Camellia sonthaiensis (Theaceae), a new species from Vietnam

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Camellia sonthaiensis Luu, Luong, Q.D. Nguyen & T.Q.T. Nguyen (Theaceae) is described and illustrated as a new yellow-flowered species from southern Vietnam. It is morphologically compared with close species in Camellia sections Archae.camellia, Bidoupia, Capitata, Chrysantha, Dalatia, Oboidea and Piquetia. Morphological data provisionally supports its placement in Camellia sect. Piquetia.

During a field trip in 2012 to survey the local flora in Son Thai Commune (Khanh Vinh District, Khanh Hoa Province, Vietnam) we discovered a population of a distinctive Camellia species with arching stems, purple twigs, and long and narrowly-lanceolate leaves. In April 2013, we collected flowering specimens from the same population. The morphological characters indicated that those specimens did not represent any known Camellia species.

Camellia sonthaiensis Luu, Luong, Q.D. Nguyen & T.Q.T. Nguyen, sp. nova (Fig. 1)


ETYMOLOGY: Named after the type location, Son Thai Commune.

Shrub 2–5 m high, evergreen, with an arching stem, sparsely branched, branches slender; new shoots purple, shiny, glabrous; young branches purple, glabrous, shiny, flexuous; mature branches light brown, with longitudinally fissured bark. Leaves pendulous, glabrous, narrowly lanceolate, obtuse at base, acuminate at apex, with shallowly toothed, undulate margin; young leaves purple, shiny; mature leaves coriaceous, shiny on both sides, adaxially light green, abaxially pale green, (10)17–30 cm long, (1.8)4–5.6 cm wide; midrib prominent on both sides; secondary venation brochidodromous, with 13–18 pairs of arched veins, adaxially slightly raised, abaxially prominent; tertiary venation adaxially distinct, abaxially indistinct; leaf petioles purple and straight when young, light green and falcate when mature, partially obstructed by leaf lamina on adaxial side, adaxially channelled, glabrous, 1–1.2 cm long, 2.5–3.0 mm wide, thick, angle of attachment variable: between 30° and 90°. Flowers pedunculate, 1–3, borne on a short bracteate shoot in axils of old leaves; short shoots ca. 2 mm long,
bracts (*sensu* Sealy 1958) 3–4, triangular or ovate, concave, compacted, subtending flower, 1.5 mm long × 1.5 mm wide, glabrous; flower buds ovate, ferruginous; open flowers evenly circular, ca. 5 cm in diameter; pedicels stout, brownish green or brown, shiny or cracked and corky, 12–15 mm long, 2 mm wide at proximal end, 3 mm wide at distal end; bracteoles (*sensu* Sealy 1958) 2–3, triangular, appressed to and scattered along pedicel, hairy on outer surface, ca. 2 mm long, 1 mm wide, distinctly differentiated from sepals; sepals 5, persistent, ovate, concave, coriaceous, finely hairy on outer surface, with translucent margin, 6–12 mm long, 10–19 mm wide, centrally green, marginally light yellow, arranged in 2 whorls forming a rather loose spiral, outer whorl of 2 sepals and inner whorl of 3 sepals; petals 7, finely hairy on outer surface, with translucent margin, concave, 14–16 mm long, 16–18 mm wide, arranged in 3 whorls; outer whorl distinct with 3 petals, petals centrally green, distally light yellow; middle and inner whorls of 2 petals each, petals yellow, with revolute margins; stamens numerous, arranged
Camellia sonthaensis, a new species from Vietnam

in 3 whorls; filaments ca. 260, lightly yellow, 13–18 mm long, basally united to each other for 3 mm, free above union, inner filaments basally sparsely hairy, outer filaments glabrous, basally united to petals for 3–5 mm, free above union; anthers yellow, 2 mm long, 1 mm wide, with two longitudinal striations, dorsifixed; styles 4 (sometimes 3), free, basally densely hairy, 9–10 mm long, 1 mm wide at base, 0.5 mm at apex, yellowish green, stigma indistinct; ovary superior, ovoidal terminating into (3)4 styles, slight longitudinal striations, yellow, finely white hairy, 4 (sometimes 3) carpellate, ca. 5 mm long, 3–4 mm in diameter, 2 ovules per locule. Mature fruits capsular, corky, 3–3.5 cm in diameter, 1.5–2 cm deep, with persistent sepals, dehiscing distally into 4 parts; columella stout, 0.8–1.1 cm long, 4–5 mm wide; seeds not seen.

