

***CAMELLIA PYRIFORMIS* (THEACEAE, SECTION *CALPANDRIA*), A NEW SPECIES FROM NORTHERN VIETNAM**

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Abstract

Camellia pyriformis is described, illustrated, and placed in section *Calpandria*. Morphological features of this new species are young branches villous; leaves above pubescent, a long midrib, below pubescent; petiole falcate, densely villous; flowers solitary or geminate; pedicel very short, pubescent; bracteoles sparsely pubescent on both sides; sepals, pubescent on both sides; petals, white, glabrous; androecium 5–6 stamens, filaments completely united to form a truncated cone, glabrous, basal adnate to the petal, shallowly dentate at the apex, each filament bearing an anther; gynoecium 3-locular, densely white silky strigose tomentose, styles glabrous; capsule pyriform, pubescent; seed broad pyriform, densely villous.

Keywords: *Calpandria*; *Camellia pyriformis*; New species; Theaceae; Vietnam.

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1. INTRODUCTION

Camellia L. (Linnaeus, 1753) is the largest genus of the Theaceae. Section *Calpandria* (Blume, 1825; Stuart, 1916) is one taxon of *Camellia* L. It is characterized by an outer whorl of filament united to form a narrow fleshy tube with anthers on the inside (Sealy, 1958). Four species have been published: *C. lanceolata* (Blume, 1825; Seemann, 1859), widely distributed in Indonesia, Malaysia, and the Philippines; *C. connata* (Craib, 1914, 1925), widely distributed in Thailand (Chang, 1981; Ming, 2000); *C. kirinoi* (Ninh, 1999), widely distributed in Vietnam; and *C. luteocalpandria* (Yu et al., 2021), widely distributed in China.

Specimens of *Camellia* were collected during a 2020–2021 floristic survey in Luc Son Commune, Luc Nam District, Bac Giang Province. After analyzing and comparing the specimens with morphologically similar *Camellia* species (Chang, 1981; Chang & Ren, 1998; Gagnepain, 1943; Nguyen, 2017; Ming, 2000; Ming & Bartholomew, 2007; Ninh, 1999; Sealy, 1958), we concluded that this species is new to science. This new species is named *Camellia pyriformis*. It is placed in the section *Calpandria*.

2. TAXONOMIC TREATMENT

Camellia pyriformis T. S. Hoang & N. B. Trinh, *sp. nov.* (Figures 1, 2)

Type:—VIETNAM. Bac Giang Province, Luc Nam District, Luc Son Commune. Primary broad-leaved evergreen at an elevation of 470 m above sea level. 1 Nov. 2021, Hoang Thanh Son, Trinh Ngoc Bon, DL211201 (holotype, isotype DLU).

Description: Evergreen shrub or small tree, 2.5–4.0 m tall; new shoots purple; young branches villous. Leaves stalked, narrow elliptic to oblong-ovate, 4.5–7.0 cm long, 0.8–3.2 cm wide, thickly coriaceous; apex acuminate or narrowly acuminate, base rounded or broadly obtuse, margins regularly serrate; above dark green, shiny and pubescent along midrib; below paler green and pubescent; midrib and lateral veins sunken above, protruding below; secondary venation pinnate with 4–6 pairs of lateral veins; petiole falcate, slightly curved, round, pale green, 2.0–5.0 mm long, densely villous. Flowers solitary or geminate, axillary, 1.2–1.5 cm diameter; pedicel very short, 2.0–5.0 mm long, pubescent; bracteoles 2–3, scales to orbicular, 1.0–1.5 mm long, 1.0–1.5 mm wide, sparsely pubescent on both sides, margins ciliate, persistent; sepals 4–5, suborbicular, 1.0–2.5 mm long, 1.5–3.0 mm wide, pubescent on both sides, margins ciliate, persistent; petals 6–7, white, free to the base, obovate to oblong-lanceolate, 3.0–4.5 mm long, 2.5–3.0 mm wide, glabrous, united with filament tube approximately 0.2 mm at the base. Androecium 5 stamens, filaments completely united to form a truncated cone, 1.5–2.0 mm long, light pink, glabrous, basal adnate to the petals, shallowly dentate at the apex, each filament bearing an anther; anthers, approximately 1.5 mm, light yellow. Gynoecium 3-locular, ovary superior, ovate, 1.2–1.4 mm long, 1.0–1.3 mm wide, densely white, silky, strigose, tomentose; styles stout, about 1 mm long, 3-fide, glabrous. Capsule pyriform, pubescent, 10.0–12.0 mm long, 6.5–7.5 mm wide, 1-loculed with 1 seed, columella abortive, pericarp thinly leathery. Seed broad pyriform, 7.0–7.5 mm long, 6.0–6.3 mm wide, black, densely villous.

