financial assistance. The State Forest Authorities of Goa, Karnataka, Kerala, Maharashtra and Tamil Nadu are duly acknowledged for giving permission to conduct field studies.

## Authors' contributions

MPG and DS carried out the study. AGP conceived the study and participated in its design and coordination. All authors read and approved the final manuscript.

## Conflict of interests

Authors do not have any conflict of interest to declare.



## References

- Lauraceae [Internet]. Lauraceae Working Group [cited 2020 September 26]. Available from: <http://lauraceae.myspecies.info/>
- Mabberley DJ. Mabberley's Plant-Book: A portable dictionary of plants, their classification and uses. Fourth Edition, Cambridge University Press; 2017. <https://doi.org/10.1017/9781316335581>
- Van der Werff H. An annotated key to the genera of Lauraceae in the Flora Malesiana region. *Blumea*. 2001;46:125-40.
- Rohwer JG. Lauraceae. In: Kubitzki K, Rohwer JG, Bittrich V, editors. *The Families and Genera of Vascular Plants*, vol. 2. Springer Verlag, Berlin, 1993; pp. 366-91. [https://doi.org/10.1007/978-3-662-02899-5\\_46](https://doi.org/10.1007/978-3-662-02899-5_46)
- Wijesekera ROB, Punnuchamy S, Jayewardene AI, editors. *Cinnamon*. Colombo, Sri Lanka: Ceylon Institute of Scientific and Industrial Research; 1975.
- Farrell KT. *Spices, Condiments and Seasonings*. USA: The AVI Pub. Co.; 1985.
- Loi DT. *Medicinal Plants and Medicinal Taste of Vietnam*. Hanoi: Science and Technological Publishing House; 1996.
- Ravindran PN, Nirmal-Babu K, Shylaja M, editors. *Cinnamon and Cassia: The Genus Cinnamomum*. CRC Press; 2003. <https://doi.org/10.1201/9780203590874>
- Kostermans AJGH. A monograph of the genus *Cinnamomum* Schaeff. (Lauraceae) I. *Gingkoana*. 1986;6:1-171.
- Lin P. 1965. On the characteristics of vegetation of the Nanling Mountains and its position in the vegetation zonation of China. *Acta Phytocol Geobot Sinica* 1965;3:50-74.
- Kira T. Forest ecosystems of east and southeast Asia in a global perspective. *Ecol Res*. 1991;6:185-90. <https://doi.org/10.1007/BF02347161>
- Wang XH, Kent M, Fang XF, editor. Evergreen broad-leaved forest in Eastern China: its ecology and conservation and the importance of resprouting in forest restoration. *Forest Ecol Manage*. 2007;245:76-87. <https://doi.org/10.1016/j.foreco.2007.03.043>
- Guo SX. Late Cretaceous and Early Tertiary floras from the southern Guangdong and Guangxi with their stratigraphic significance. *Institute of Vertebrate Paleontology and Paleoanthropology and Nanjing Institute of Geology and Palaeontology*. Academia Sinica (eds.), *Mesozoic and Cenozoic Red Beds of South China*. Beijing, China: Science Press; 1979. p. 223-31 (in Chinese).
- Coiffard C, Gomez B, Nel A, Kvac̆ek J, Néraudeau D, Thévenard F, editors. Application of the Wagner's Parsimony Method in fossil plant assemblages from the Cretaceous of Europe. *Rev Palaeobot Palyno* 2008;148:1-12. <https://doi.org/10.1016/j.revpalbo.2007.08.002>
- Berry EW. The Flora of the Frontier Formation. *U S Geol Surv Prof Pap* 1929;158:129-35.
- Bell WA. Flora of the Upper Cretaceous Nanaimo Group of Vancouver Island, British Columbia. *Mines and Geology Branch: Bureau of Geology and Topography; Geological Survey; Memoir. Tafelbd*. Department of Mines and Technical Surveys. 1957. <https://doi.org/10.4095/101457>
- Bell WA. Upper Cretaceous Floras of the Dunvegan, Bad Heart, and Milk River Formations of Western Canada. *R Duhamel*. 1963. <https://doi.org/10.4095/100613>
- Lozinsky RP, Hunt AP, Wolberg DL, Lucas SG, editors. Late Cretaceous (Lancian) dinosaurs from the McRae Formation, Sierra County, New Mexico. *New Mex Geol*. 1984;6:72-77.
