

**CHECKLIST FOR THE GENUS *Luisia* AND A NEW SPECIES
(*Luisia*, Orchidaceae) FROM SOUTHERN VIETNAM**

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ABSTRACT

Recently, there have been some reports on new species of the genus *Luisia* in Vietnam. There is disagreement among studies on the number of species in this genus. Our study gathers available documents and samples from herbariums in order to tally and classify them. Research results have recorded 13 species of the *Luisia* genus in Vietnam. The study also describes one taxon as a new species. A taxonomic key for the identification of all species of the *Luisia* genus known in Vietnam is also established. The study will be a useful reference for classification as well as the identification and description of new species belonging to the genus *Luisia*.

Keywords: *Luisia*, new species, orchids, species composition, Vietnam.

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INTRODUCTION

Luisia Gaudich. is a small genus of the Orchidaceae family, announced in 1829 based on the specimen of the species *Luisia teretifolia* Gaudich. According to some records, the genus *Luisia* has about 41 female species that are mainly distributed in Australia, Bhutan, China, Fiji, India, Indonesia, Japan, Korea, Malaysia, New Guinea, Philippines, Sri Lanka, and Thailand (Chen et al., 2009; Gogoi, 2016; Mishra et al., 2020). In Vietnam, there are some studies on the Orchidaceae, but statistics on the species number of the genus *Luisia* are inconsistent. Pham-Hoang (1999) recorded nine species. Nguyen Tien Ban et al. (2005) recorded 10 species. In recent years, a number of new species of the *Luisia* genus have been discovered, for examples, *Luisia appressifolia* and *Luisia parviflora* (Averyanov, 2002, 2012, 2015). Averyanov et al. (2003) also updated the number of orchid species in Vietnam. In this report, the author recorded that the genus *Luisia* consists of 11 species. Inconsistencies between studies as well as new discoveries cause the number of species of the genus *Luisia* to change. However, there has been no statistical research on the species number of the genus *Luisia*, nor has a complete taxonomy key been established for this genus in Vietnam. This study aimed to verify the number of species based on previous studies, including the examination of specimens and synonyms. The study also established a taxonomic key to the species for the genus *Luisia* in Vietnam. During the process of researching specimens and species descriptions of the genus *Luisia*, we found that the plants grown at the conservation garden of the Taynguyen Institute for Scientific Research are different from the species in the genus. Here, we illustrate and describe them as a new species in science.

MATERIALS AND METHODS

The updated checklist is based on a review of the scientific names of all species belonging to the genus *Luisia*. Samples of the newly recorded species were collected around the Da Lat City area of the Lam Dong province in

Vietnam during 2022. A suite of specimens in the genus *Luisia* were examined from the following herbaria of Taynguyen Institute for Scientific Research and also compared with digital images available in databases of the Muséum National d'Histoire Naturelle (P) (<https://science.mnhn.fr/>), Royal Botanic Gardens Kew (K), "Herbarium LE" (<https://en.herbariumle.ru/>), Missouri Botanical Garden (MO) and Plants of the World Online (<https://powo.science.kew.org/>). The scientific names and nomenclature were checked according to International Plant Names Index (<https://www.ipni.org/>) and World Flora Online (<https://www.worldflora-online.org/>).

RESULTS

***Luisia hoanii* N.V. Duy, T.V. Tran & V.H. Quach, sp. nov. (Figs. 1, 2a, b, c)**

Type: VIETNAM. Lam Dong province, Da Lat City, evergreen forest, at an altitude of 1,500–1,600 m, type herbarium specimen prepared on 4 December 2022, N.V. Duy VTN1245 (holotype: VTN1245), VTN1246 (isotype: DLU).

Description: Epiphyte, stems suberect, curved, stout, branched, glabrous, about 12–20 cm long, about 5 mm in diameter. Leaves terete, obtuse, 8–15 cm long and 2–4 mm diameter; leaf bases very little or hardly overlapping, irregularly slightly longitudinally rugulose, about 1.5 cm long and 3.5 mm diameter. Inflorescence racemose, breaking through vagina, 1 mm or smaller in length, stout, flowered near apex about 1 or 2, lower part with many large overlapping bracts; bracts wide triangular, about 2 mm, fleshy. Dorsal sepal widely oblong-ovate, rounded at apex, 3–4 mm long and 2–2.5 mm wide, invisible veins; lateral sepals oblong-ovate, oblique, obtuse at apex, 3–3.5 mm long and 2–2.5 mm wide, invisible veins. Petals narrowly oblong, slightly oblique, rounded at apex, 4.5–6 mm long and 1.5–2 mm wide, invisible veins; sepals and petals pale yellow or yellowish green. Lip elliptical, flesh, 4–5 mm long and 3–3.5 mm wide, apex obtusely rounded, no clear boundary between epichile and hypochile,