Phenology: Flowers from August to October; fruits from November to December.

Distribution, habitat, and conservation status: The tree usually grows on the edge of shallow creeks or on flat ground near streams. It grows under the canopy of mixed bamboo and wood forest in association with *Bambusa nutans*, *Trema orientalis*, *Xylopia vielana*, *Archidendron robinsonii*, *Wendlandia acuminata*, *Canarium parvum*, *Ardisia depressa*, *Elaeocarpus griffithii*, *Vernonia arborea*, *Archidendron clypearia*, *Licuala spinosa*, *Antidesma montanum*, *Schizostachyum dullooa*, *Carex cruciata*, *Tacca chantrieri*, and *Justicia fragilis*.

Camellia pyriformis is known from two populations of less than 50 individuals that occupy an area of less than 1 hectare, growing under the canopy of mixed bamboo and wood forest along rivers at an elevation of 140–470 m. This area has not yet been protected and is threatened by deforestation and agricultural expansion. Therefore, *C. pyriformis* is assessed as Critically Endangered (CR) according to the IUCN Standards and Petitions Committee (2019).

Etymology: The specific epithet comes from its characteristic pyriform capsule.

Vernacular name: Trà anh đào.

Additional specimens examined:—VIETNAM. Quang Ninh Province, Ha Long City, Hoa Binh Commune, Dong Son Ky Thuong Nature Reserve, primary broad-leaved evergreen at an elevation of 240 m above sea level. 1 Sep. 2020, Hoang Thanh Son, Trinh Ngoc Bon, VAFS4521 (VAFS). Quang Ninh Province, Ha Long City, Vu Oai Commune, Dong Son Ky Thuong Nature Reserve, primary broad-leaved evergreen at an elevation of 140 m above sea level. May 2022, Hoang Thanh Son, VAFS6152 (VAFS).

Note: The new species has many characteristics of section *Calpandria* such as flowers solitary or geminate, axillary; bracteoles 2–3, scales to orbicular, persistent; sepals 4–5, suborbicular, persistent; petals 6–7, free to the base, obovate to, united with filament tube at the base. Androecium 5 stamens, filaments completely united to form a fleshy tube, basal adnate to the petal, shallowly dentate at the apex, each filament bearing an anther. Gynoecium 3-locular, ovary superior; styles stout, 3-fide. Therefore, the new species is classified into section *Calpandria*. Prior to this article, section *Calpandria* included a total of 4 species worldwide, namely, *C. connata*, *C. lanceolata*, *C. kirinoi*, and *C. luteocalpandria*. The new species is similar to *C. connata* and *C. lanceolata* by flower white, filaments completely united, ovary 3, pubescent, style united but differs from *C. connata* by perules pubescent (vs. perules glabrous), and from *C. lanceolata* by petals glabrous on both sides (vs. petals tomentose or velutinous). The new species is similar to *C. kirinoi* and *C. luteocalpandria* by filaments completely united, ovary 3, pubescent, style united but differs from *C. kirinoi* by flower white, stamens 5–6, style glabrous (vs. flower light yellow, stamens 20–22, style tomentose) and from *Camellia luteocalpandria* by flower white, and capsule broad pyriform (vs. flower yellow, capsule oblate or subglobose). The known species of *Camellia* sect. *Calpandria* can be distinguished using the following key, which is summarized in Table 1.

Key to the species of *Camellia* sect. *Calpandria*

- 1a. Flower white
- 2a. Perules glabrous.....*C. connata*
- 2b. Perules pubescent
- 3a. Petals glabrous on both sides; filaments completely united to form a truncated cone.....*C. pyriformis*
- 3b. Petals strigose-tomentose on the back, velutinous on the face; filaments completely united to form a drum-shaped fleshy tube.....*C. lanceolata*
- 1b. Flower yellow
- 4a. Petals outer side pubescent*C. kirinoi*
- 4b. Petals both sides glabrous.....*C. luteocalpandria*



Figure 1. *Camellia pyriformis* T. S. Hoang & N. B. Trinh

Notes: (a) Branch with leaves; (b) Bud; (c) Flower bud; (d, e) Flowers; (f) Gynoecium; (g) Fruit; (h) Seed.
 Source: Photos by Hoang Thanh Son and Trinh Ngoc Bon.

