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Camellia hagiangensis, a new species of red *Camellia* (Theaceae) recorded from Northern Vietnam

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ABSTRACT

Camellia hagiangensis, a new red *Camellia* species, from Ha Giang province in northern Vietnam is described and illustrated. The morphological data support a placement within Subg. *Camelia* Sect. *Camellia* and we propose the IUCN conservation status for *Camellia hagiangensis* as vulnerable.

Key words: Vietnam, New Species, *Camellia hagiangensis*, Sect. *Camellia*, Red Tea.

INTRODUCTION

Camellia L (Theaceae) is well distributed in Vietnam and China, with its species located widespreadly these countries. The number of species in *Camellia* genus had been estimated from 120 to 300 (Chang & Bartholomew 1984; Gao et al. 2005; Ming & Barthonomew 2007). Vietnam was considered major centre of diversity for the genus, where some 20% of the *Camellia* species can be found (Sealy 1958; Chang & Bartholomew 1984). Recently, many additional new species of *Camellia* have been discovered and described in Vietnam (Pham et al. 2019; Luong et al. 2016 a,b; Nguyen et al. 2018). In Vietnam, sixty eight species and one variety of *Camellia* are listed by Le (2017).

Camellia was divided into two subgenera (*Thea* and *Camellia*) and 14 sections (Ming & Bartholomew 2007). In particular, subgenus *Camellia* includes six sections and subgenus *Thea* includes eight sections. Sect. *Camellia* belongs subgenus *Camellia*. In Vietnam, only one species of Sect. *Camellia*, *C. yokdonensis* Dung bis & Hakoda, has been reported (Le 2017).

General morphology characteristics of the species in the *Camellia* Sect. *Camellia* are: flowers

subsessile, bracteoles and sepals imbricate, petals basally connate, androecium and gynoecium subequal in length to petals, outer filament whorl connate for basal four over five, styles connate base and split into 3 above, ovary 3-locular.

MATERIALS AND METHODS

Here one species of *Camellia hagiangensis* Q.U. Le. & Le was described and illustrated. The new species was gathered in the forest of Quang Ba district, Ha Giang province in Viet Nam at 1000-1200 m alt in January 2019. Specimens were deposited in the Herbarium of Thai Nguyen University of Agriculture and Forestry (TUAF) with N^0: TU2012019. The morpho-photographs of the species were taken with a Panasonic LX100 camera. Using method of analyzing and comparing the morphological characteristics with close species, the new species is described and its taxonomic position assessed in classification systems of Ming & Bartholomew (2007) because this is the latest system of *Camellia* and is more frequently used by taxonomists. We have classified the species in the *Camellia* Sect. *Camellia* and a new species is named as *Camellia hagiangensis.*

TAXONOMIC TREATMENT

***Camellia hagiangensis* Q.U. Le. & Le, sp. nov**. (Figs. 1 & 2).

***Camellia hagiangensis* Q.U. Le. & Le**. –**Type**: Viet Nam, Ha Giang province, in the forest of Quang Ba district; on very steep high rock mountain in rich secondary broad-leaved evergreen forest, elevation 1000- 1200 m above sea level; 23° 00' 53'' N, 104° 51' 41'' E; *Quang Ung Le, Thi Thu Le, TU2012019* (TUAF! [Thai Nguyen University of Agriculture and Forestry]- holotype; isotype: TUAF!; paratype: TCET! [Thai Nguyen College of Economics and Techniques].