reddish purple. Column about 2.5 mm high at back, shot, stout, fleshy, reddish purple; stigma large, deep; clinandrium shallow, higher at back; pollinium rather large, almost rounded, slightly flattened, about 0.5 mm. Ovary and pedicel 6–7 mm long. Capsule cylindrical, slightly oblique, 2–3 cm long, 0.4–0.6 cm in diameter.

Species name etymology: Species epithet refers to the name of Mr. Nong The Duy Hoan, son of the plant discoverer, Dr. Nong Van Duy.

Distribution and ecology: *Luisia hoanii* was collected in evergreen forests around Da Lat city, Lam Dong province, in the south of Vietnam.

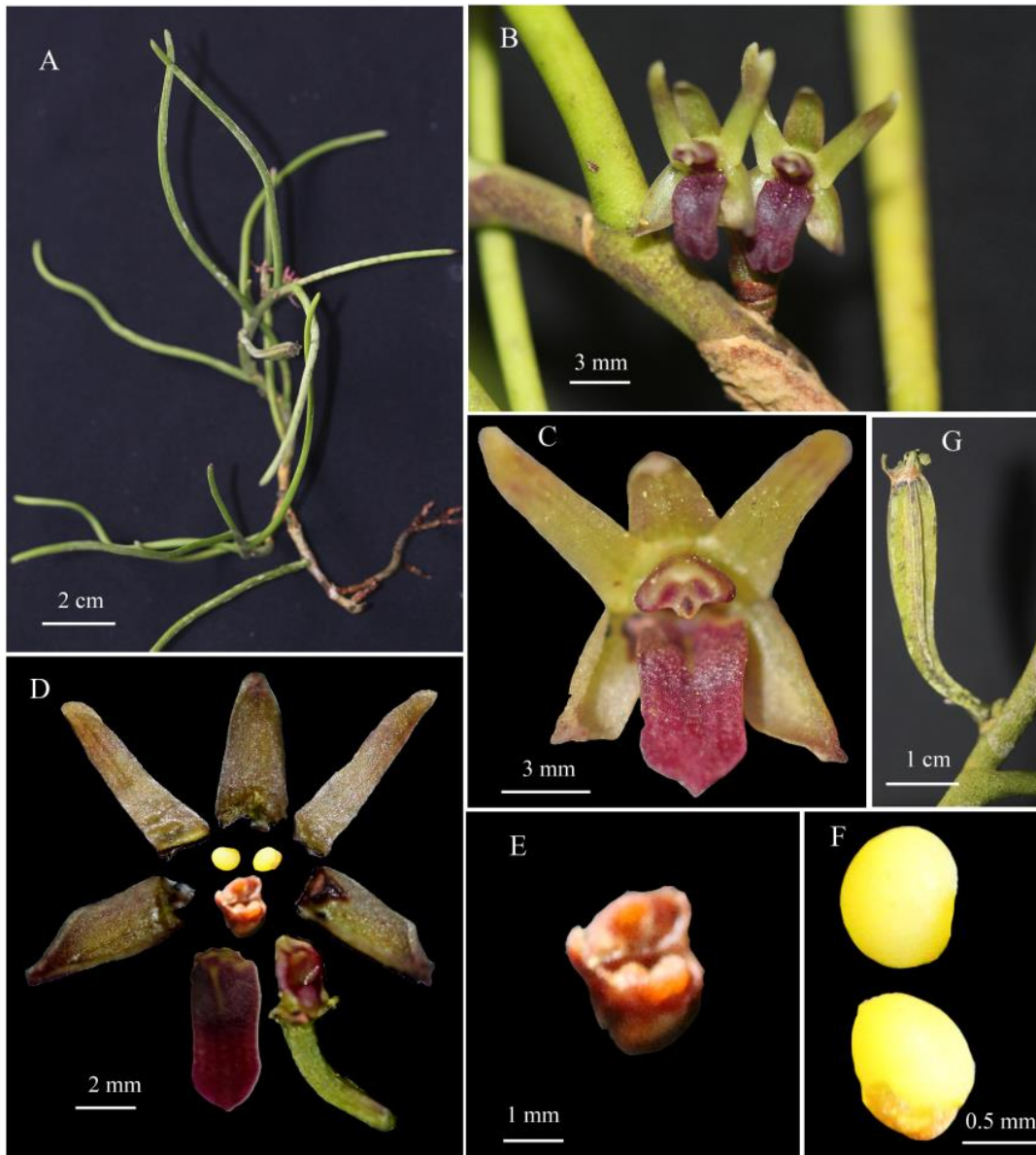


Figure 1. *Luisia hoanii* N.V. Duy, T.V. Tran & V.H. Quach, sp. nov., A. Stems with flowers; B, C. Flowers; D. Flower structure (dorsal sepal, lateral sepals, petals, lip and ovary and column); G. Fruit; E. Anther with pollinia inside; F. Pollinium [Photos by Nong Van Duy]

Conservation status: Currently only a few individuals have been seen during fieldwork. We provisionally list this species as data deficient (DD) according to IUCN (2023). More surveys are needed to properly assess the species' current status.

Discuss: Morphologically, *Luisia hoanii* is similar to *Luisia brachystachys* (Lindl.) Blume and *Luisia brachyota* Hou H. Fu, Liang Ma & S.P. Chen. However, *Luisia hoanii* is distinct from *Luisia brachystachys* in many

morphological characteristics, including: sepals and petals pale yellow or greenish yellow with invisible veins (vs. reddish tint and visible veins), lip without clear boundary between epichile and hypochile (vs. indentation between epichile and hypochile). It is distinct from *L. brachyota* in many morphological characteristics, including: lateral sepal with invisible veins (vs. 6-veins), petals and sepals (vs. whitish with faint purple lines), column reddish purple (vs. yellow) (Table 1).

