

**A NEWLY RECORDED SPECIES *Strobilanthes lamiifolia* (Nees) T. Anderson
(Acanthaceae) FOR THE FLORA OF VIETNAM**

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ABSTRACT

Strobilanthes lamiifolia (Nees) T. Anderson is reported here as a new record for the flora of Vietnam. It is morphologically allied to *Strobilanthes sulfurea* but differs in the shape of the leaf, bract, and bracteoles. Photographs and line drawings are given together with information on habitat, ecology and preliminary conservation assessment based on IUCN criteria.

Keywords: Vietnam, *Strobilanthes*, morphology, plant diversity, taxonomy.

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INTRODUCTION

The genus *Strobilanthes* Blume (1826: 796) is the third largest genus in the family Acanthaceae and comprises approximately 450 species distributed in the tropical and subtropical regions of Asia (Deng et al., 2006; Wood & Scotland, 2009; Hu et al., 2011; Mabberley, 2017; Chen et al., 2019, 2020; Deng, 2020; Deng & Gao, 2020). It is characterized by homomorphic calyx lobes, 4 monadelphous stamens in which usually 2 filaments are distinctly longer than the other two, 2-locular ovary with 2(-8) ovules per locule, and seeds borne on hook-like retinacula (Hu et al., 2011; Deng, 2020). In Vietnam, the genus is represented by 47 species (Benoist, 1935; Ho, 2000; Lien, 2005; Wood & Scotland, 2003; Wood et al., 2017; Xuyen & Hai, 2006; Oanh et al., 2017; Son et al., 2018; Trang et al., 2020). However,

detailed taxonomic studies on the genus are still awaited.

During our several floristic exploration trips in northern Vietnam, we encountered an interesting *Strobilanthes* species which does not match with any known Vietnamese species (Fig. 1). After examining the voucher specimens and type materials in several herbaria like CAL, HN, K,... and consulting the relevant literature (Benoist, 1935; Bremekamp, 1944; Bennett & Scotland, 2003; Deng et al., 2006, 2007; Deng, 2020; Wood & Scotland, 2009, Ho, 2000, Hu & Tsui, 2002; Hu et al., 2011), it was identified as *Strobilanthes lamiifolia* (Nees) T. Anderson. This taxon was hitherto recorded from Bhutan, China, India, Myanmar, and Nepal, but never from Vietnam. Present work reports this as a new addition to the Flora of Vietnam. A detailed description and illustration (Figs. 2, 3) are provided here.