- Crabtree DR. Angiosperms of the Northern Rocky Mountains: Albian to Campanian (Cretaceous) megafossil floras. *Ann Missouri Bot Gard*. 1987;74:707-47. <https://doi.org/10.2307/2399448>
- Van Boskirk MC. The Flora of the Eagle Formation and its Significance for Late Cretaceous Floristic Evolution. *Yale University*, 1998; pp. 1-382.
- Johnson KR. Megafloora of the Hell Creek and Lower Fort Union Formations in the Western Dakotas: Vegetational Response to Climate Change, the Cretaceous-Tertiary Boundary Event, and Rapid Marine Transgression. *Geological Society of America Special Papers*. 2002;361:329-91. <https://doi.org/10.1130/0-8137-2361-2.329>
- von Ettingshausen CB. II. – A contribution to the Tertiary flora of Australia. *Geol. Mag.* 1883;10:153-57. <https://doi.org/10.1017/S001675680016604X>
- von Ettingshausen CB. Beiträge zur Kenntniss der Tertiärfloora Australiens, Zweite Folge. *Denkschr Math-Naturwiss Cl Kaiserl Akad Wiss Wien* 1887;53:81-142.
- von Ettingshausen C.B. Beiträge zur Kenntniss der fossilen Flora Neuseelands. *Denkschr Math.-Naturwiss. Cl Kaiserl Akad Wiss Wien* 1887;53:143-94.
- von Ettingshausen CB. Contributions to the knowledge of the fossil flora of New Zealand. *Trans NZ Inst*. 1891;23:237-49.
- Pole. Cretaceous macrofloras of eastern Otago, New Zealand: angiosperms. *Aust J Bot* 1992;40:16906. <https://doi.org/10.1071/BT9920169>
- Cantrill DJ, Wanntorp L, Drinnan AN, editors. Mesofossil flora from the Late Cretaceous of New Zealand. *Cretaceous Res* 2011;32:164-73. <https://doi.org/10.1016/j.cretres.2010.11.006>
- Huang J, Li L, van der Werff H, Li H, Rohwer JG, Crayn DM, Meng H, van der Merwe M, Conran JG, Li J, editors. Origins and evolution of cinnamon and camphor: A phylogenetic and historical biogeographical analysis of the *Cinnamomum* group (Lauraceae). *Molecular Phylogenetics and Evolution* 2016;96:33-44. <https://doi.org/10.1016/j.ympev.2015.12.007>
- Lorea-Hernández FG. A systematic revision of Neotropical species of *Cinnamomum* Schaeffer (Lauraceae). PhD [dissertation]. St. Louis: University of Missouri, 1996. Available from <https://biodiversitylibrary.org/bibliography/10824#/summary>.
- Blume CL. *Cinnamomum*. *Rumphia, sive, Commentationes botanicæ imprimis de plantis Indiæ Orientalis: tum penitus incognitis tum quæ in libris Rheedii, Rumphii, Roxburghii, Wallichii aliorum recensentur*. Lugduni Batavorum [Leiden, the Netherlands]: 1835; 1: 26-45. <https://doi.org/10.5962/bhl.title.51502>
- Meissner C. Lauraceae. In: de Candolle, A.P. (Ed.), *Prodromus Systematis Naturalis Regni Vegetabilis*, Paris: Masson et Fils 1864;25:1-260.
- Kostermans AJGH. The New World species of *Cinnamomum* Trew (Lauraceae). *Reinwardtia* 1961;6:17-24.
- Rohwer JG. Toward a phylogenetic classification of the Lauraceae: Evidence from matK sequences. *Syst Bot* 2000; 25: 60-71. <https://doi.org/10.2307/2666673>
- Chanderbali AS, Van der Werff H, Renner SS, editors. Phylogeny and historical biography of Lauraceae: Evidence from the chloroplast and nuclear genomes. *Ann Missouri Bot Gard*. 2001;88:104-34. <https://doi.org/10.2307/2666133>
- Groth K. Molecular systematic studies on the genus *Cinnamomum* Schaeffer (Lauraceae). Diploma thesis, Germany: University of Hamburg, Hamburg; 2003.