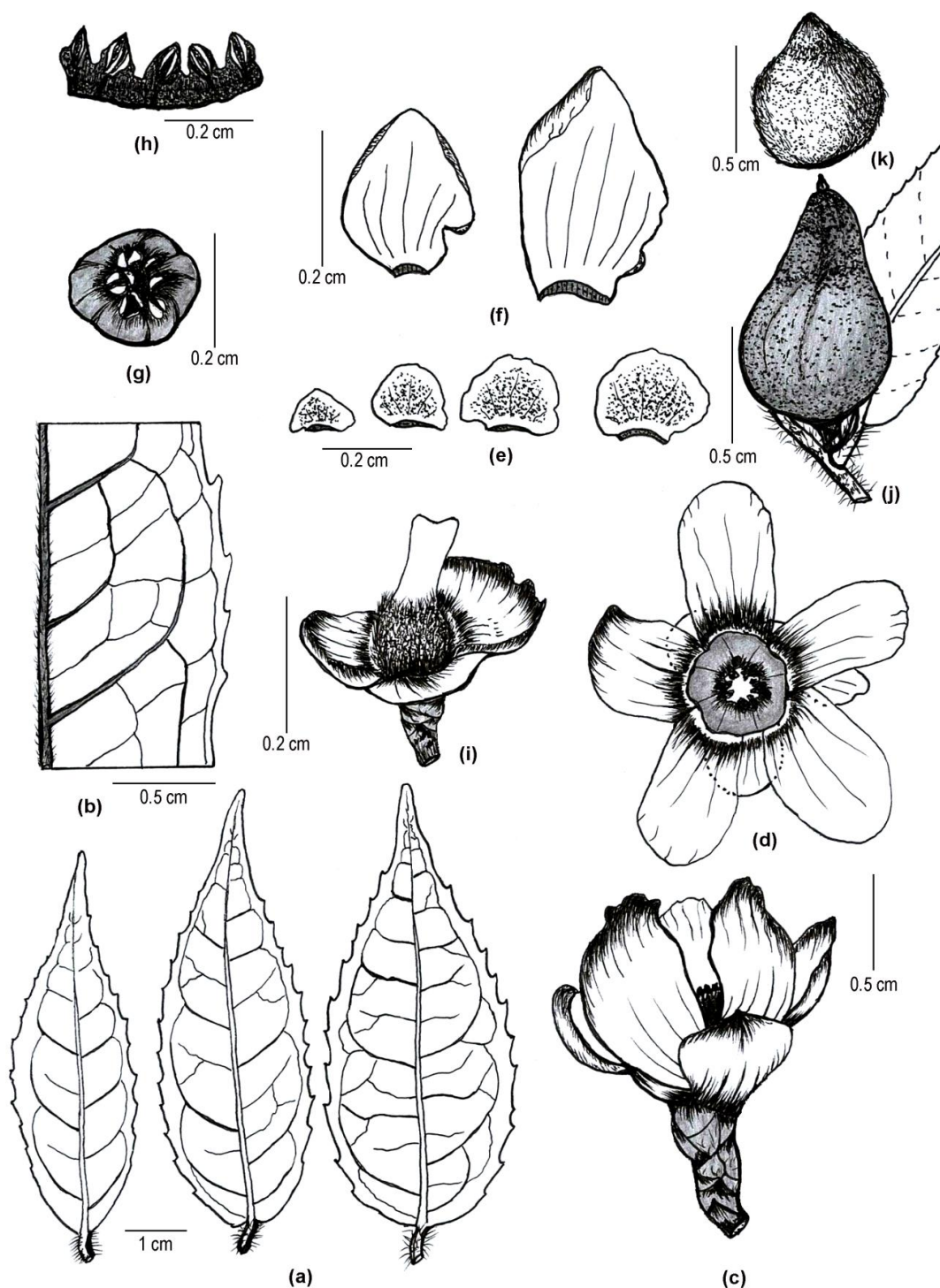


Figure 2. *Camellia pyriformis* T. S. Hoang & N. B. Trinh

Notes: (a) Leaves (adaxial surface); (b) Detail of the abaxial surface (apart); (c) Flower (lateral view); (d) Flower (top view); (e) Sepals; (f) Petals; (g) Androecium; (h) Stamens; (i) Gynoecium with sepals; (j) Fruit; (k) Seed.

Source: Drawn by Luong Van Dung.

