A new yellow *Camellia* (Theaceae) from central Vietnam

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(Received 17 January 2019; Revised 5 March 2019; Accepted 22 March 2019)

ABSTRACT: *Camellia pukhangensis* (Theaceae), a new species with yellow flowers from Quy Hop District, Nghe An Province, Vietnam, is described and illustrated. *Camellia pukhangensis* has nearly sessile leaves with an attenuate to caudate apex, cordate base, hirsute abaxial surface, hirsute adaxial midrib, hirsute petiole, deltate to ovate perules hairy on the outer surface, bright yellow orbicular to obovate petals hairy on the outer surface, androecium pubescent to two-thirds from the base, pubescent ovoid ovary with three (or four) locules and three (or four) pubescent styles free to the base. The morphological data support the provisional placement of *C. pukhangensis* in *Camellia* sect. *Archecamellia* Sealy.

Keywords: *Camellia*, Theaceae, new species, Vietnam

Camellia, the largest genus of Theaceae, has its center of distribution in southern China and northern Vietnam (Chang and Bartholomew, 1984). The species number from 119 to 350, based on the opinion of various authors (Sealy, 1958; Chang and Bartholomew, 1984; Ming, 2000; Gao et al., 2005; Ming and Bartholomew, 2007). Vietnam, with more than 30 species of *Camellia* with yellow flowers (Le and Luong, 2016), is the center of diversity for plants with this feature. Among them are two species of yellow *Camellia*: *C. pleurocarpa* and *C. quephongensis*, in north-central Vietnam (including Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Quang Tri, and Thua Thien-Hue provinces). During a survey of the flora of the Pu Khang mountain range, Lien Hop Commune, Quy Hop District, Nghe An Province, we collected samples of a yellow *Camellia* that did not agree with either of them. After comparing it with closely related species, we determined it to be an undescribed species, which we here name *C. pukhangensis*.

Taxonomic Treatment

Camellia pukhangensis D.N. Do, D.V. Luong, S. T. Hoang

& H.T. Le, sp. nov. (Figs. 1, 2).—TYPE: VIETNAM. Nghe An Province: Quy Hop District, 15 Jan 2018, *Dai Ngoc Do & Huong Thi Le 186* (holotype: DLU).

Shrubs or small trees, 2–8 m tall, evergreen; young branches hirsute, becoming glabrous mature. Leaves shortly stalked; petiole 5–8 mm long, hirsute; blades oblong, 16–24 cm long, 5.5–8 cm wide, base cordate; margin serrate, apex attenuate to caudate, coriaceous, abaxially hirsute, adaxially hirsute only on midrib, lateral veins 16–20 pairs, abaxial veins protruding, adaxial midrib and lateral veins sunken. Flowers 5.5–6.5 cm in diameter, solitary at apex of branches, sessile or subsessile; bracteole and sepals indistinguishable (perules) 11–13, deltate to ovate, 0.3–4 cm long, 0.2–1.8 cm wide, abaxially hairy, margins ciliate. Petals 10–13, orbicular to obovate, bright yellow, 3–4.5 cm long, 2.3–4 cm wide, abaxially hairy, united with outermost filaments 1–1.5 cm at base. Stamens 350–390, in 5 or 6 series, light yellow, 3–3.5 cm long, pubescent to 2/3 from base, outer filaments united for 1.7–2 cm from base to form a cup; anthers yellow, 3–3.5 mm long, ca. 1 mm wide. Ovary with 3(or 4) loculi, ovoid, light yellow, 4–4.5 mm long,

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Fig. 1. *Camellia pukhangensis* D. N. Do, D. V. Luong, S. T. Hoang & H. T. Le. **A.** Leaf, adaxial view. **B.** Venation detail of leaf (abaxial surface). **C.** Flower bud. **D.** Flower, top view. **E.** Perules and Gynoecium. **F.** Perules (inner surfaces shown). **G.** Petals (inner surfaces). **H.** Stamens. **I.** Gynoecium (other floral parts removed). Drawn by Dung Van Luong.

Fig. 2. *Camellia pukhangensis* D. N. Do, D. V. Luong, S. T. Hoang & H. T. Le. **A.** Branches with leaves. **B.** Flower bud. **C.** Flower. **D.** Perules and Gynoecium. Photos taken by Dai Ngoc Do.

Table 1. Morphological comparison of the species of Section *Arhecamellia* Sealy (data partly based on Sealy, 1958; Gao et al., 2005; Yang et al., 2014)