- Rohwer JG, Li J, Rudolph B, Schmidt SA, Van der Werff H, Li HW, editors. Is *Persea* (Lauraceae) monophyletic? Evidence from nuclear ribosomal ITS sequences. *Taxon* 2009;58:1153-67. <https://doi.org/10.1002/tax.584009>
- Rohde R, Rudolph B, Ruthe K, Lorea-Hernández FG, de Moraes PLR, Li J, et al. Neither *Phoebe* nor *Cinnamomum* – the tetrasporangiate species of *Aiouea* (Lauraceae). *Taxon* 2017;66(5):1085-11. <https://doi.org/10.12705/665.6>
- Clarke CB. Lauraceae. In: Hooker JD, editor. *The Flora of British India* vol. 5. London: Reeve & Co. London;1886. p.116-89.
- Long DG. Lauraceae. In: Grierson AJC, Long DG, editors. *Flora of Bhutan*. Vol. 1, Part 2. Edinburgh: Royal Botanic Garden; 1984. p. 250-81.
- Kostermans AJGH. Materials for a revision of Lauraceae V. *Reinwardtia*. 1988;10:439-69.

41. Kostermans AJGH. Lauraceae. In: Dassanayake MD, Fosberg FR, editors. A Revised Handbook to the Flora of Ceylon. Vol. 9. New Delhi: Amerind Publishing Co; 1995. p.105-71.
42. Govaerts R. World Checklist of Seed Plants. MIM, Deurne; 1999; 3(1, 2a & 2b): 1-1532.
43. Van der Werff H. Eight new species of Lauraceae from Ecuador, Peru and Panama. *Novon* 2009;19(4):534-48. <https://doi.org/10.3417/2008066>
44. Kress WJ, DeFilipps RA, Farr E, Kyi DYY. A Checklist of the Trees, Shrubs, Herbs and Climbers of Myanmar. *Contributions from the United States National Herbarium* 2003;45:1-590.
45. Ara H, Mia MMK, Khan B, editors. An Annotated Checklist of Lauraceae in Bangladesh. *Bangladesh J Plant Taxon.* 2007; 14(2):147-62. <https://doi.org/10.3329/bjpt.v14i2.533>
46. Li XW, Li HW, Van der Werff H. *Cinnamomum*. In: Wu ZY, Raven PH, Hong DY, editors. *Flora of China*. Volume 7. Beijing: Science Press and Missouri Botanical Garden Press, St. Louis. 2008;166-87.
47. Soh WK. Taxonomic revision of *Cinnamomum* (Lauraceae) in Borneo. *Blumea*. 2011;56:241-64. <https://doi.org/10.3767/000651911X615168>
48. de Kok RPJ. A revision of *Cinnamomum* Schaeff. (Lauraceae) for Peninsular Malaysia and Singapore. *Gardens' Bulletin Singapore*. 2019;71(1):89-139. [https://doi.org/10.26492/gbs71\(1\).2019-07](https://doi.org/10.26492/gbs71(1).2019-07)
49. Brandis D. Forest Flora of North-West and Central India: A Handbook of the indigenous trees and shrubs of those countries. London: Wm. H. Allen & Co; 1874.
50. Cooke T. The Flora of the Presidency of Bombay. Dehra Dun (India): Bishen Singh Mahendra Pal Singh;1908.
51. Gamble JS. Flora of the Presidency of Madras. Vol. 2. London: Adlard & Sons Ltd.;1921.
52. Kanjilal UN, Kanjilal PC, De RN, Das, A. 1940. Flora of Assam Vol. 4, Shillong: Govt. of Assam Publication;1940.
53. Gandhi KN. Lauraceae. In: Saldanha, CJ, Nicolson DH, editors. *Flora of Hassan District, Karnataka, India*. New Delhi: Amerind Publishing Co. Pvt. Ltd; 1976.