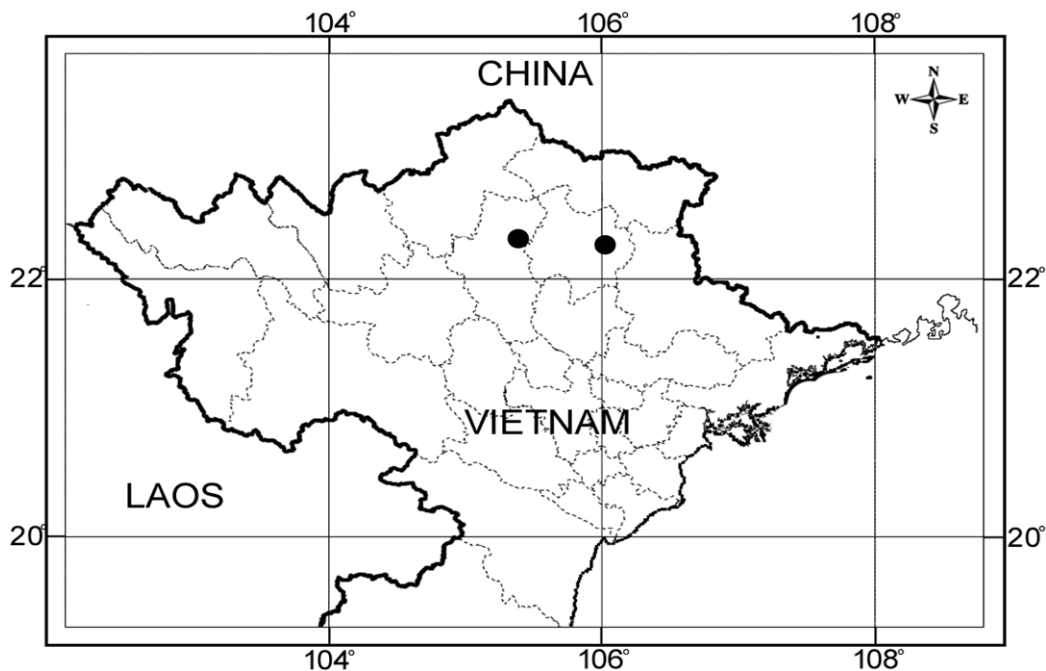


Figure 1. Map showing the distribution of *Strobilanthes lamiifolia* (Nees) T. Anderson (●) in northern Vietnam

MATERIALS AND METHODS

The morphological description of the newly recorded species provided here is

based on the examination of the fresh plant and dried specimens housed in the herbarium of the Institute of Ecology and

Biological Resources, Vietnam Academy of Science and Technology, Ha Noi, Vietnam (HN). A detailed comparison with morphologically similar species is provided based on our review of the relevant literature (Benoist, 1935; Ho, 2000; Deng et al., 2006; Hu et al., 2011; Deng, 2020). Vouchers were prepared following the standard protocol (Jain & Rao, 1977) and deposited in HN. Materials in CAL, HNU, VNM, VNMN, and digitized plant specimens available on the web, e.g. JSTOR Global Plants (<https://plants.jstor.org/>), BM (<https://www.nhm.ac.uk>), Chinese Virtual Herbarium (<https://www.cvh.ac.cn/>), GZU (<https://botanik.uni-graz.at/en/>), K (<https://apps.kew.org/herbcat/navigator.do>), L (<https://bioportal.naturalis.nl/>) and P (<https://science.mnhn.fr/>) were also examined. For the conservation assessments, the IUCN Red List categories and criteria (IUCN, 2012) were followed and information from our field surveys, and herbarium data were also considered.

RESULTS

Taxonomic Treatment

Strobilanthes lamiifolia (Nees) T. Anderson, J. Linn. Soc., Bot. 9: 476. 1867. (Figs. 2, 3).

Basionym: *Goldfussia lamiifolia* Nees in Wall., Pl. Asiat. Rar. 3: 88. 1832. Type: NEPAL, 1821, Wall. Cat. no. 6081 (lectotype designated by Deng et al., 2006, K001115704 (K-W); **isolectotypes**: BM000906307! (BM), CAL0000019718! (CAL), CGE!, GZU250302!, GZU256279!, GZU256280! (GZU), K000883041!, K000883042!, K000883043! (K), LE, WU!).

Synonyms: *Ruellia rotundifolia* D. Don, Prodr. Fl. Nepal: 120. 1825, non *Strobilanthes rotundifolia* Benoist, Bull. Mus. Natl. Hist. Nat. 28: 97. 1922. Type: NEPAL, Wallich s.n. (holotype: BM!); *Pteracanthus rotundifolius* (D. Don) Bremek., in Verh. Ned. Akad. Wetens. Afd. Nat. Sect. 2, 41(1): 199. 1944. *Strobilanthes mahongensis* H. Lév., Cat. Pl. Yunnan: 6. 1915, 'makongensis'. Type: CHINA, Yunnan, E. E. Maire s.n. (lectotype

designated by Deng et al. 2006 E00047324! (E), isoelectotype: BM000906313!) (BM)). *Goldfussia mahongensis* (H. Lév.) E. Hossain in Notes Roy. Bot. Gard. Edinb. 32(3): 407. 1973. *Strobilanthes hancockii* C. B. Clarke ex W. W. Sm. in Notes Bot. Gard. Edinb. 10: 193. 1918. Type: CHINA, Yunnan, Hancock 104 (lectotype: K000882692! (K), isoelectotype: (NY)). *Goldfussia hancockii* (C. B. Clarke ex W. W. Sm.) Bremek., in Verh. Ned. Akad. Wetens. Afd. Nat. Sect. 2, 41(1): 231. 1944. *Strobilanthes austinii* C. B. Clarke ex W. W. Sm. in Notes Bot. Gard. Edinb. 10: 190. 1918. Type: CHINA, Yunnan, A. Henry 13382 (lectotype: K000882694! (K)). *Goldfussia austinii* (C. B. Clarke ex W. W. Sm.) Bremek., in Verh. Ned. Akad. Wetens. Afd. Nat. Sect. 2, 41(1): 231. 1944.