Camellia sonthaensis was found in a broad-leaved, evergreen forest on humid fertile soils, along a mountain stream. Flowers were seen for a short time in April. It appears to belong in sect. Piquetia, as it has salient morphological characteristics: large leaves, 1–3 nodding and pedicellate flowers borne on short shoots in the axils of the leaves, 3–4 bracts, a very stout and upward thickened pedicel, 2–3 persistent bracteoles, 5 persistent sepals, 7 petals, stamens free above the union with petals, hairy inner filaments, and a densely hairy ovary. The usually 4-locular ovary with four styles may be used to distinguish C. sonthaensis from the other known species of the section, namely, C. piquetiana, C. dongnaiensis, C. dalatensis and C. longii (Pierre 1877, Sealy 1958, Richards et al. 2002, 2003, Orel 2006, 2014a, Tran & Luong 2012). However, the fact that the capsule of C. piquetiana, the type species of the section, was reported by Sealy (1958) to have four or five lobes and four or four locules suggests possible 4-locular ovaries in C. piquetiana and the section. Flowers with four to five styles are also reported for C. piquetiana in Richards et al. (2002, 2003). In fact, the new species is easily distinguishable from C. piquetiana and C. longii by the yellow flowers and smaller leaves; from C. dalatensis by the glabrous twigs, smaller and glabrous leaves, fewer secondary veins, glabrous petiole and fewer petals, and from C. dongnaiensis by the purple young leaves, lighter yellow flowers, more sepals, free inner filaments and entirely free styles.

The known species of Camellia sect. Piquetia can be distinguished using the following key:

1. Flowers red ........................................... 2
1. Flowers yellow or orange ........................................... 3
2. Corolla campanulate; petals 5–6 .................. C. longii
2. Corolla rotate; petals 8 or more ............... C. piquetiana
3. Twigs hairy; leaves abaxially hairy .......... C. dalatensis
3. Twigs and leaves glabrous ......................... 4
4. Flowers orange; sepals 3; petals 8; inner filaments fused in bottom third, glabrous; styles compound, basally fused ............................................... C. dongnaiensis
4. Flowers light yellow; sepals 5; petals 7; inner filaments free and basally hairy; styles entirely free .......... C. sonthaensis

Camellia sonthaensis also has a number of morphological characteristics in common with other Camellia species, especially those of sect. Archecamellia (sensu Sealy 1958, Ming 2000) and sect. Chrysanthia (sensu Chang 1981, Chang & Bartholomew 1984), such as the coriaceous leaves, brown punctures and arched nerves on the abaxial surfaces, a distinct pedicel, five persistent sepals, seven yellow petals, numerous stamens, a 3–4 locular ovary and 3–4 free styles. There are however many differences (see Appendix). In addition, its narrowly lanceolate leaves, five hairy sepals, seven hairy petals, 3- to 4-carpellate and densely hairy ovary, and 3 or 4 hairy and entirely free styles render C. sonthaensis distinct from the recently reported large-leaved and yellow-flowered Camellia species, including C. capitata (sect. Capitata), C. bugiamapensis and C. luteocerasa (sect. Dalatia), C. dilinhasis (sect. Oboidea), and C. inusitata (sect. Bidoupia) (Orel & Wilson 2010, Orel et al. 2012, Tran & Luong 2013, Orel et al. 2014b).

Acknowledgements

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References


### Appendix. Comparison of selected characteristics of *Camellia sonthaiensis* and its morphologically close species. Data are from sources given in the first column under the species' names.

