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Abstract

This study reports two newly recorded species of the genus *Diospyros* (Ebenaceae) from China—*Diospyros dasyphylla* Kurz and *Diospyros sumatrana* Miq. Information on morphological characteristics, phenology, habitat features, and distribution of the two newly recorded species is provided, and their endangered status is assessed based on field investigations within China. *Diospyros dasyphylla* is similar to *Diospyros xylocarpa* Y. M. Shui, W. H. Chen & Sima, differing in that the former has young branches and abaxial leaf surfaces densely covered with yellow-brown coarse hairs, mature fruit approximately 6 cm in diameter, and persistent calyx 8 mm in length. *Diospyros sumatrana* is similar to *Diospyros elliptifolia* Merr., distinguished by its white, urceolate corolla, fruit approximately 2 cm in diameter, and erect persistent calyx. Voucher specimens are deposited in the Herbarium of Guangxi Institute of Botany (IBK) and the Museum of Beijing Forestry University (BJFC). These data provide foundational information for research on *Diospyros* diversity in China.

Full Text

Preamble

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Two Newly Recorded Species of *Diospyros* from China

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Abstract

Diospyros dasyphylla Kurz and *Diospyros sumatrana* Miq. (Ebenaceae) are reported as newly recorded species in China. We provide detailed information on their diagnostic morphological characters, phenology, habitat, and distribution, and assess their endangered status based on field surveys conducted within China. *Diospyros dasyphylla* closely resembles *D. xylocarpa* Y. M. Shui, W. H. Chen & Sima, but can be distinguished by its young branchlets and abaxial leaf surfaces densely covered with yellow-brown hirsute hairs, mature fruits approximately 6 cm in diameter, and persistent fruiting calyx 8 mm long. *Diospyros sumatrana* is similar to *D. elliptifolia* Merr., but differs in its white, urceolate corolla, fruits about 2 cm in diameter, and erect persistent calyx. Voucher specimens are deposited in the Herbarium of Guangxi Institute of Botany (IBK) and the Museum of Beijing Forestry University (BJFC). These findings provide fundamental data for research on *Diospyros* diversity in China.

Keywords: Ebenaceae, *Diospyros dasyphylla*, *Diospyros sumatrana*, China

Introduction

The genus *Diospyros* L., established by the Swedish botanist Linnaeus in 1737 and formally described in *Species Plantarum* (1753), represents the largest genus in the family Ebenaceae, comprising approximately 800 species distributed primarily in tropical and subtropical regions worldwide (Duangjai et al., 2006, 2009). According to the Plants of the World Online database (2024), the genus contains over 100 species each in Africa, the Americas, Madagascar, Australia, and New Caledonia, with more than 300 species in Southeast Asia. *Diospyros* is renowned for its valuable timber (ebony) and economically important fruit (persimmons), serving as a significant component of forest ecosystems in Asia and Africa (Judd et al., 2002; Christenhusz et al., 2017).

Taxonomic research on Chinese *Diospyros* has traditionally emphasized macromorphological classification. In 1987, Li Shugang completed the first comprehensive monographic revision of the genus for *Flora Reipublicae Popularis Sinicae*, documenting 57 species and six varieties (Li, 1987). Over the subsequent three decades, research has primarily focused on reporting new species and new distributional records (Lee et al., 1996; Li et al., 2006; Tian et al., 2014; Huang et al., 2015; Nong et al., 2017; Tong & Xia, 2019; Sima et al., 2021; Meeprom et al., 2022). To date, more than 70 *Diospyros* species have been reported from China (JSTOR 2024), including 47 endemics, primarily distributed in the southeastern and southwestern regions. Among these, *D. kaki* Thunb., *D. lotus* L., and *D. oleifera* Cheng are widely cultivated as important economic fruit trees, while *D. cathayensis* Steward and *D. armata* Hemsl. (commercially known as “Jindanzi”) are popular as ornamental bonsai specimens.

During field investigations of *Diospyros* in Yunnan and Hainan provinces from 2021 to 2023, we collected specimens of two problematic taxa. Through careful examination of relevant literature and comparative analysis, we identified these

as *Diospyros dasyphylla* Kurz and *Diospyros sumatrana* Miq., both previously unrecorded in China. We herein provide detailed morphological descriptions of these two newly recorded species.

1.1 *Diospyros dasyphylla* Kurz (Figs. 1, 2)

Taxonomic Citation: *Diospyros dasyphylla* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 40: 71. 1871. — Holotype: Myanmar, Karen hills, Taipo mountains, alt. 4000 ft., March 1862, Dr. Brandis 948 (HBG-507428!).