Description (Figs. 2, 3): Isophyllous herbs upto 70 cm; stems slender, decumbent and often rooting at nodes, terete or angular, pubescent when young, later glabrous. Leaves unequal in each pair; petioles 0.5–3 cm, upper leaves sessile, densely yellowish brown pilose; ovate, 4–10 × 2–8 cm, base usually asymmetric, attenuate to cuneate, decurrent onto petiole, apex acute to acuminate, margin crenate or serrate, adaxially dark green and sparsely pilose, abaxially glabrous and pubescent along veins; secondary veins 8–13 on each side of midvein, abaxially prominent and adaxially impressed, netted near margin. Inflorescences terminal or axillary from apical leaf axils, spikes simple, 3–6 cm, rachis glandular pubescent; peduncle 0–5 cm, sparsely pilose, square; sterile bracts resembling reduced leaves. Bracts imbricate, oblong to ovate, 10–15 × 5–8 mm, obtuse or concave, caducous or somewhat persistent after flowering, dull green, abaxially pubescent and covered with cystoliths, margin usually crenulate; bracteoles caducous, oblong or narrowly oblanceolate, 14–18 × 1.5–4 mm, abaxially pubescent. Calyx 10–16 mm at anthesis, accrescent to 2 cm in fruit, densely gland-tipped ciliate, tube 1–2 mm; 2-lipped; lower lip 2-lobed almost to base, lobes linear-oblong, acute, equal; upper lip 3-lobed to middle, lobes linear-oblong, acute, unequal,

one lobe longer than others, longer lobe 7–8 × 1.8–2 mm, shorter lobes 6–7 × 1.5–1.8 mm. Corolla creamy white to purplish white (in Vietnamese specimens), purplish red to blue (in Chinese specimens), 3–4.5 cm, ventricose, outside pubescent, tube cylindrical for its basal 1–1.5 cm, gently curved and widening above to 1 cm at mouth, lobes ovate-rounded, 6 × 3 mm, apex retuse. Stamens 4, included; filaments of longer stamens pair unequal, longer 5–5.5 mm, shorter 4–4.5 mm, included, sparsely pubescent; filaments of shorter pair incurved, 1–2.5 mm, sparsely pubescent; anthers thecae oblong-linear, 2–2.5 mm, connective not produced; staminode 1; base of filaments hirsute. Ovary oblong, comose; style 2.5–3.5 cm long, glabrous except pubescent at base; stigma unequally 2-lobed. Capsule, 13–18 mm, glandular pubescent towards apex, 4-seeded. Seeds flattened, ovate-elliptic, 3.5–4 mm, densely appressed pilose; areole 0.5 mm.

Phenology: Flowering from October to November; fruiting from November to December.

Distribution: Vietnam: Bac Kan (Bach Thong), Tuyen Quang (Na Hang). Bhutan, China, India, Myanmar, Nepal.

Ecology: *Strobilanthes lamiifolia* was found growing under the shades of secondary forests on soil or soil mixed with rocks, at an elevation range of 400–900 m a.s.l.

Specimens examined: VIETNAM. Bac Kan province, Bach Thong district, Vu Muon commune, 18 November 2016, *Do Van Hai DVH18112016* (HN); Tuyen Quang province, Na Hang district, 27 October 1998, *Hai-Ning Qin, Hua Zhu, Ming-Li Zhang, Tian-Gang Gao 294* (HITBC, PE, TAIF); Tuyen Quang province, Na Hang district, 29 December 2001, *T-V 100* (HN); Tuyen Quang province, Na Hang district, Vinh Yen commune, 1 November 2003, *Nguyen Quoc Binh, Dao Dinh Cuong VN 1204* (HN); Tuyen Quang province, Na Hang district, Son Phu commune 24 October 2021, *Do Van Hai, Nguyen Van Truong DVH 401* (HN).