Diagnosis: The new species is a perennial plant, small to medium, evergreen shrub to 3 - 5 m tall; with upright habit; mature branches glabous, bark brown-gray; branchlets reddish-brown, thin pubescent when young. Leaves simple, alternate, petioles 6-10 mm long, 1.5-2.0 mm wide, glabrous. Axillary leaf buds are white to light green, pubescent; newborn leaves being red, pubescent. Mature leaves are variable in size, shiny on both sides, blades thick and coriaceous, oblong elliptic to elliptic, base cuneate, 8-13 cm long, 2.5-4.8 cm wide; leaf apex strongly acuminate to caudate tip, slightly curved to one side, margins transparent and regularly short serrate, ca 42 teeth per side; adaxial leaf surface deep green, glabrous; abaxial leaf surface pale green to white green; midrib also light green, sparsly pubescent along midrib; veins abaxially elevated and adaxially impressed, secondary veins pinnate, 5-7 on each side of mid-vein; petiole slightly curved, rounded in cross in section, same colour as the leaf, glabous. Mature flowers infundibular when just blooming, sessile, slightly scented, red, terminal, mostly solitary, 4.5-5.5 cm in diameter; bracteoles sepals 7-10, imbricate, sub-ovate to ovate, 0.7-1.3 cm long, 0.5-0.8 cm wide, outside pubescent, shiny, outside whorl sepals pale green, inside whorl sepals with pink-red, narrowing toward the apex. Petals 5, spirally arranged, imbricate, connate at base from 0.7-0.9 cm, adnate to androecium, red, slightly concave head petals, with glabrous or pubescent in outside faces, arranged in 2-3 whorls, obovate to oblong obovate, enlarging toward the apex, 1.8 -3.0 cm long, 1.4-2.8 cm wide. Stamens arranged in 3 whorls, white, glabrous. Stamens numerous, about 75 -100, filaments in outer whorl with 2.2-2.5 cm long; these in inner whorl with 1.4-1.5 cm long. Filaments in outer whorl basally connate for two over three of their length, adnate to petals for 1.0 cm from base of petals; inner filaments free, anthers yellow, 1.2-2 mm long. Cylindrical ovary has tomentose, 2.0-2.2 mm height, 1.8-2.0 mm wide, 3-loculed. Style 1, 2-2.8 cm long, pale pink, pubescent, base connate, apex splitting into 3-lobed, free to about one over six of their length. Fruits inverted egg shape, contain 3 capsules, 3.5 - 6 cm hight, 3-5.5 cm diameter, each capsules containing one or two semiorbicular to orbicular seeds, glabrous, brown, 1-1.5 cm diameter.

Phenology: The relativelt large number of mature flowers may indicate that January to March is the main flowering for this species. Fruiting started from April to October.

Etymology: The specific epithet refers to the province of Ha Giang in Viet Nam where this species was collected.

Distribution and ecology: *Camellia hagiangensis* is only found from the type locality which is situated on the slope of Quang Ba forest, Ha Giang province in Vietnam (Figure 3). The new species was discovered in high rock moutain of broad-leaved evergreen forest. It grows with species of *Fagraea fragrans*, *Burretiodendron hsienmu, Manglietia conifera*, *Melientha suavis pierre* and other species.

Conservation status: *Camellia hagiangensis* was recorded only from Ha Giang province in Vietnam. The area of occupancy for this species is estimated to be less than 1 km^2. Despite a further search of the area around the type locality, only 9 additional mature trees were found. The total known population of the species is fewer than 50 individuals. This found species do not belong to any protected forest. Moreover, the habitats are highly disturbed by local people collecting forest products. Based on our information, a conversation status of *Camellia hagiangensis* is proposed as critically endangered under criterion D (IUCN, 2011).

Vernacular: Vietnamese name is Tra do Ha Giang (Trà đỏ Hà Giang)