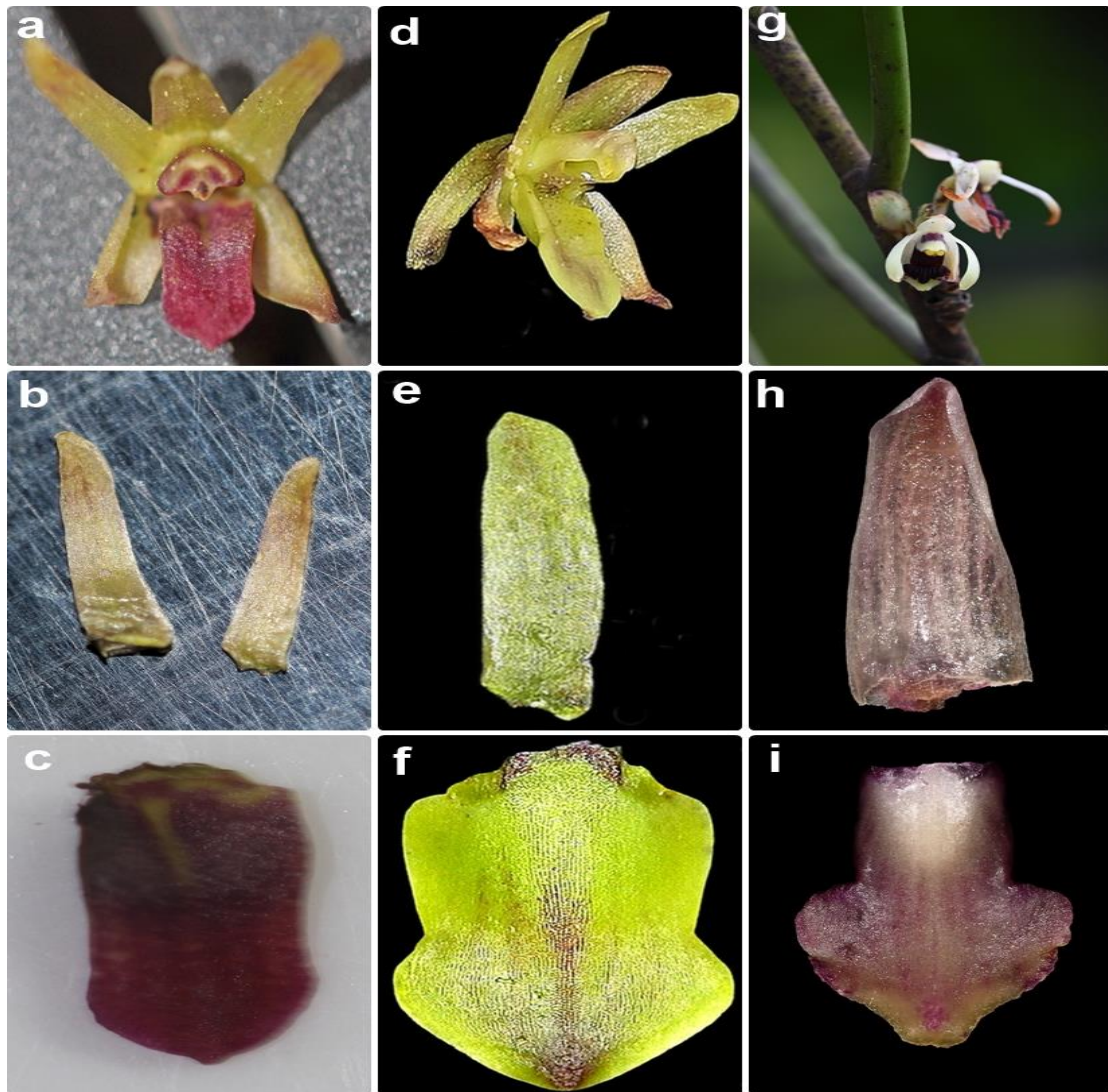


Figure 2. *Luisia hoanii* N.V. Duy, T.V. Tran & V.H. Quach, sp. nov., a. Flower, b. Petal, c. Lip; *Luisia brachystachys*, d. Flower, e. Petal, f. Lip; *Luisia brachyota*, g. Flower, h. Petal, i. Lip [Photos by Nong Van Duy, Edward Entalai Besi & Hou-Hua Fu]

Table 1. Morphological comparison of *Luisia hoanii* N.V. Duy, T.V. Tran & V.H. Quach, sp. nov. with *Luisia brachystachys* (Lindl.) Blume and *Luisia brachyota* Hou H. Fu, Liang Ma & S. P. Chen.

Feature	<i>Luisia hoanii</i> sp. nov.	<i>Luisia brachystachys</i>	<i>Luisia brachyota</i>
Inflorescences	1 or 2	5 or more	3–5
Dorsal sepal	invisible veins	3-veins	7-veins
Lateral sepal	invisible veins	4-veins	6-veins
Petals and sepals	pale yellow or greenish yellow	with reddish tint	whitish with faint purple lines
Lip	without a distinct boundary between epichile and hypochile, reddish purple	with a distinct boundary between epichile and hypochile, pale green	without a distinct boundary between hypochile and epichile, deep purple-red
Column	reddish purple	pale green	yellow

Key to the species of *Luisia* genus in Vietnam

- 1a. Inflorescence breaking through vagina or axils of leaves.....2
 1b. Inflorescence opposite to leaves.....10
 2a. Petals linear, 1–2 mm wide.....3
 2b. Petals oblong or elliptic, 4–9 mm wide.....5
 3a. Inflorescence 1–2-flowered.....4
 3b. Inflorescence 5–6-flowered.....*L. curtisii*
 4a. Sepals and petals whitish; epichile of lip broadly ovate-triangular.....*L. filiformis*