Morphological Description: Trees 15–20 m tall with smooth, blackish-brown bark. Branchlets densely covered with brown setose and appressed hairs. Leaves densely tomentose, elliptic to oblong, 5–18 cm × 2–6 cm, cordate at base, acuminate at apex; leaf veins impressed adaxially; petiole slightly pubescent, 0.3–0.8 cm long. Male inflorescences racemose, axillary or borne on lower parts of old branches, covered with two rows of scales approximately 3 mm long, densely hairy externally. Fruits globose, 4–6 cm in diameter, 8-locular; green when immature, turning yellow or orange at maturity; fruiting pedicel ca. 5 mm long; fruiting calyx divided to base, lobes ovate-elliptic, spreading, ca. 8 mm × 9 mm. Seeds wedge-shaped to elliptic, ca. 1.5 cm × 2.5 cm, yellowish-brown, smooth, flat on both sides with one surface convex.

This species resembles *Diospyros xylocarpa* Y. M. Shui, W. H. Chen & Sima, but differs in having smaller leaves (5–18 cm × 2–6 cm vs. 8.1–32.4 cm × 4.9–14.4 cm) with cordate bases (vs. cuneate to rounded), and fruits that are fleshy rather than woody, with a persistent calyx 8 mm in diameter (vs. 1.1–1.4 cm).

Phenology: Flowering March–April; fruiting November–December.

Habitat: Tropical evergreen broad-leaved forests at 300–650 m elevation.

Conservation Assessment: Currently, only two populations are known from Hainan Island, China, with fewer than 40 mature individuals total, though habitat conditions remain good. Based on available data, the species has a very small population size and extremely limited area of occupancy (AOO) in China. According to the IUCN Red List Categories and Criteria (2012), Guidelines for Application of IUCN Red List Criteria at Regional and National Levels (2012), and Guidelines for Using the IUCN Red List Categories and Criteria (2022), *Diospyros dasyphylla* should be assessed as Critically Endangered (CR) in China under criterion D.

Specimens Examined: China: Hainan, Sanya City, Yazhou District, 14 November 2022, Zou Chunyu et al. ZCY2176 (IBK); same locality, 25 December 2022, Zou Chunyu et al. ZCY4000 (IBK); Baoting County, Maogan Town, 28 December 2022, Zou Chunyu et al. ZCY4033 (IBK); Yaxian (Sanya City), Nanlin Sifeng Mountain (Nanlin Township), 8 October 1933, Huang Zhi 34521 (IBK). **Vietnam:** Hoa Binh Province, Yen Thuy District, Cuc Phuong National Park, 11 December 2000, D. D. Soejarto, N. M. Cuong and T. Q. Bich 11728

(L0334806!). **Thailand:** Doi Chiang Dao, Pa Blawng Cave area, 20 April 1989, J. F. Maxwell 89-478 (L2665634!).

Distribution: Hainan, China; India, Thailand, Laos, Vietnam, and Japan. First record for China.

Figure Captions:

Fig. 1 [Figure 1: see original paper] Voucher specimen of *Diospyros dasyphylla* Kurz. A. Bark; B. Male twig; C. Male inflorescences; D. Female twig; E. Immature fruit; F. Dry fruit; G. Seeds.

Fig. 2 [Figure 2: see original paper] *Diospyros dasyphylla* Kurz.

1.2 *Diospyros sumatrana* Miq. (Figs. 3, 4)

Taxonomic Citation: *Diospyros sumatrana* Miq., Pl. Jungh.: 203. 1852. — Lectotype: Indonesia, Sumatra, Sumatera Utara, Angkola, hoog Ankule Sumatra, Junghuhn F. W., s. n. (L0006080!).

Morphological Description: Trees up to 20 m tall with black, smooth bark. Young branchlets pubescent, becoming glabrescent. Young leaves densely hairy, later glabrescent; petiole slightly pubescent, 0.2–0.5 cm long; leaf blade elliptic, ovate, rectangular or obovate, 5–16 cm × 1.5–5 cm, cuneate at base, acuminate at apex; adaxial surface smooth, green, veins impressed adaxially, raised abaxially. Female flowers solitary or in cymes. Pedicel ca. 0.1–0.3 cm long; calyx 4-lobed, lobes leaf-like, slightly pubescent, broadly ovate; corolla white, urceolate, ca. 7 mm long, 4-lobed, lobes recurved, lanceolate; staminodes 8; ovary 8-locular, densely tomentose. Fruit ellipsoid, nearly sessile, 1.5–2 cm in diameter, smooth. Fruiting calyx slightly enlarged, lobes leaf-like, erect.

