

FIRST REPORT OF A STRICT DRAGON TREE SPECIES  
(*DRACAENA CAMBODIANA*: ASPARAGACEAE) FROM INDIA

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ABSTRACT

*Dracaena cambodiana* Pierre ex Gagnep., a dragon tree species, is reported here for the first time from India. Its taxonomic relationships with other closely related species of genus *Dracaena* Vand. ex L. are examined and discussed. A detailed taxonomic description, along with color photographs is provided to facilitate its future identification. Recent surveys confirm that the habitat and regional population of the plant is under severe threat. Hence, following IUCN Red List Categories and Criteria, it is regionally categorized as Critically Endangered.

KEY WORDS: Dragon blood, *Dracaena cambodiana*, Critically Endangered, Assam, NE India

RESUMEN

Se reporta aquí *Dracaena cambodiana* Pierre ex Gagnep., una especie de árbol del dragón, por primera vez para la India. Se examinan y se discuten sus relaciones taxonómicas con otras especies semejantes del género *Dracaena* Vand. ex L.. Se aporta una descripción taxonómica detallada, junto con fotografías en color para facilitar su futura identificación. Los muestreos recientes confirman que el hábitat y población regional de la planta están en seria amenaza. Por ello, siguiendo las categoría y criterios de IUCN para la Lista Roja, se categoriza regionalmente como Criticamente Amenazada.

INTRODUCTION

The genus *Dracaena* Vand. ex L. belongs to the family Asparagaceae, subfamily Nolinoideae. There are about 113 spp. (The Plant List 2013), out of which ca. 63 spp. occur in Africa (incl. Madagascar), and the remainder are in Asia, Australia, and Central America (Damen et al. 2018). In India, the genus is represented by 9 species and 2 varieties, mostly confined to the Himalayan regions, NE India and Andaman and Nicobar Islands (Karthikeyan et al. 1989; Sinha & Srivastava 1996).

The arborescent taxa of *Dracaena* form the “dragon tree” group (Marrero et al. 1998). This group comprises ca. 15 taxa (Klimko et al. 2018). They can be clearly differentiated from the “mesic” group of *Dracaena* by closely packed leaves at branch apices, lack of distinct internodes, differentiated leaf sheaths, leaf blades lacking distinct costa, and flowers that are diurnal or nocturnal with free tepals and stamens with thickened filaments inserted at the tepal bases (Wilkin et al. 2012). The “mesic” group of *Dracaena* is characterized by stems with leaf scars separated by distinct internodes, undifferentiated leaf sheaths, leaf blades with a clearly defined costa, and flowers with nocturnal anthesis and possessing a long, narrow tube in which the exerted stamens with filiform filaments are inserted (Brown 1914).

During field explorations (2016–2019) at West Karbi Anglong District of Assam, the authors found a lithophytic dragon tree species growing on rock crevices at Dongka sarpo area. Subsequent critical study of the specimens and consultation of literature revealed the identity of the plant as *Dracaena cambodiana* Pierre ex Gagnep. Therefore, the present collection of the plant is the first record of a strict dragon tree species within the political boundary of India, which also extends its distributional range ca. 1300 km northwestward. A



FIG. 1. *Dracaena cambodiana*, plants in their natural habitat. Photo by J. Sarma.

description of the plant along with colored photographs and a distribution map is provided to facilitate its future identification.

***Dracaena cambodiana*** Pierre ex Gagnep., Bull. Soc. Bot. France 81:286. 1934. X. Chen & Turland in Z.Y. Wu & P.H. Raven, eds. Fl. China 24:217. 2000. (**Figs. 1 & 2**). *Pleomele cambodiana* (Pierre ex Gagnep.) Merr. & Chun, Sunyatsenia 5:31. 1940. TYPE: CAMBODIA: SAMRONG-TONG: Pra Mountains, 28 Mar 1870, L. Pierre 660 (SYNTYPE: P 00689824, 00689826, photocopy!; ISOSYNTYPE: GH 00098599, photocopy!). Additional syntypes: VIETNAM: ANNAM: Nui han heo près de Nha-trang, 22 Sep 1922, M. Poilane 4790 (SYNTYPE: P 00689820, 00689821, photocopy!); Hué, 18 Jul 1927, J. & M.S. Clemens 4057 (SYNTYPE: P 00689822, photocopy!).