54. Fyson PF. The Flora of the South Indian Hill Stations. Vol.1. New Delhi: Today & Tomorrow's Printers and Publishers; 1977.
55. Haines HH. The Botany of Bihar and Orissa. Part 5-6. Dehra Dun (India): Bishen Singh Mahendra Pal Singh; 1978.
56. Saldanha CJ, Nicolson DH, editors. *Flora of Hassan District, Karnataka, India*. New Delhi: Amerind Publishing Co. Pvt. Ltd; 1978.
57. Prain D. Bengal Plants Vol. 2. Dehra Dun (India): Bishen Singh Mahendra Pal Singh;1981.
58. Deb DB. The Flora of Tripura State, Vol. I. New Delhi (India): Today and Tomorrow's Printers and Publishers;1981.
59. Rao RR, Razi BA, editors. A synoptic Flora of Mysore District with an Appendix of Unani, Ayurvedic and Trade name of Drugs. New Delhi: Today and Tomorrow's Printers and Publishers;1981.
60. Chandrasekharan V. Lauraceae. In: Henry AN, Kumari GK, Chithra V, editors. *Flora of Tamil Nadu, India. Series 1. Analysis. Vol 2*. Coimbatore: Botanical Survey of India; 1983.
61. Sharma BD, Singh NP, Raghavan RS, Deshpande UR, editors. *Flora of Karnataka Analysis*. Calcutta: Botanical Survey of India;1984.
62. Saldanha C, Ramesh BR. Lauraceae. In: Saldanha CJ. *Flora of Karnataka*. Vol. 1. Oxford & IBH Publishing Co;1984.
63. Rao RS. *Flora of India series 2. Flora of Goa, Diu, Daman, Dadra and Nagarhaveli*. Vol. 2. Howrah: Botanical Survey of India; 1986.
64. Vasudeva Rao MK. A preliminary report of the Angiosperms of Andaman-Nicobar Islands. *J Econ Tax Bot.* 1986;8(1):107-84.
65. Pullaiah T, Ali Moulali DA. *Flora of Andhra Pradesh Vol 2*. Jodhpur (India): Science Publishers; 1997.
66. Dagar JC, Singh NT, editors. *Plant Resources of the Andaman and Nicobar Islands*. Dehra Dun: Bishen Singh Mahendra Pal Singh;1999.
67. Londhe AN. Lauraceae. In: Singh NP, Lakshminarasiman P, Karthikeyan S, Prasanna PV, editors. *Flora of Maharashtra State. Dicotyledones. Vol. 2*. Howrah (India): Botanical Survey of India; 2001.p. 823-33.
68. Sasidharan N. Biodiversity Documentation for Kerala. Part 6: Flowering Plants. Peechi, Kerala (India): Kerala Forest Research Institute; 2004.
69. Nayar TS, Rasiya Beegam A, Mohanan N, Rajkumar G, editors. Flowering Plants of Kerala: A Handbook. Thiruvananthapuram (India): Tropical Botanic Garden and Research Institute; 2006.
70. Singh GP, Singh DK, Singh KP editors. *Flora of Mizoram*. Vol. 2. Kolkata: Botanical Survey of India; 2012.
71. Nayar TS, Rasiya Beegam A, Sibi M, editors. Flowering Plants of the Western Ghats India. Vol. 1. Dicots. Thiruvananthapuram (India): Jawaharlal Nehru Tropical Botanic Garden and Research Institute; 2014.
72. Krishnakumar N, Udayan PS, Subramani SP, Anandalakshmi R, editors. Flowering Plants of Sholas and Grasslands of the Nilgiris. Coimbatore: Institute of Forest Genetics and Tree Breeding; 2013.
73. Kostermans, AJGH. The South Indian Species of *Cinnamomum* Schaeffer (Lauraceae). *Bull Bot Surv India*. 1983;25:90-133.
74. Baruah A, Nath SC. A systematic census on the *Cinnamomum* Schaeffer (Lauraceae) members growing in North-East India. *J Econ Tax Bot.* 2005;29(2):294-27.