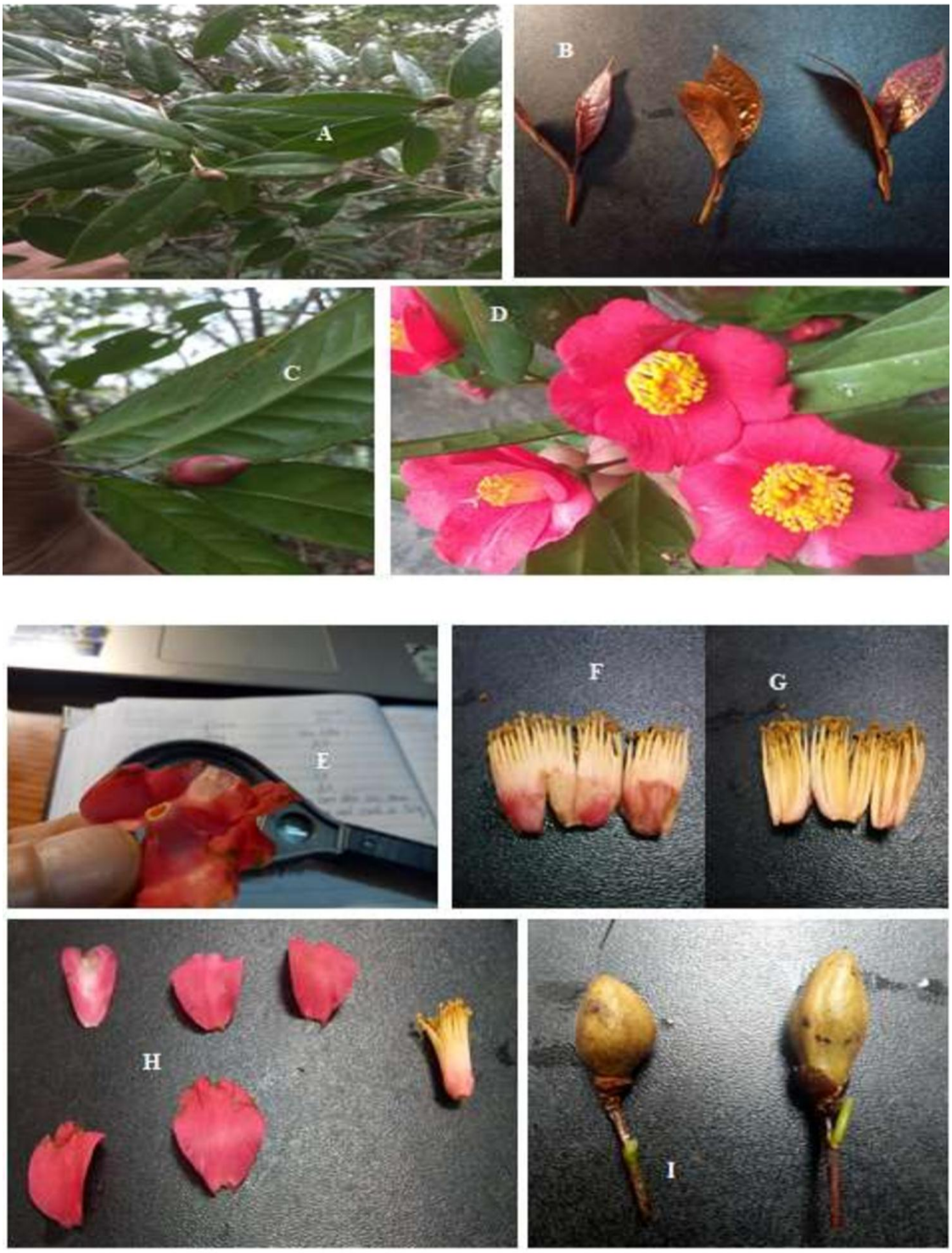

Fig. 1. *Camellia hagiangensis*. A. Flower bud branch, **B.** Newborn leaf, **C.** Mature flower bud, **D.** Inflorescence, **E.** Petals with pubescent, **F.** Outer filaments, **G.** Inner filaments, **H.** Petals and Androecium, **I**. Young fruit. (*Photos and design by Thanh Tuan*)