<table>
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<tr>
<th>Species</th>
<th>Leaf lamina</th>
<th>Flowers</th>
<th>Sepals</th>
<th>Petals</th>
<th>Stamens</th>
<th>Ovary</th>
<th>Styles</th>
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<tbody>
<tr>
<td><em>C. cattiensensis</em></td>
<td>glabrous, dull green, with distinct orange-coppery sheen when young, deep green when mature, narrowly obovate, 44 cm long, 14 cm wide, base auriculate</td>
<td>solitary, axillary, occasionally terminal, upright, intensely orange, with randomly distributed, clearly defined areas of dark-brown pigmentation</td>
<td>6, glabrous, pink to light green in the middle, light yellow distally, maturing to light brown</td>
<td>8, orange, with narrow white margins</td>
<td>fused in bottom third, glabrous</td>
<td>5-carpellate, each carpel bilocular, tomentose</td>
<td>compound, proximally 5-parted, but fused at the base, glabrous (?)</td>
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<tr>
<td><em>C. dalatensis</em></td>
<td>adaxially glabrous, abaxially hairy, oblong, 40–45 cm long, 8–11 cm wide, base cordate</td>
<td>1–3, axillary, yellow</td>
<td>5, yellow</td>
<td>8–10, yellow</td>
<td>outer filaments united basally</td>
<td>4–5-carpellate, pubescent</td>
<td>4–5, pubescent</td>
</tr>
<tr>
<td><em>C. diinhensis</em></td>
<td>glabrous, deep green, oblong-elliptic or elliptic, 16–24.5 cm long, 5.5–9.5 cm wide, base cuneate</td>
<td>1–3, axillary, light yellow</td>
<td>5, light yellow, glabrous</td>
<td>8–9, light yellow, glabrous</td>
<td>free above the union with petals, glabrous</td>
<td>3-carpellate, hairy</td>
<td>proximally, glabrous distally, light yellow to white, proximally fused for 4–5 mm</td>
</tr>
<tr>
<td><em>C. dongnaiensis</em></td>
<td>glabrous, dull green, with distinct orange-coppery sheen when young, deep green when mature, narrowly obovate, 44 cm long, 14 cm wide</td>
<td>solitary, axillary, occasionally terminal, light green in the middle, light green distally, maturing to light yellow</td>
<td>3, glabrous, pink to light green in the middle, light green distally, maturing to light yellow</td>
<td>8, yellow-apricot with intense pink margin, glabrous</td>
<td>fused in bottom third, glabrous</td>
<td>5(6)-carpellate, each carpel bilocular, tomentose</td>
<td>compound, proximally 5(6)-parted, but fused at the base, glabrous (?)</td>
</tr>
<tr>
<td><em>C. flava</em></td>
<td>glabrous adaxially, pubescent or villose abaxially, oval or oblong-elliptic or oblong oval, 6–15 cm long, 2–8 cm wide, base shallowly cordate</td>
<td>solitary, axillary, yellow</td>
<td>5, densely grey-vellutinous on outer surface, glabrous to grey-vellutinous on inner surface</td>
<td>9–13, yellow, puberulous</td>
<td>outer filaments fused into a column up to 9 mm long, glabrous, inner filaments free, densely hairy</td>
<td>5-carpellate, densely yellow-tomentose</td>
<td>5, free to base, densely yellow-hairy except for apical 2 mm</td>
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<tr>
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<tr>
<td><em>C. krempfii</em></td>
<td>glabrous, oblone, 28–31.5 cm long, 6–7.5 cm wide, base cordate</td>
<td>solitary, axillary, white (?), basally united for 7–9 mm above the union with petals, puberulous on lower half, glabrous above</td>
<td>10–13, 10, white (?), grey-velutinous, united for 7–8 mm above the union with petals, forming a fleshy cup</td>
<td>5-carpellate, hairy</td>
<td>5-carpellate, hairy</td>
<td>5, free to base, hairy</td>
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<td>(Gagnepain 1941, Sealy 1958, Pham-hoang 2000)</td>