Plant 3.5–5.0 m tall; main trunk 20–30 cm thick at base, branched from base to apex; bark greyish to greyish-brown, with vertical fissures towards base, sometimes peeling away; branches spreading and ascending, 10–15 cm in diam.; branch apex faintly reddish-brown, 3.0–4.5 cm in diam.; leaf scars only visible at apical portion of branches. Leaves crowded at stem apex, slightly narrowed above base; blade narrowly elliptic-lanceolate, 53–100 × 1.5–3.8 cm; margin concolorous; leaf base 3.0–4.5 mm wide, whitish with reddish hue; apex long acuminate. Inflorescence paniculate 100 cm long or longer, rachis glabrous, indumentum absent, apex of rachis much congested, usually having short glomerular branches up to 1.5 cm long; bracts of glomerule papillose outside. Flower 6–7 per glomerule. Pedicel articulate, green, 3.2–7.3 mm long. Tepals elliptic or elliptic-lanceolate, 7.7–8.4 × 2.2–2.7 mm, reflexed, base united up to 2 mm, creamy with pale-green central bend, apex slightly hooded, verrucose. Filament 6.0–7.0 mm long, 0.6–0.8 mm in diam., cylindrical, slightly flattened at base, upper half golden-yellow, lower half pale-yellow, not tuberculate; anthers narrowly oblong, 1.4–1.5 mm long, creamy. Style ca. 3 mm long and 0.4–0.5 mm in diam. Stigma capitate tri-lobed 0.7–0.8 mm in diam.