Discussion and Taxonomic notes: *Camellia hagiangensis* distributes in a relatively small geographical area which is a part of the thick residual subtropical forest where it forms a part of the dense understory. The new discovery considerably supplements the biodiversity resource for *Camellia* specieses. After also analyzing and comparing the morphological characteristics, the new finds are morphologically dissimilar to all known *Camellia* species. Considering the inclusiveness of the system of Ming & Bartholomew (2007), the new species should be placed in *Camellia* sect. *Camellia*. In Indochina, only two species of Sect. *Camellia, C. namkadingensis* Soulad. & Tagane (Souledeth et al. 2019) and *C. yokdonensis* Dung bis & Hakoda (Hakoda et al. 2007), have been reported, but two these specieses are quite different specieses from *C. hagiangensis* in petals colour, leaves characters, petal

number, and androecium, gynoecium ovaries which displayed in Table 1. In addition, *C. hagiangensis* most closely resembles *C.reticulata, C. pitardii* var. *pitardii* and *C. hongkongensis* reported, but *C. reticulata* is a quite different species from *C. hagiangensis* in having petioles (pubescent vs glabous), flowers (axillary or subterminal vs only terminal), larger flower diam. (7-10 cm in diam. (to more than 20 cm in diam. For some cultivars) vs 4.5-5.5 cm in diam.), more petals (5-7 petals (often more for some cultivars) vs only 5 petals), bracteoles and sepals color (green vs pink-red inner sepals that look like petals), larger petals (4-6 x3-4.5 cm vs 1.8-3 x 1.4 x 2.8 cm), longer stamens (3-4 cm vs 2.2-2.5 cm), longer style (2.5-3.5 cm vs 2.2-2.8 cm) (Website1). In comparison with *C. hongkongensis*, this is a quite different from *C. hagiangensis* in having larger flowers (5-7 cm in diam. vs 4.5 -5.5 cm in diam.), more petals (6-7 petals vs only 5 petals), longer stamens (3 cm vs 2.2-2.5 cm), fruit (rough vs glabous) (Website1). In comparison with *C. pitardii* var. *pitardii*, this is a quite different from C. hangiangensis in having oblate fruit (Website3). This record supported evidences in biodiversity of *Camellia* species in the nature. In addition, the discovery of second red flower *Camellia* in Vietnam has great significance for science and medicine.