 4b. Sepals and petals greenish yellow; epichile of lip cordate.....*L. antennifera*
 5a. Lip without a distinct boundary between epichile and hypochile.....6
 5b. Lip with a distinct boundary between epichile and hypochile.....8
 6a. Inflorescence 1–2-flowered; sepals and petals pale yellow or greenish yellow.....7
 6b. Inflorescence 3–6-flowered; sepals and petals pale pink.....*L. zollingeri*
 7a. Dorsal sepal 8.5–9.0 mm long and 5.0–5.5 mm wide; lip golden yellow with brown spots
*L. appressifolia*
 7b. Dorsal sepal 3–4 mm long and 2–2.5 mm wide; lip reddish purple.....*L. hoanii*
 8a. Inflorescence 1–2-flowered.....*L. macrotis*
 8b. Inflorescence 3–6-flowered.....9
 9a. Dorsally carinate-winged toward apex and then becoming a tooth protruding from apex
*L. morsei*
 9b. Dorsally slightly carinate and keel becoming winged at apex.....*L. brachystachys*
 10a. Lip without a distinct boundary between epichile and hypochile.....11
 10b. Lip with a distinct boundary between epichile and hypochile.....12
 11a. Inflorescence 1–2-flowered; sepals greenish yellow.....*L. psyche*
 11b. Inflorescence 3–4-flowered; sepals dull brownish-red.....*L. thailandica*
 12a. Inflorescence 1–2-flowered; column 1.5–1.8 mm.....*L. parviflora*
 12b. Inflorescence 3–6-flowered; column about 3 mm.....*L. ramosii*

Species checklist of the genus *Luisia* in Vietnam

1) *Luisia antennifera* Blume, *Rumphia* 4: 50 (1849).