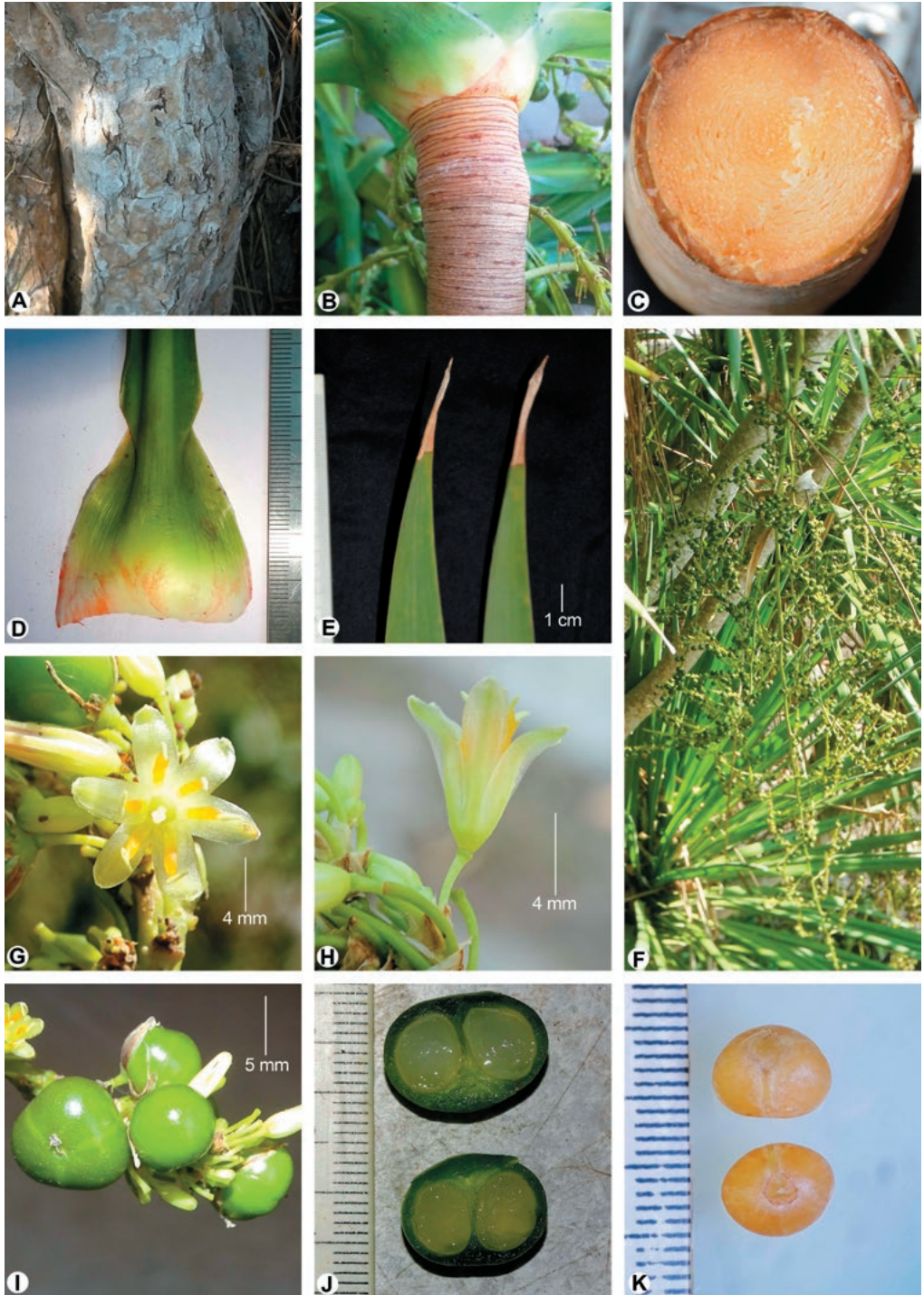


Fig. 2. *Dracaena cambodiana*. A. Lower portion of the trunk showing bark; B. branch apex; C. transverse section (T.S.) of a branch apex; D. leaf base; E. leaf apex; F. infructescence; G. flower, top view; H. flower, side view; I. fruits; J. T.S. of fruits; K. seeds (A, B, C, F not to scale). Photos by J. Sarma, S. Dey, & H.A. Barbhuiya.

TABLE 1. Detailed comparison between *Dracaena cochinchinensis* and *D. cambodiana*.

Character	<i>D. cochinchinensis</i> (after Chen & Turland 2000)	<i>D. cambodiana</i> (after Chen & Turland 2000)	<i>D. cambodiana</i> (present specimen, <i>J. Sarma s.n.</i> )
Plant height	5–15 m	3–4(–10) m	3.5–5.0 m
Stem apex	reddish	not reddish	slightly reddish
Leaf blade	30–100 × 2–5 cm	60–70 × 1.5–3.0 cm	53–100 × 1.5–3.8 cm
Leaf base color	reddish	not reddish	white with slightly reddish hue
Inflorescence	> 40 cm long, rachis densely papillose-pubescent	30–40 cm long, rachis glabrous or subglabrous	up to 100 cm long, rachis glabrous
Number of flowers per glomerule	2–5	3–7	6–7
Pedicle length	3–6 mm	5–7 mm	3.2–7.3 mm
Tepal color	milky white	greenish white or pale yellow	greenish white or pale yellow
Tepal length	6–8 mm	6–7 mm	7.7–8.4 mm
Filament	reddish brown, tuberculate distally	color not known, not tuberculate distally	golden yellow, not tuberculate distally
Fruit	orange, subglobose, 0.8–1.2 cm in diam., 1–3-seeded	color not known, ca. 1 cm in diam.	orange-red, 1.0–1.7 cm in diam., 1–3-seeded
Flowering time	March	July	November–February
Distribution	China, Thailand, Cambodia & Vietnam	China, Thailand, Laos, Cambodia & Vietnam	India (Assam)

Ovary tri-locular, glabrous ca. 3.4 × 1.7 mm. Fruit a berry, subglobose to weakly lobed, 10–17 × 10–12 mm, 1–3 seeded, greenish while young, orange-red when ripe. Seeds subglobose, 7.2–8.2 × 5.8–7.0 mm, surface smooth.

*Phenology*.—Flowering: November–February; fruiting: January–April.

*Habitat*.—The plant was growing in crevices of granite boulders at elevations from 100–150 m (Fig. 1). The associated species were *Bambusa tulda*, *Bombax ceiba*, *Combretum* sp., *Ficus* sp., *Tetrameles nudiflora*, *Tetrastigma* sp., etc.

Additional specimens examined.—INDIA. Assam: West Karbi Anglong, Dongka sarpo, 25°55'28.08"N, 92°41'31.27"E, ca. 101 m, 30 Dec 2018, *J. Sarma s.n.* (HBARC-00006400!).

*Notes*.—*Dracaena cambodiana* shows close resemblances with *D. cochinchinensis* (Lour.) S.C. Chen. Chen (1980) separated the former from the latter with the absence of branch apex and leaf base pigmentation, absence of indumentum in the inflorescence axis, and tuberculi on the distal part of the filament. Chen and Turland (2000) followed the same concept; however, they drew attention to problems regarding the typification of the name *D. cochinchinensis* and the morphological similarity and consequent possible conspecificity of the two taxa. The detailed comparison between the two taxa is summarized in the Table 1. Although flowering phenology of the currently recorded population of *D. cambodiana* is remarkably different from that of its earlier records from Southeast Asia, our specimen only shows slight variation from typical *D. cambodiana* in having light pigmentation at branch apex and leaf bases. These differences may be attributed to intraspecific variation and geographical position.

*Dracaena cambodiana* is an important medicinal plant as well as a beautiful ornamental tree; it is a major source of dragon's blood (a deep red resin), a precious traditional medicine in China. Several antifungal and antibacterial compounds, antioxidants, flavonoids, etc. have been extracted from various parts of the plant (Dang et al. 2008; Liu et al. 2008; Luo et al. 2010, 2011; Wang et al. 2017).