75. Choudhury D, Biswas R, Mandal P, Das AP. Diversity of *Cinnamomum* Schaeffer (Lauraceae) in Terai and Duars region of West Bengal, India. *Pleione*. 2013;7(2):441-48.
76. Manilal KS, Shylaja M. A new species of *Cinnamomum* Schaeffer (Lauraceae) from Malabar. *Bull Bot Surv India*. 1986;28(1-4):111-13.
77. Mohanan M, Henry AN. *Cinnamomum chemungianum* (Lauraceae)- a new species from Kerala, southern India. *J. Bombay Nat Hist Soc.* 1991;88(1):97-99.
78. Baruah A, Nath SC. *Cinnamomum assamicum* S. C. Nath and A. Baruah. A new species of *Cinnamomum* Schaeffer from north-eastern India. *J Econ Tax Bot.* 2001;25:27-32.
79. Baruah A, Nath SC. Taxonomic status and composition of stem bark oil of a variant of *Cinnamomum bejolghota* (Lauraceae) from Northeast India. *Nord J Bot.* 2002;21:571-76. <https://doi.org/10.1111/j.1756-1051.2001.tb00812.x>
80. Baruah A, Nath SC. *Cinnamomum champokianum* (Lauraceae) from Assam, north-eastern India. *Nord J Bot.* 2007;25: 281-85. <https://doi.org/10.1111/j.0107-055X.2007.00069.x>
81. Baruah A, Nath SC. A note on *Cinnamomum assamicum* Nath and Baruah (Lauraceae). *J Econ Tax Bot.* 2009;33(3):711 ref.1.
82. Gangopadhyay M. Notes on the family Lauraceae from India and its adjoining countries I. *Bull Bot Surv India* 2006;48(1-4):103-56.
83. Gangopadhyay M. Nine new taxa and a new combination in Lauraceae from India and Myanmar. *Bangladesh J Plant Taxon.* 2008;15(2):89-06. <https://doi.org/10.3329/bjpt.v15i2.1739>
84. Gangopadhyay M. Notes on the nomenclature of the family Lauraceae from India. *Nelumbo* 2011;53:213-16.
85. Geethakumary MP, Santhoshkumar ES, Pandurangan AG. *Cinnamomum dubium* Nees (Lauraceae) – A new record for India. *Indian Journal of Forestry* 2007;30(1):73-74.
86. Geethakumary MP, Pandurangan AG, Santhoshkumar ES. *Cinnamomum litseaefolium* (Lauraceae) – A new distributional record for India. *Rheedea*. 2012;22(2):127-30.
87. Geethakumary MP, Pandurangan AG, Deepu S. A new species of *Cinnamomum* (Lauraceae) from Nilgiris, southern Western Ghats, India. *Phytotaxa*. 2015;224(3):283-90. <https://doi.org/10.11646/phytotaxa.224.3.7>

88. Geethakumary MP, Pandurangan AG, Deepu S. A new species of *Cinnamomum* and notes on the status of *C. palghatensis* in Western Ghats, India. *Phytotaxa*. 2017;326(4):252-58. <https://doi.org/10.11646/phytotaxa.326.4.3>
89. Jagadeesan R, Gangaprasad A, Mathew SP. *Cinnamomum mohananii* (Lauraceae) - A new species from Southern Western Ghats of the Peninsular India. *International Journal of Advanced Research*. 2014;2(9):611-14.
90. Robi AJ, Sujanalpal P, Udayan PS. *Cinnamomum agasthyamalayanum* (Lauraceae) from Kerala, India. *International Journal of Advanced Research*. 2014;2(10):1012-16.
91. Robi AJ, Thomas VP, Sreenivas VK, Udayan PS, Sujanalpal P. *Cinnamomum ovalifolium* (Lauraceae) – A new record for India with notes on its lectotypification. *Nelumbo*. 2018;60(2): 110. <https://doi.org/10.20324/nelumbo/v60/2018/122393>
92. Remya Krishnan RV, Santhoshkumar ES, Radhamany PM, Valsaladevi G, Jagadeesan R. *Cinnamomum mathewianum* (Lauraceae): A new species from Kerala, India. *International Journal of Advanced Research* 2014;2(7):29-32.