Table 1. Morphological comparison of the species of *Camellia* sect. *Calpandria*

Character	<i>C. pyriformis</i>	<i>C. kirinoii</i> (Ninh, 1999)	<i>C. luteocalpandria</i> (Yu et al., 2021)	<i>C. lanceolata</i> (Sealy, 1958)	<i>C. connata</i> (Sealy, 1958)
Habit	shrub or tree, 2.5–4.0 m tall	shrub or tree, 1.5–2.0 m tall	shrub or small tree, 3.0–4.0 m tall	shrub or small tree, 4.0–9.0 m	shrub or small tree, 3.0–9.0 m
Young branches	densely villous	white hirsute	densely spreading grayish-yellow villous	hirsute or villous	densely hirsute
Leaf blade shape	narrow elliptic to oblong-ovate	narrow elliptic	oblong	elliptic or oblong-elliptic, sometimes ovate	elliptic or oblong-elliptic, sometimes oblanceolate-elliptic
Leaf size	4.5–7 cm long, 0.8–3.2 cm wide	9.5–13.5 cm long, 3.0–4.5 cm wide	7.0–10.0 cm long, 2.5–3.5 cm wide	14.5 cm long, 2.0–6.2 cm wide	(5.5)–6.0–9.0 cm long, (2.2)–2.5–4 cm wide
Leaf apex	acuminate or narrowly acuminate		apex acuminate to caudate	obtuse to bluntly acuminate	short and blunt to short and bluntly acuminate
Leaf base	rounded or slightly cordate		rounded or slightly cordate	narrow to wide cuneate, rarely rounded	cuneate to wide cuneate or almost round
Adaxial	pubescent along midrib	glabrous	densely villous along midvein	glabrous or short pubescent along the midrib	glabrous or obscurely puberulous along the midrib
Abaxial	pubescent	pubescent	villous along the midrib and lateral vein	villous	sparsely pilose or villous along the midrib
Petiole	2.0–5.0 mm long, densely villous	1.0–2.0 mm long, hirsute	petioles 1.0–2.0 mm long, villous	3–8 (10.0–12.0) mm long, hirsute and becoming glabrous	(3)–4.0–7.0 mm long, densely hirsute
Flower	solitary or geminate, axillary	solitary, axillary	solitary or rarely geminate, axillary	1–2 (more) at the top of such shoots	solitary, terminal or axils of the uppermost leaves
Flower diameter	1.2–1.5 cm	1.0–2.0 cm	1.5–2.0 cm		
Pedicele	about 2.0 mm long, pubescent	1.0–1.5 mm long, pubescent	1.0–2.0 mm long, sparsely grayish-yellow pubescent	about 2.0 mm long	about 3.0 mm long
Bracteole	2–3, scales to orbicular, sparsely pubescent on both sides	5–6	2, or rarely 3, abaxially grayish-yellow pubescent, adaxially glabrous		

Table 1. Morphological comparison of the species of *Camellia* sect. *Calpandria* (cont.)

Character	<i>C. pyriformis</i>	<i>C. kirinoii</i> (Ninh, 1999)	<i>C. luteocalpandria</i> (Yu et al., 2021)	<i>C. lanceolata</i> (Sealy, 1958)	<i>C. connata</i> (Sealy, 1958)
Sepal	pubescent on both sides	7–8, outer side pubescent	sepals 4–6, outer side pubescence and concentrated at the middle and upper part, inner side glabrous		
Perules (bracteole and sepal)				(4) 5–8, outer side glabrous to strigose-tomentose, inner side glabrous to velutinous	10–11, glabrous
Petal	6–7, white, free to the base, both sides glabrous	7–8, light yellow, outer side pubescent	petals 6–8, yellow, both sides glabrous	4 or (5)–6–9 white, outer side strigose-tomentose, inner side velutinous	5, white
Stamen	5–6, glabrous	20–22	7–8(–12), glabrous	4–7, glabrous	
Ovary	3, densely white silky strigose tomentose	3, densely tomentose	3, densely grayish-yellow pubescent	3, densely yellow silky strigose tomentose	3, densely tomentose
Style	glabrous, united	densely tomentose	basal 1/2 pubescent, apex 3-lobed	hairy or glabrous	tomentose
Capsule	pyriform, pubescent	globose, pubescent	oblate or subglobose, apex obtuse or beak acute	subglobose or broad pyriform	subglobose, slightly pubescent along grooves
Seed	broad pyriform, densely villous		hemispherical or subglobose, densely reddish-brown pubescence	irregularly plano-convex, cuneate-convex, or tetrahedral, prominent hilum	plano-convex, prominent hilum

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