*Distribution and Conservation Status*.—*Dracaena cambodiana* is narrowly distributed in China (S. Hainan), Thailand, Laos, Cambodia, and Vietnam (Chen & Turland 2000). Recent overexploitation to meet increasing demand for dragon's blood has resulted in rapid depletion of the plant (Ou et al. 2013). For this reason, the species is already listed in the inventory of Rare and Endangered Plants of China (Zhang & Li 2010; Zhao et al. 2013). So far, its global conservation status has not been evaluated by the International Union for Conservation

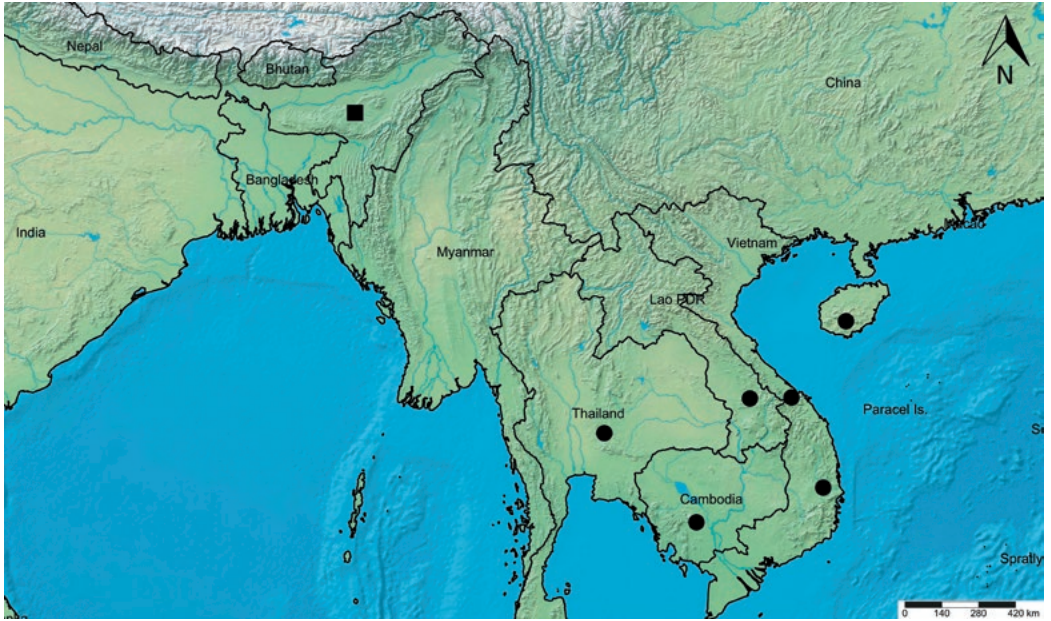


Fig. 3. Distribution map of *Dracaena cambodiana*. Circle (●) indicates previously known localities. Square (■) indicates the currently reported locality. Map created with SimpleMapper, [www.simplemapper.net](http://www.simplemapper.net) (Shorthouse 2010).



Fig. 4. Stone quarry laborers breaking granite boulders at the natural habitat of *Dracaena cambodiana*. Photo by J. Sarma.

of Nature (IUCN). In India, the species is currently known from a single locality, the Dongka sarpo area of West Karbi Anglong district, Assam (Fig. 3). The area of occupancy (AOO) is estimated to be 0.05 km<sup>2</sup>. The habitat of the plant is severely fragmented due to open excavation of a stone quarry (Fig. 4) and there is continuing decrease in AOO and number of mature individuals. The population size is estimated to be fewer than 50 mature individuals. Hence, following IUCN (2012a) the species is categorized as Critically Endangered (criteria: CR B2ab(ii)(v)+D). The *Dracaena* seeds are usually dispersed by birds, but due to the large fruit size only a few species of birds are able to swallow the fruits (González-Castro et al. 2019). Therefore, the probability of any rescue from neighboring countries is uncertain. Thus, the category is not uplisted or downlisted (IUCN 2012b). Considering its medicinal, ornamental, and ecological values, an appropriate conservation program is urgently needed to prevent further fragmentation of its natural habitat.

#### ACKNOWLEDGMENTS

We are thankful to the Assam Forest Department for allowing us to use their resources in extensive field explorations, especially in remote areas. We extend our sincere thanks to Karbi Anglong Autonomous Council Authority and Hamren Territorial Division for providing logistic support during field tours. We extend our heartiest thanks to Bhugeswar Teron, Forester I, Hamren Division, for his continuous assistance in frequent field explorations. We are also indebted to Paul Wilkin, Royal Botanic Gardens, Kew, and T.H.J. Damen, Wageningen, Netherlands, for their valuable comments on the identity of the plant. Finally, yet importantly, we are grateful to Ajith Ashokan and one anonymous reviewer for their constructive comments on the manuscript.

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