93. Remya Krishnan RV, Santhosh kumar ES, Radhamany PM Valsaladevi G. A new variety of *Cinnamomum mathewianum* (Lauraceae) from Kerala, India. *International Journal of Botany Studies* 2016;1(3):40-42.
94. POWO. Plants of the World Online [Internet]. Facilitated by the Royal Botanic Gardens, Kew; 2019[cited 2020 July 01]. Available from <http://www.plantsoftheworldonline.org/>
95. Liu B, Liu H. Botanic Gardens Conservation International (BGCI), IUCN SSC Global Tree Specialist Group. *Cinnamomum bejolghota* [Internet]. The IUCN Red List of Threatened Species 2019 [cited 2020 September 26]. Available from: <https://dx.doi.org/10.2305/IUCN.UK.2019-2.RLTS.T145301455A147625915.en>
96. de Kok R. *Cinnamomum champokianum* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T145304181A145415903.en>.
97. Deepu S. *Cinnamomum chemungianum* [Internet]. The IUCN Red List of Threatened Species 2018 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2018-1.RLTS.T38778A120256971.en>.
98. de Kok R, Geethakumary MP. *Cinnamomum dubium* [Internet]. The IUCN Red List of Threatened Species 2019 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T145307747A145416006.en>.
99. de Kok R, Geethakumary MP. *Cinnamomum filipedicellatum* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T38779A123772864.en>
100. Deepu S, Geethakumary MP, Pandurangan AG *Cinnamomum gamblei* [Internet]. The IUCN Red List of Threatened Species 2018 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2018-1.RLTS.T123844196A123844201.en>.
101. Liu B, Liu H. Botanic Gardens Conservation International (BGCI) & IUCN SSC Global Tree Specialist Group. *Cinnamomum glanduliferum* [Internet]. The IUCN Red List of Threatened Species 2019 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2019-2.RLTS.T147648804A147648806.en>.
102. de Kok R, Geethakumary MP. *Cinnamomum goaense* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T38780A138508282.en>.
103. de Kok R. *Cinnamomum heyneanum* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T38781A123773039.en>.
104. de Kok R. *Cinnamomum impressinervium* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T145310029A145416081.en>.
105. de Kok R. *Cinnamomum iners* [Internet]. The IUCN Red List of Threatened Species 2019 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2019-2.RLTS.T62020057A62020059.en>.
106. de Kok R, Geethakumary MP. *Cinnamomum keralaense* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T145310541A145416101.en>.
107. World Conservation Monitoring Centre. *Cinnamomum litseifolium* [Internet]. The IUCN Red List of Threatened Species 1998 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T34272A9855335.en>.
108. Deepu S, Geethakumary MP, Pandurangan AG, Haridasan, K, Ved D, Saha D, Ravikumar K. *Cinnamomum macrocarpum* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T50126577A124289554.en>.
109. de Kok R, Geethakumary MP. *Cinnamomum malabratrum* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T145338082A145416196.en>.
110. de Kok R. *Cinnamomum parthenoxylon* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T33198A2834736.en>.
111. de Kok R, Geethakumary MP. *Cinnamomum perrottetii* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T31225A123772918.en>.
112. de Kok R. *Cinnamomum riparium* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T31226A123772960.en>.
113. Saha D, Ved D, Ravikumar K, Haridasan K. *Cinnamomum sulphuratum* [Internet]. The IUCN Red List of Threatened Species 2015 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T50126579A50131310.en>.
114. de Kok R. *Cinnamomum tamala* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T145404427A145416586.en>.
115. de Kok R, Robi J. *Cinnamomum travancoricum* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T145405602A145416616.en>.
116. de Kok R, Geethakumary MP. *Cinnamomum walaiwarensense* [Internet]. The IUCN Red List of Threatened Species 2020 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T38782A138508313.en>.
117. Saha D, Ved D, Ravikumar K, Haridasan K. *Cinnamomum wightii* [Internet]. The IUCN Red List of Threatened Species 2015 [cited 2020 September 26]. Available from <https://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T50126581A50131315.en>.