Distribution: Northern Vietnam.

Specimens examined: *L0061594* (holotype), *L0061595* (holotype).

2) *Luisia appressifolia* Aver., *Lindleyana* 15: 79 (2000).

Distribution: Ha Giang province, Quang Ba district, Bat Dai Son village. Primary forest on limestone along ridge, below peak and on some of the lower slopes belonging to ridge named Chung Ti Tei (H'mong) behind habitations; Cao Bang province, Nguyen Binh district, Ca Thanh municipality, Cao Lu village.

Specimens examined: *LE 01073779* (Paratype), *LE 01054278*, *LE 01054309*, *LE 01061457*, *LE 01073771*, *LE 01073772*, *LE 01073794*, *MO-3310184*.

3) *Luisia brachystachys* (Lindl.) Blume, *Rumphia* 4: 50 (1849).

Synonym: *Luisia indivisa* King & Pantl., *Luisia siamensis* Rolfe ex Downie, *Mesoclastes brachystachys* Lindl.

Distribution: Khanh Hoa province, Nha Trang City; Lam Dong province, Da Lat City; Binh Phuoc province, Bu Gia Map district, Bu Gia Map National Park.

Specimens examined: *K000873795*, *K001114864*, *LE 01124125*, *P00324092* (isotype), *P00324093*, *P00324094*, *P00324095*.

4) *Luisia curtisii* Seidenf., *Contr. Orchid Fl. Thailand* 13: 49 (1997).

Distribution: Lam Dong province, Da Lat City.

Specimens examined: *K000891540*, *P00324096*.

5) *Luisia hoanii* N.V. Duy, T.V. Tran & V.H. Quach, sp. nov.

Specimens examined: *N.V. Duy VTN 1245*.

Distribution: Lam Dong province, Da Lat City, evergreen forests.

6) *Luisia filiformis* Hook.f., *Fl. Brit. India* 6: 23 (1890).

Synonym: *Luisia gamblei* Hook.f., *Luisia grovesii* Hook.f.

Distribution: Dong Nai province, Dinh Quan district; Gia Lai province, Mang Yang district, A Yun municipality, Kon Ka Kinh National Park; Ninh Thuan province, Ninh Hai district, Vinh Hai municipality, slopes on Nui Chua mountains, border of primary evergreen closed dry forest and dry savanna-like secondary grasslands on rocky mountain slopes composed of granite.

Specimens examined: *K000891544* (type), *LE 01073775*, *LE 01073776*, *LE 01073780*, *LE 01073784*, *P00905802*.

7) *Luisia macrotis* Rchb.f., *Gard. Chron.* 1869: 1110 (1869).

Distribution: Lam Dong province, Da Lat City.

Specimens examined: *P00324100*.

8) *Luisia morsei* Rolfe, *J. Linn. Soc., Bot.* 36: 33 (1903).

Synonym: *Luisia tonkinensis* Schltr., *Luisia teretifolia* auct. non Gaudich., *Luisia platyglossa* Rchb.f.

Distribution: Bac Can province, Na Ri district, Lung Hin Con village. Remnants of primary mixed evergreen dry open forest along tops of remnant karst limestone ridge in Ninh Binh province, Cuc Phuong National Park; Kon Tum province, Sa Thay district, Chu Mom Ray National Park. Primary closed evergreen broad-leaved mountain forest, at altitude of 600–1,770 m; Lang Son province, Huu Lung district, Huu Lien commune in primary evergreen broad-leaved forest with bamboo near the top of remnant karst limestone ridge; Son La province, Moc Chau district, Chieng Hac commune, Co Liu village. Primary evergreen broad-leaved wet mossy forest along rocky tops of remnant karst limestone ridge at an altitude of 1,200–1,240 m; Cao Bang province, Ha Lang district, Thanh Nhat commune. Primary open coniferous and mixed semideciduous forest along tops of remnant

limestone ridge; Cao Bang province, Thach An district, Thai Cuong commune. Primary semideciduous broadleaved forest on steep slopes and bluffs of remnant limestone ridge.