Conservation status: During our investigations, we could observe only a few scattered populations of *Strobilanthes lamiifolia*. As per our estimation, approximately 50 to 100 mature individuals occur in the areas of Na Hang (Tuyen Quang province) and Bach Thong (Bac Kan province). The habitat has been protected from artificial disturbances such as deforestation and exploitation of timber and non-timber forest products, by the regional authorities. *Strobilanthes lamiifolia* is tentatively assessed here as Data Deficient (DD) in accordance with the IUCN Red List categories and criteria (2012). Further inventories are needed to find additional populations in Vietnam.

Note: *Strobilanthes lamiifolia* is morphologically similar to *Strobilanthes sulfurea* (1933: 732) in its habit, and inflorescence type. However, it differs from *S. sulfurea* in its leaf, bract, bracteoles and other characters. The detailed comparison between *S. lamiifolia* and *S. sulfurea* is given in Table 1.

Nomenclatural notes: In the protologue of *Goldfussia lamiifolia* Nees (1832: 88), Nees cited a gathering as “Lecta in Napalia, a. 1821, Wallichio”. This name was established from the invalidly published *Ruellia lamiifolia* Wall. “Wall. Cat. n. 2347” (1830). Anderson (1867: 476) cited several specimens under *Strobilanthes lamiifolia* (Nees) including “Wall. Cat. n. 2347”. In search of the original material, 12 duplicates were traced, three at GZU (barcodes GZU250302; GZU256279; GZU256280), one at CAL (barcode CAL0000019718), one at BM (barcode BM000906307) and three at K (barcodes K000883041, K000883042, K000883043), and four at CGE, LE, WU). Deng et al. (2006) chosen with the duplicate in Wallich Herbarium at Kew (K001115704) as the lectotype, and therefore remaining duplicates are isolectotypes according to Art. 9 footnote 1 of the ICN (Turland et al., 2018), but they were not cited by Deng et al. (2006).