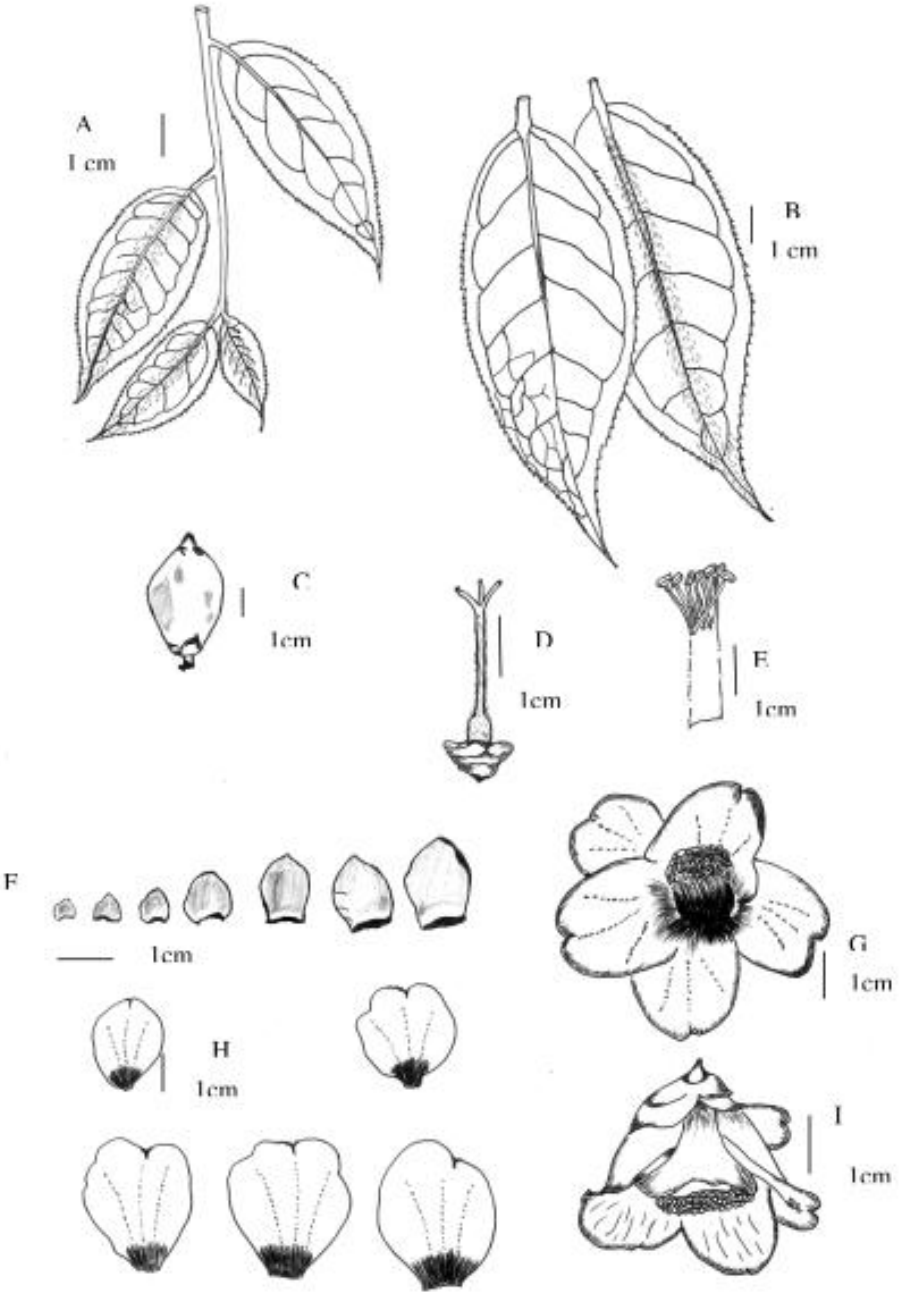

Figure 2. *Camellia hagiangensis* Q.U. Le. & Le. - **A**. Juvenile leaves, adaxial and abaxial view, - **B**. Adult leaf, with abaxial view (right) and primary, secondary, tertiary venation (left), - **C**. fruit, - **D**. ovary and styles, - **E**. filaments, - **F**. sepals, - **G**. flower top view, - **H**. petals, - **I**. lateral view of flower. Drawn by Thanh Tuan.

Figure 3. Distribution of *Camellia hagiangensis*, location in Ha Giang province is marked by blue rounds

Table 1. Morphological comparison between *C. hagiangensis* with *C. namkadingensis* and *C. yokdonensis*

Characters	***Camellia hagiangensis***	***Camellia namkadingensis***	***Camellia yokdonensis***
Leaf blade shape	oblong elliptic to elliptic	obvate to elliptic	oblong
Newborn leaves	red, pubescent	not screen	not screen
Mature leave hairiness	sparsly pubescent along midrib	glabrous	glabrous
Lateral veins	5-7 pairs	8-10 pairs	7-8 pairs
Leaf size	8-13 cm long and 2.5-4.8 cm wide	8-13 cm long and 2.8- 6.0 cm wide	15-20 cm long and 5.5-6 cm wide
Petiole	0.6 – 1.0 cm long, glabrous	1-1.2 cm long, glabrous	0.6-1.0 cm long, pubescent
Flower diameter (cm)	4.5-5.5 cm diameter	6.0 cm diameter	3-4.3 cm diameter
Flower booming period	january to march	december	february to march
Petal number	5	6	7-10
Petal size	1.8 - 3.0 cm long, 1.4-2.8 cm wide	(2-)2.5-2.7 x 1.5-2.2	not screen
Petal color	red	pink	organe-red
Petal hairiness	glabrous or pubescent in outside faces	glabrous	glabrous
Androecium	about 75-100 stamens	more than 350 stamens	170 stamens
Filaments	1.4-2.5 cm long, united two over three of their lenght	1.3-2.6 cm long, united three over four of their lenght	About 2.0 cm, united one over four to one over three of their lenght
Anthers	yellow	yellow	yellow
Style	2.0-2.8 cm long, pale pink, pubescent, trifid at the apex for 3-7 mm	3 cm long, glabrous	1.0-1.3 cm long, trifid at the apex for 5-6 mm, glabrous, yellow
Ovary	pubescent	glabrous	glabrous