Characters	<i>C. euphlebia</i>	<i>C. flava</i>	<i>C. petelotii</i>	<i>C. tonkinensis</i>	<i>C. pukhangensis</i>
Habit	Shrub, 2 m tall	Shrub or small tree, 2–5 m tall	Shrub or small tree	Shrub	Shrub or small tree, 2–8 m tall
Young branches	Glabrous	Glabrous	Glabrous	Glabrous	Hirsute
Leaf blade shape	Broadly elliptic	Oval or oblong-elliptic or oblong-oval	Broadly oblong or oblong-oval	Elliptic or broadly elliptic	Oblong
Leaf size (cm)	11–14 × (4.5)–5–6.4	10.5–15 × 3.8–5.8	14.5–18 × 4.5–7.5	9–13.5 × 2.5–5.2	16–24 × 5.5–8
Leaf apex	Shortly broadly and bluntly cuspidate-acuminate	Acuminate	Shortly acuminate	Acuminate or narrowly acuminate	Attenuate to caudate
Leaf base	Obtuse to subrounded	Shallowly cordate	Widely cuneate	Obtuse to rounded	Cordate
Adaxial leaf surface	Glabrous	Glabrous	Glabrous	Glabrous	Hairy along midrib
Abaxial leaf surface	Glabrous	Pubescent along midrib	Glabrous	Puberulous along midrib near base	Hirsute
Petiole	Glabrous	Pubescent	Glabrous	Puberulous, glabrescent	Hirsute
Flower	Solitary at end of branches	Solitary at end of branches	Solitary at end of branches	Solitary at end of branches	Solitary at end of branches
Pedicel	ca. 5 mm long, glabrous	6–9 mm long, glabrous	1–1.2 cm long, glabrous	ca. 7 mm long, glabrous	Almost sessile
Bracteoles	8, glabrous		outer surface puberulous	5, outer surface puberulent	
Sepal	5, outer surface velutinous		5, outer surface puberulous	5, outer surface yellow puberulent	
Perules		ca. 12, outer surface velutinous		6, outer surface velutinous	11–13, outer surface pubescent
Petal	8–9, outer surface velutinous	10–13, outer surface velutinous	ca. 14, outer surface puberulous	9–12, glabrous	10–13, outer surface pubescent
Filaments	Glabrous	Pubescent	Glabrous	Puberulent	Pubescent
Ovary	3 loculi, glabrous	5 loculi, tomentose	3 loculi, glabrous	3 loculi, hairy	3–(4) loculi, pubescent
Styles	3, free to base, glabrous	5, free to base, hairy	3, free to base, glabrous	3, free to base, hairy	3–(4), free to base, pubescent

4–5 mm wide, pubescent; styles 3(or 4), free to base, 3–3.2 cm long, pubescent. Capsules not seen.

Etymology: The specific epithet refers to the type location, Pu Khang Mountain in Nghe An Province, Vietnam, where it was discovered.

Phenology: Flowering from November to March; fruiting period unknown.

Distribution: *Camellia pukhangensis* occurs in forests in Lien Hop Commune, Quy Hop District, Nghe An Province, at altitudes of 500–900 m. It is scattered on mountain sides and among rocks in association with species of Clusiaceae, Euphorbiaceae, Melastomataceae, Myrtaceae, and Lauraceae.

Additional specimens examined: VIETNAM. Nghe An Province: Quy Hop District, 15 Jan 2018, *Dai Ngoc Do & Huong Thi Le 187, 188* (DLU).

IUCN Red List category: *Camellia pukhangensis* is known from only one population of 122 individuals that occupies an area of less than 1 km². The location is currently threatened by cutting and agricultural expansion, hence, the species is provisionally categorized as Critically Endangered (CR) B2a (IUCN, 2017).

Notes: *Camellia pukhangensis* is characterized by leaves abaxially hirsute and adaxially hirsute only along the midrib (section *Eriandra* Coh. St.); solitary flowers at the apex of branches, short pedicels, perules more than 10 (section *Archecamellia* Sealy); the gynoecium is 3(or 4) locular with three free styles (section *Chrysanth* Chang). However, species in section *Eriandra* are characterized by small leaves hairy only on the midrib, small white flowers, the androecium in 2 or 3 whorls and compound styles (Chang and Bartholomew, 1984; Ming and Bartholomew, 2007). *Camellia pukhangensis* has yellow petals, the androecium in 5 or 6 whorls and free styles. Section *Chrysanth* is characterized by 1–3 axillary flowers or flowers at the apex of branches, long pedicels, bracteoles and sepals distinguishable, 5–7 bracteoles, 5–7 persistent sepals, 8–12 yellow petals, the androecium in four whorls and the stamens connate into a short tube, the gynoecium glabrous or pubescent with 3–5 loculi and 3–5 free styles (Chang and Bartholomew, 1984; Ming and Bartholomew, 2007). *Camellia pukhangensis* has solitary, sessile or subsessile flowers at the end of branches and the bracteoles and sepals are indistinguishable. So the new species cannot belong to section *Chrysanth*. Section *Archecamellia* is characterized by flowers solitary at the end of branches, 11–16 persistent perules, 8–14 petals, glabrous or pubescent stamens connate into a cup, a glabrous or pubescent gynoecium with 3–5 loculi and 3 or 5 free styles (Sealy, 1958). The new species, *C. pukhangensis*, has many characteristics of section

Archecamellia, such as solitary flowers at the end of branches, 11–13 indistinguishable persistent perules, pubescent stamens connate into a cup, a pubescent gynoecium with 3(or 4) loculi and 3(or 4) free styles. Because of the similarity of the features, we place *C. pukhangensis* in section *Archecamellia* (*C. euphlebia*, *C. flava*, *C. petelotii* and *C. tonkinensis*) (Sealy, 1958; Gao et al., 2005; Yang et al., 2014). The main similarities and differences of the species of section *Archecamellia* are summarized in Table 1.

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Acknowledgments

This work was supported by a grant from the National Institute of Biological Resources (NIBR), funded by the Ministry of the Environment (MOE) of the Republic of Korea (NIBR201804102, NIBR201906102). We thank Nguyen Giang Hoai director of Phu Quy stone company and Phung Van Hao, a staff member of Vinh University, for helping to collect the type specimens.

Conflict of Interest

The authors declare that there are no conflicts of interests.

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