This species resembles *Diospyros elliptifolia* Merr., but differs in having smaller leaves (5–16 cm × 1.5–5 cm vs. larger), a white urceolate corolla (vs. different morphology), fruits ca. 2 cm in diameter, and an erect persistent calyx.

Phenology: Flowering April–May; fruiting August–November.

Habitat: Tropical seasonal rainforests at ca. 700 m elevation.

Conservation Assessment: This species is an important component of tropical forests in Southeast Asia and is also widely distributed in tropical forests of southeastern Yunnan, China. Field surveys indicate abundant seedlings and saplings in all Chinese populations, with habitats well protected. We therefore infer that subpopulations in China are not declining. According to the IUCN Red List Categories and Criteria (2012), Guidelines for Application of IUCN Red List Criteria at Regional and National Levels (2012), and Guidelines for Using the IUCN Red List Categories and Criteria (2022), *Diospyros sumatrana* should be assessed as Least Concern (LC) in China.

Specimens Examined: **China:** Yunnan, Hekou County, Longbao Village, 16 August 2022, Zou Chunyu, Huang Jinquan, Lu Wei ZCY3918 (IBK); Lvchun County, Banpo Town, 7 April 2023, Zou Chunyu, Huang Jinquan, Fan Zhichao

ZCY4269 (IBK); Maguan County, Gulinjin Township, 11 April 2023, Zou Chunyu, Huang Jinqian, Fan Zhichao ZCY4331 (IBK). **Indonesia:** Sumatra, Gunung Leuser Nature Reserve, 14 June 1972, Ketambe, W. J. J. O. de Wilde and B. E. E. de Wilde Duyfjes 12832 (L2664686!); Sumatera Barat, Kab. Padang Pariaman, Kec. 2x11 Enam Lingkung, Dusun Sekayu Paku, Nagari Asam Pulau, Bukik Panjang, 13 May 2006, Fajar et al. 43 (ANDA00026012!). **Malaysia:** Upper Perak, March 1889, Wray, L. Jr. 3508 (K000792590!). **Thailand:** Trang Province, Yahndakao District, Sai Roong Falls, 26 April 1987, J. F. Maxwell 87-440 (L2664319!).

Distribution: Southeastern Yunnan, China; Myanmar, Laos, Thailand, Vietnam, Indonesia, and Malaysia. First record for China.

Figure Captions:

Fig. 3 [Figure 3: see original paper] *Diospyros sumatrana* Miq. A. Female twig; B. Fruit twig; C. Female flowers; D. Longitudinal section of female flower; E. Immature fruit; F. Longitudinal section of immature fruit; G. Cross-section of immature fruit.

Fig. 4 [Figure 4: see original paper] Voucher specimen of *Diospyros sumatrana* Miq.

Discussion and Conclusion

The discovery of *Diospyros dasyphylla* and *D. sumatrana* in China significantly expands their known distribution ranges and enriches our understanding of *Diospyros* diversity in the country. However, the baseline information on Chinese *Diospyros* resources remains incomplete, as evidenced by continuing reports of new species and records (Tian et al., 2014; Huang et al., 2015; Nong et al., 2017; Tong et al., 2019; Sima et al., 2021). Several factors contribute to this knowledge gap. *Diospyros* species are typically dioecious, with separate male and female individuals, and some are polygamous with variable sexual expression. Most species are tall trees (10–30 m) that often exhibit biennial flowering patterns, making flowers and fruits difficult to observe and collect. Consequently, voucher specimens with critical diagnostic characters are frequently unavailable, hindering comprehensive taxonomic studies.

Furthermore, leaf morphology in some *Diospyros* species shows remarkable variation. In *D. sumatrana*, for example, leaf size and shape vary substantially within a single population, ranging from 5–16 cm in length and from narrowly lanceolate to ovate in shape. Francis (1995) similarly noted considerable leaf morphological variation in *D. sumatrana* in Malaysian Sabah and Sarawak, with transitional forms that complicate species delimitation and identification.

The genus *Diospyros* exhibits extremely complex morphological variation and occupies diverse habitats, with particular adaptations to tropical rainforests. Intensive field-based taxonomic investigations of Chinese *Diospyros* will not only clarify the country's *Diospyros* resources but also enhance our understanding of the genus's diversity and patterns of character variation. Such research will pro-

vide essential material for systematic and evolutionary studies while offering a scientific foundation for the innovative utilization and conservation of *Diospyros* germplasm resources in China.

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