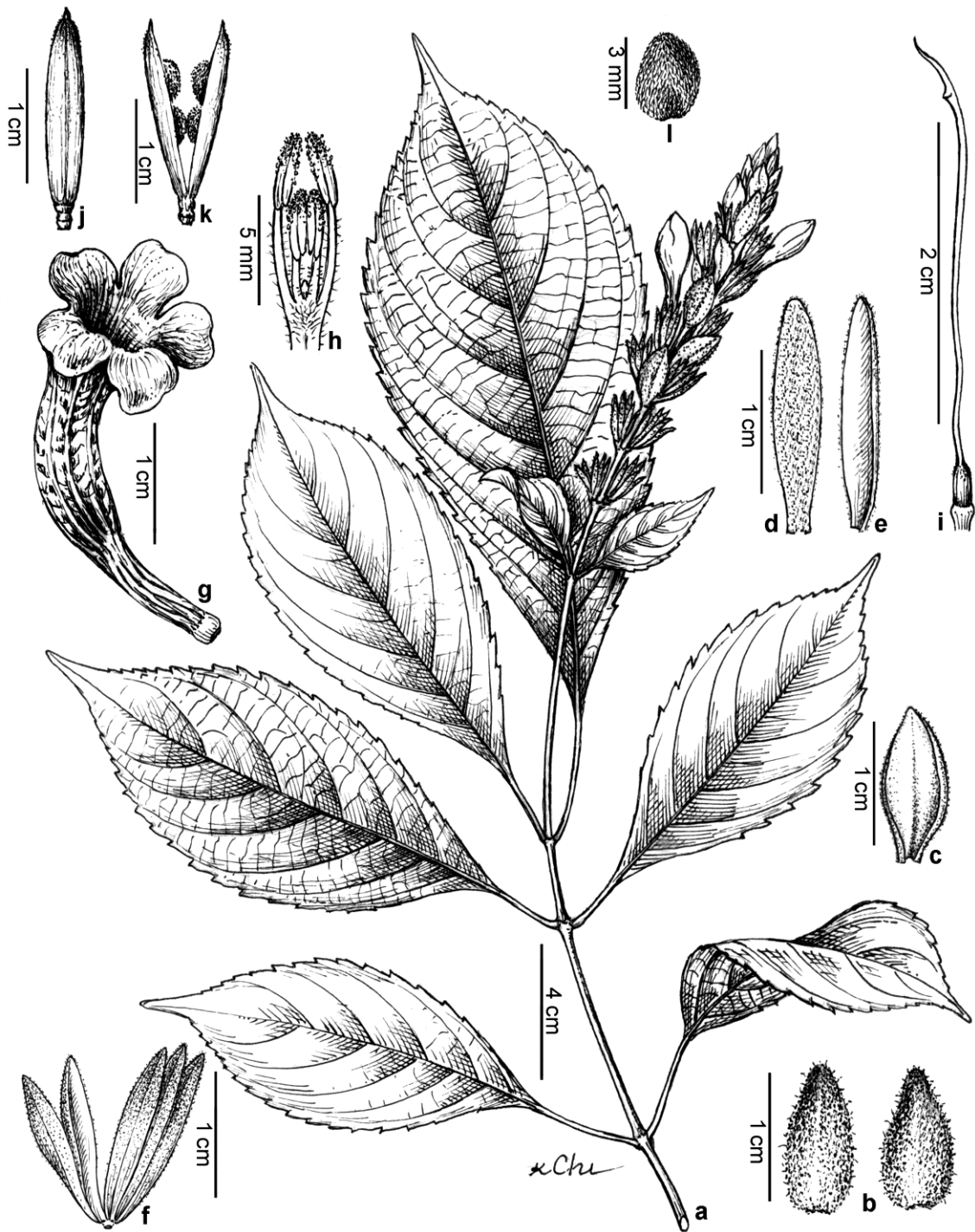


Figure 2. *Strobilanthes lamiifolia* (Nees) T. Anderson
 a) Habitat; b) Bracts (abaxial view); c) Bract (adaxial view); d) Abaxial view
 of bracteole; e) Adaxial view of bracteole; f) Calyx (open); g) Flower;
 h) Stamens; i) Ovary and style; j) Fruit (closed); k) Fruit (open);
 l) Seed [Drawn by Le Kim Chi from DVH18112016 (HN)]