Specimens examined: *K000891556*, *K000891557*, *LE 01048688*, *LE 01066766*, *MO-3310174*, *MO-3310192*, *MO-3310191*, *P00324102*, *P00324105*.

9) *Luisia parviflora* Aver., *Wulfenia* 22: 168 (2015).

Distribution: Lam Dong province, Lac Duong district, Bidoup-Nui Ba National Park. Evergreen broad-leaved, mountainous primary forests, often found on tall moss trees at altitudes of 1,400 m to 1,600 m.

Specimens examined: *LE 01073880* (holotype), *LE 01090027*.

10) *Luisia psyche* Rchb.f., *Bot. Zeitung (Berlin)* 21: 98 (1863).

Synonym: *Cymbidium scarabiiforme* C.S.P. Parish ex Rchb.f., *Luisia laosensis* Guillaumin.

Distribution: Khanh Hoa province, Nha Trang City, Suoi Dau Stream; Lam Dong province, Don Duong district; Dong Nai province; Dak Lak province, Buon Don district, Krong Na municipality, Yok Don National Park. Dry open semi-deciduous Dipterocarpus forest with bamboo on thin ferralitic soil at altitudes at 180–220; Kon Tum province, Dak Gley district. Secondary evergreen dry forest rich in primary elements with bamboo domination at altitudes of 700–750 m; Cao Bang province, Tra Linh district, Quoc Toan municipalite, vicinity of Thang Heng and Lung Tao villages near Thang Heng lake. Broadleaved evergreen closed primary forest on steep slopes and bluffs of limestone mesas and ridges at altitudes of 600–650 m.

Specimens examined: *P00324109* (type), *K000891553*, *LE 01073806*, *LE 01073809*, *LE 01073872*, *LE 01073876*, *MO-3310202*, *MO-3310200*, *MO-3310193*.

11) *Luisia ramosii* Ames, *Philipp. J. Sci.*, C 6: 55 (1911).

Synonym: *Luisia trichorrhiza* (Hook.) Blume.

Distribution: Lam Dong province, Bao Loc City; Tay Ninh province, Tan Phu district; Thua Thien-Hue province, A Luoi district, Hong Kim municipality, Dut village, at altitude of 1,000 m. Secondary closed broad-leaved forest along mountain ridge composed of shale and granite.

Specimens examined: *K000891533* (type), *LE 01073825*, *LE 01073826*, *P00324110*, *P01019712*.

12) *Luisia thailandica* Seidenf., *Dansk Bot. Ark.* 27(4): 28 (1971).

Distribution: Kontum province, Kon Plong district, Hieu municipality, Mang La forest enterprise. Degraded primary and secondary wet evergreen broad-leaved forest along mountain river valley at altitudes of 1,100–1,150 m; Lai Chau province, Tam Duong district; Dien Bien province.

Specimens examined: *LE 01073833*, *LE 01073837*, *LE 01073838*, *MO-3305565*, *MO-3310206*.

13) *Luisia zollingeri* Rchb.f., *Ann. Bot. Syst. (Walpers)* 6(4): 622 (1863).

Synonym: *Luisia brachystachys* Blume, *Luisia latilabris* Rolfe ex Downie, *Luisia latipetala* J.J. Sm., *Luisia zollingeri* var. *latipetala* (J.J. Sm.) Sulist.

Distribution: Lam Dong province, Da Lat area. Primary broadleaved evergreen submontane and mountain forests near Da Lat City at altitude of 1,200–1,500 m; Thanh Hoa province, Thach Thanh district, Thanh Yen municipality, Mo village. Remnants of primary evergreen seasonal broad-leaved lowland dry forest on steep rocky slope of limestone hills at altitudes of 300–350 m; Son La province; Ba Ria-Vung Tau province.

Specimens examined: *LE 01073816*, *LE 01073819*, *LE 01073820*, *P00324140*, *P00324142*, *P00324143*.

CONCLUSION

At present, our study has recorded a total of 13 species including a new species

belonging to the genus *Luisia* from Vietnam. Three of them are endemic to Vietnam: *Luisia appressifolia*, *Luisia hoanii*, *Luisia parviflora*. A taxonomic key to all species of the genus *Luisia* in Vietnam is established.