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<tr>
<td><em>C. longii</em></td>
<td>glabrous, dark purple to lilac to red, sometimes almost brown, lamina narrow elliptic to narrow oblone, 27.0–31.0 cm long, 6.0–10.5 cm, slightly coriaceous</td>
<td>axillary or terminal, solitary, red</td>
<td>5, red, finely hairy on outer surface</td>
<td>7–8, red, hairy on outer surface</td>
<td>basally joined for 1.0–1.2 cm, glabrous</td>
<td>4–6-carpellate, densely, finely tomentose</td>
<td>proximally fused for ca 5.0 mm, 5–6 parted distally, finely pubescent, proximally, glabrous</td>
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<td>(Orel et al. 2014b)</td>
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<td><em>C. oconoriana</em></td>
<td>glabrous, dull, of soft lilac colour when young, green when mature, lamina very narrowly elliptic to narrowly elliptic, 30–36.5 cm long, 8–8.5 cm wide, slightly coriaceous</td>
<td>solitary or 2, always axillary, yellow with dark pink-lilac to purple blush</td>
<td>2, glabrous, of yellow-green colour, with pink randomly distributed pigmentation</td>
<td>5–6, yellow, with dark pink-lilac to purple blush</td>
<td>proximally fused for c.6 mm, forming a bright orange, ring-like structure</td>
<td>4–5-carpellate, unevenly parted, finely hairy</td>
<td>compound, 3–5 parted, finely hairy, proximally, glabrous distally, light yellow to white, proximally fused for 4–5 mm</td>
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<td>(Orel et al. 2013)</td>
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<tr>
<td><em>C. piquetiana</em></td>
<td>glabrous, dark green, oblong-elliptic, 29–50 cm long, 9.5–12.5 cm wide, base obtuse or round</td>
<td>1–3 on short bracteate shoots in leaf axils, pink, suffused with purple</td>
<td>5, pubescent on outer surface, glabrous on inner surface</td>
<td>7 or more, pink, marginally purple</td>
<td>united one another for 3–5 mm, inner filaments basally puberulous, outer filaments glabrous</td>
<td>5(6)-carpellate, densely tawny-tomentose</td>
<td>4–6, free to base, densely pubescent</td>
</tr>
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| *Camellia tonkinensis*  
(Pitard 1910, Pham-hoang 2000, Tran & Luong 2013) | glabrous, sparsely puberulous along the midrib base, dark green, elliptic or oblong-elliptic, 9–13.5 cm long, 2.5–5 cm wide, papery, base round or angular. | solitary, axillary or subterminal, pale yellow | 5, light yellow, yellow puberulous | 9–12, pale yellow, glabrous | puberulent, outer filaments united for 4 mm | 3-carpellate, pale yellow tomentose | 3, free to base, pale yellow tomentose |
| *C. vidalii*  
(Rosmann 1999) | glabrous, green, oblong-elliptic or elliptic, 35–40 cm long, 6–8 cm wide, base round or angular. | up to 3, terminal or axillary, light or chromium yellow | 5, yellow (?), glabrous | 9–10, light or chromium yellow, glabrous | glabrous, outer filaments united, inner filaments free | 5-carpellate, hirsute | 5, free to base, pubescent |
| *C. sonthaiensis*  
(this study) | glabrous, purple when young, green when mature, lamina narrowly lanceolate, (10) 17–30 cm long, (1.8) 4–5.6 cm wide, coriaceous, base obtuse and revolute. | 1–3 flowers borne on a very short bractate shoot in the axils of old leaves, yellow | 5, finely hairy on outer surface, with translucent margin | 7, yellow, finely hairy on outer surface, with translucent margin | free above the union with petals, basally hairy on inner filaments | 3 (sometimes) to (mostly) 4-carpellate, hairy | 3 (sometimes) to (mostly) 4, 14–15 mm long, free to base, basally densely hairy |