Key to identification of species of *Camellia* Sect. *Camellia* in Indochina

1a. Ovary pubescent

2a. Sepals 7-10, petal number 5, red, glabrous or pubescent in outside faces, androecium 75-100 stamens……***Camellia hagiangensis* Q.U. Le. & Le**.

1b. Ovarry glabrous

3a. Sepals 10, petal number 6, pink, glabrous, androecium more than 350 stamens……***Camellia namkadingensis* Soulad. & Tagane**.

3b. Sepals 6-8, petal number 7-10, organe-red, glabrous, androecium 170 stamens….....***Camellia yokdonensis* Dung bis & Hakoda**.

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Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

Chang HT, Bartholomew B. 1984. Camellias. Timber press, Portland.

Gao JY, Parks CR, Du YQ. 2005. Collected Species of the Genus Camellia: An Illustrated Outline. Zhejiang Science and Technology Publishing House, Hangzhou.

Hakoda N, Kirino S, Tran N. 2007. New Species of Genus camellia in Vietnam. Int Camellia J 39: 54-57.

IUCN. 2011. IUCN Redlist Categones and Criteria, version 3.1. -www.iucnredlist.org-, accessed on 2 march 2011.

Luong VD, Hoang TS, Tran N, Pham HN. 2016a. Camellia quangcuongii (Theaceae), a New species from Vietnam. J Jpn Bot 91: 226-230.

Luong VD, Le A, Nguyen TH, Nguyen TL. 2016b. *Camellia thuongiana* – a new yellow camellia species from vietnam. Dalat Uni J Sc 6(3): 338-344.

Ming TL, Bartholomew B. 2007. Theaceae. In: Wu Z.-Y and Raven P.H. (eds), Flora of China 12: 366-478. Scienece press, Beijing and Missouri Botanical Garden, St. Louis.

Nguyen LT, Tran N, Chiyomi U, Hironori K, Luong DV, Hoang ST, Nguyen KD, Nguyen HV,, Thai TC. 2018. Two new species of Camellia (Theaceae) from Vietnam. Korean J Pl Taxon 48(2): 115-122.

Le NHN. 2017. Study on classification of *Camellia L.* genus belonging the Theaceae family in Vietnam (Dissertation by Vietnamese language).

Pham VT, Luong VD, Averynov L, Trinh NB, Nguyen TL, Nguyen TLT. 2019. *Camellia Velutina* (Theaceae, Sect. Chrysantha), A new species from northern Vietnam. Pak J Bot 51(4): 1441-1446.

Website1:http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=242310199.

Website2:https://www.herbarium.gov.hk/PublicationsPreface.aspx?BookNameId=1&ContentId=37&SectionId=3

Website3:http://www.efloras.org/florataxon.aspx?flora_id=1001&taxon_id=242310175

Sealy R . 1958. A revision of the Genus *Camellia*. The Royal Horticultural Society, London.

Souladeth P, Tagane S, Yahara T. 2019. Flora of Nam Kading National Protected Area V: Two new species of Camellia (Theaceae), *C.namkadingensis* and *C.rosacea*. Thai Forest Bull Bot 47(1): 82-90.