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REFERENCES

- Averyanov L. V. & Averyanova A. L., 2002. Rare species of orchids (Orchidaceae) in the flora of Vietnam. *Turczaninowia*, 5(4): 85–86.
- Averyanov L. V. & Averyanova A. L., 2003. Updated Checklist of the Orchids of Vietnam. Vietnam National University Publishing House. pp. 1–101.
- Averyanov, L. V., Nguyen K. S., Nguyen T. T., Nguyen P. T., Nong V. D., Nguyen V. C. & Chu X. C., 2015. New Orchids in flora of Vietnam. *Wulfenia*, 22: 168–170.
- Averyanov, L. V., 2012. New orchid taxa and records in the flora of Vietnam. *Taiwania*, 57: 127–152. [https://doi.org/10.6165/tai.2012.57\(2\).127](https://doi.org/10.6165/tai.2012.57(2).127)
- Averyanov L. V., Averyanova A. L., Khang Sinh Nguyen, Orlov N. L., Maisak T. V., Hiep Tien Nguyen, 2018. New and rare orchid species (Orchidaceae) in the flora of Cambodia and Laos. *Novitates Systematicae Plantarum Vascularium*, 49: 24–41. doi: 10.31111/novitates/2018.49.24
- Besi E. E., Hooi W. K., Sylvester Pungga R., Yong C. S. Y., Mustafa M., & Go R. 2022. Rare orchid species in Malaysia: New records, recollections and amended descriptions. *PLoS ONE*, 17(4): e0267485. doi: 10.1371/journal.pone.0267485
- Chen X., Liu Z., Zhu G., Lang K.-Y., Ji Z., Luo Y.-B., Jin X., et al., 2009. Flora of China 25: 488–490.
- Feng W. X., Yong L., Kumar P., Qiang L., 2019. New record and additional notes on *Luisia appressifolia* (Orchidaceae) in China. *Plant Science Journal*, 37(1): 18–21. <https://doi.org/10.11913/PSJ.2095-0837.2019.10018>
- Gogoi K., 2016. *Luisia trichorrhiza* var. *flava* (Orchidaceae): a new variety from Assam, India. *Richardiana*, 16: 322–326.
- Hou-Hua Fu, Cheng-Yuan Zhou, Liang Ma, Siren Lan & Shi-Pin Chen, 2023. *Luisia brachyota* (Orchidaceae; Epidendroideae) a new species from China: evidence based on morphological and molecular data. *Phytotaxa*, 632(1): 087–092. <https://doi.org/10.11646/phytotaxa.632.1.8>
- IUCN, 2023. The IUCN Red List of Threatened Species. Version 2023-1. <https://www.iucnredlist.org>. Accessed on 23/1/2024.
- Jibankumar Singh Khuraijam & Rup Kumar Roy, 2015. A new species of *Luisia* Gaud. (Orchidaceae) from northwestern Bihar, India. *Biodiversity Journal*, 6(3): 699–702.
- Mishra S., Jalal J. S., Paulose V. C. and Singh L. J., 2020. Two new species of *Luisia* (Vandae, Orchidaceae) from the Andaman and Nicobar, India. *Phytotaxa*, 453(3): 255–264.
- Nguyen Tien Ban, Averyanov L.V. & Duong Duc Huyen, 2005. Orchidaceae Juss. 1789. In: Nguyen T. B. (ed.): *Conspectus of Vietnamese plants 3*: 512–666. Ha Noi: Agriculture Publishing House.
- Pham-Hoang H., 1999. Orchidaceae. In: Pham-Hoang, H. (Ed.) *An Illustrated Flora of Vietnam*, vol. 3. Youth Publishing House, Ho Chi Minh City: 958–960.
- Sanath Kumar N. & Sanjeet Kumar, 2021. Taxonomic note on *Luisia zeylanica* (Orchidaceae) from Bonai Forest Division, Odisha, India. *Jardin Botanique de Guyane. Richardiana Volume 5*: pp. 142–147.
- Sanjay Mishra, Jeewan Singh Jalal, Vivek C.P., Gautam Anuj Ekka, Dinesh Kumar Agrawala and Lal Ji Singh, 2020. A Note on the Occurrence of *Luisia unguiculata* (Orchidaceae) in Andaman and Nicobar Islands, India. *Nelumbo*, 62(1): 50–53.