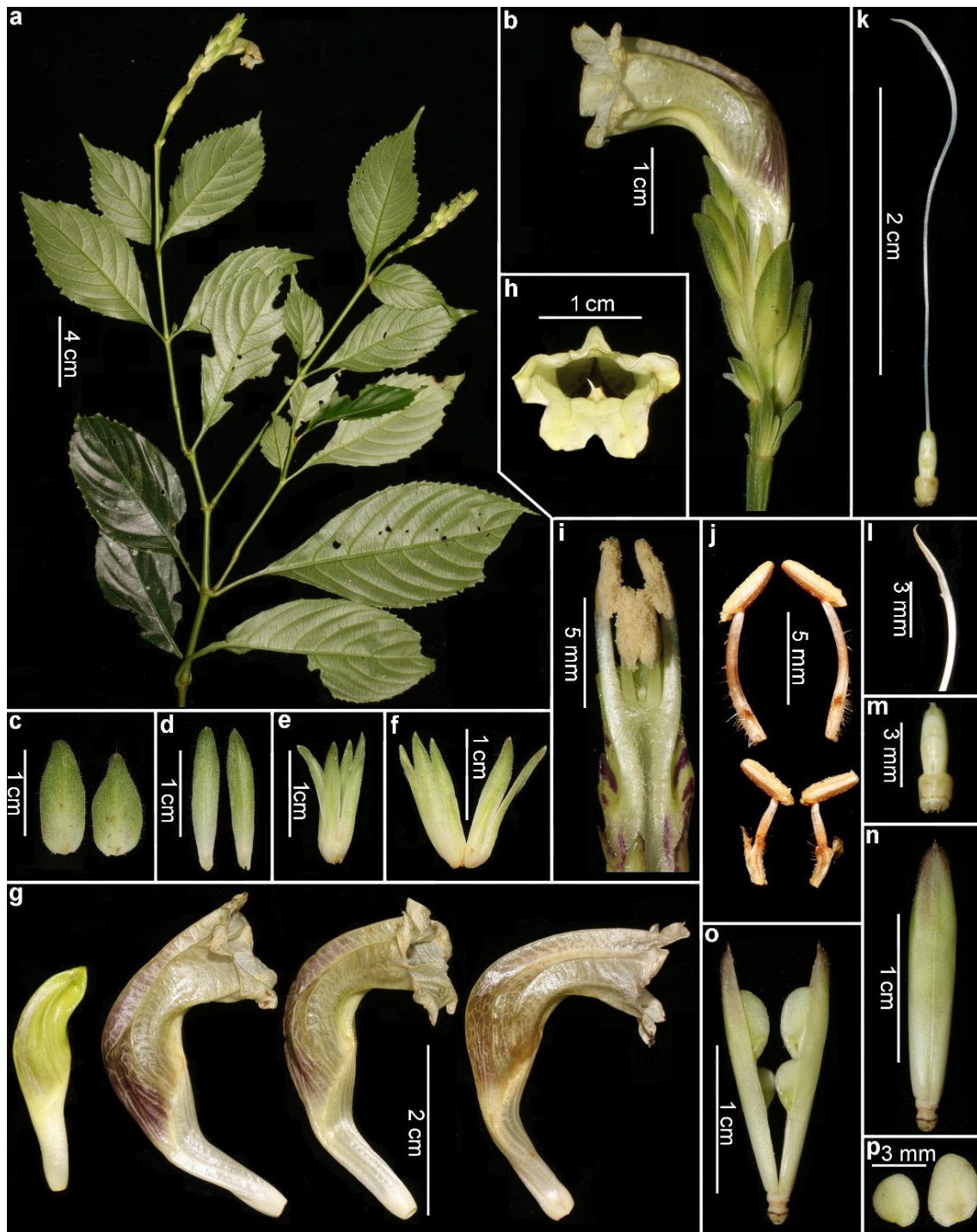


Figure 3. *Strobilanthes lamiifolia* (Nees) T. Anderson.

a) Flowering branch; b) Inflorescence; c) Bracts; d) Bracteoles; e) Calyx; f) Calyx (open); g) Flower in different developmental stages; h) Flower (front view); i) Stamens (intact view); j) Stamens (lateral view); k) Ovary and style; l) Stigma; m) Ovary; n) Fruit; o) Fruit (open); p) Seed [Photos by Do Van Hai]

Table 1. Morphological comparison between *Strobilanthes lamiifolia* and *Strobilanthes sulfurea* (data from Benoist, 1933, 1935)

| Morphological characters | <i>Strobilanthes lamiifolia</i> | <i>Strobilanthes sulfurea</i> |
|--------------------------|---|---|
| Stem | Terete or angular, pubescent when young, later glabrous | Quadrangularis, glabrous |
| Leaves | Isophyllous, ovate, 4–10 × 2–8 cm | Weakly anisophyllous, lanceolate to ovate-lanceolate, 9–16 × 3–7 cm |
| Secondary veins | 8–13 pairs | 6–7 pairs |
| Leaf surface | Adaxially sparsely pilose, abaxially glabrous and pubescent along veins | Glabrous on both sides |
| Inflorescence position | Terminal and axillary spikes | Terminal spikes |
| Bracts | Oblong to ovate, 10–15 × 5–8 mm, pubescent | Lanceolate to linear, 6 × 1–1.4 mm, gland-tipped hirsute |
| Bracteoles | pubescent | gland-tipped hirsute |
| Calyx | Calyx 10–16 mm, densely gland-tipped ciliate; 2-lipped; lobes linear-oblong | Calyx up to 15 mm, gland-tipped hirsute; 5-lobed almost to base; lobes linear |
| Corolla | Creamy white to purplish white | Yellow |
| Stamens | Filaments sparsely pubescent, anthers thecae oblong-linear | Filaments glabrous, anthers thecae ovate |
| Ovary | Comose | Glabrous |
| Style | Glabrous except pubescent at base | Glabrous |

CONCLUSION

Strobilanthes lamiifolia is recorded in Vietnam for the first time. The number of species as well as the new distribution data for the genus *Strobilanthes* in Vietnam needs to be further studied. The present report will help prioritise the conservation of the newly recorded species in Vietnam.

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