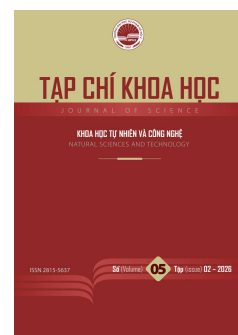




HPU2 Journal of Sciences: Natural Sciences and Technology

Journal homepage: <https://sj.hpu2.edu.vn>



Article type: Research article

Taxonomic characteristics of the genus *Combretum* Loebl. in Vietnam

Hong-Anh Le^a, Quynh-Chi Pham^a, Thi-Thuy Nguyen^a, Thanh-Hoa Mai^b, Minh-Tam Ha^{a*}

^aHanoi Pedagogical University 2, Phu Tho, Vietnam

^bTay Bac University, Son La, Vietnam

Abstract

The genus *Combretum* Loebl. encompasses around 250 species, predominantly inhabiting tropical and subtropical zones. However, updated taxonomic clarification for the genus in Vietnam remains limited. In Vietnam, the genus comprises 11 species and 1 variety, which are found along forest edges, stream banks, and ravines of secondary forests scattered all over the country, rarely cultivated. Characterized as woody climbers, or straggling, rarely small trees; leaves simple, opposite, whorled, lower surface often scaly and often with domatia (shaped tufted hairs in axils of lateral veins); flowers bisexual; stamens usually exerted from calyx tube; disk usually present; ovaries inferior, 1-loculed; fruits dry, indehiscent; 4-5-winged, or 4-5-ridged; seed with cotyledons convolute and without endosperm. *Combretum* species contribute significantly to forest ecosystem dynamics and offer diverse applications. Among them, *Combretum micranthum* and *Combretum quadrangulare* were assessed on the IUCN Red List of Threatened Species in 2025, but are listed as Least Concern (LC). Nine species are utilized in traditional medicine, and one species (*Combretum micranthum*) is used for ornamental purposes. This study presents a comprehensive account of the genus *Combretum* in Vietnam, detailing its key morphological features, patterns of distribution, habitat preferences, ecological functions, and practical uses. Additionally, a dichotomous identification key is proposed to aid in distinguishing all taxa found in the flora of Vietnam.

Keywords: *Combretaceae*, *Combretum*, taxonomy, Vietnam, identification key

1. Introduction

Genus *Combretum* was published by Pehr Loeffling in the *Iter Hispanicum* in 1758 [1]. It belongs to Combretaceae R.Br. [2]. According to recent studies, the genus has about 250 species, mostly in the

* Corresponding author, E-mail: haminhtam@hpu2.edu.vn

<https://doi.org/10.56764/hpu2.jos.2026.5.2.24-30>

Received date: 19-3-2026 ; Revised date: 29-5-2026 ; Accepted date: 31-7-2026

This is licensed under the CC BY-NC 4.0

tropics and subtropics of South Africa, America and Asia, and Madagascar [3], [4]. Vietnam has 11 species and 1 variety; it can be found along forest edge, stream banks, and ravines in secondary forests scattered across the country, and is rarely cultivated [4]. The genus is characterized by species that are woody climbers, or straggling, rarely small tree; leaves simple, opposite, whorled, lower surface often scaly and often with domatia (shaped tufted hairs in axils of lateral veins); flower bisexual; stamens usually exerted from calyx tube; disk usually present; ovary inferior, 1-loculed; fruit dry, indehiscent, 4-5-winged, or 4-5-ridged; seed without endosperm, with cotyledons folded. Species belonging to *Combretum* play an important role in ecosystems. Several species are used for medicinal purposes, and some are cultivated as ornamentals.

Several studies have addressed the identifying characteristics, cataloging, or the utility value of the genus *Combretum* in Vietnam, as: Nguyen Tien Ban (2023) Checklist of 12 species and 1 subspecies belong to *Combretum* of Vietnam, among them 2 species and 1 subspecies are synonyms [4]; Pham Hoang Ho (2003) described 11 species and 2 varieties, among them 2 species and 2 varieties are synonyms [6]; F. Gagnepain (1920) described 8 species, among them 3 species are synonyms [7]; Lecompte (1969) described 7 species and 1 subspecies [8]... However, these studies remain incomplete and lack a truly systematic approach, and the nomenclature has not yet been fully updated. Therefore, this study aims to provide a comprehensive and up-to-date taxonomic revision of the genus *Combretum* in Vietnam.

2. Materials and methods

Materials: *Combretum* Loefl. in Vietnam, including 39 specimens, which were preserved at Herbarium Institute of Biology (Hanoi, Vietnam), and 26 specimens, which were preserved at Herbarium Vietnam National University (Hanoi, Vietnam) with a total of 65 specimens of 8 species (*Combretum deciduum*, *C. griffithii*, *C. latifolium*, *C. pilosum*, *C. quadrangulare*, *C. sundaicum*, *C. tetralophum*, *Combretum wallichii* var. *ternatum*) and over 100 field photographs of the species were provided by scientists at the Institute of Biology. Additional data were collected from online botanical databases [14]. All species found in Vietnam were compared to specimen photos on *Plants of the World Online/Kew science* [14].

Methods: This study followed the standard taxonomic approach described by Nguyen Nghia Thin (2007) [5], which emphasizes morphological analysis, especially of reproductive organs. Field surveys were conducted to collect samples, take photographs, and observe living specimens in their natural habitats. Characteristics related to distribution, habitat, and morphology were documented on-site.

Species identification and assessment methods: Species were identified using comparative morphological methods and references from Pham Hoang Ho (2003) [6], [7]–[13]. Classification was carried out in the Botany office (Institute of Biology) and Botany experiment office (Hanoi Pedagogical University 2). Here, all specimens were analyzed and described, from a general overview to detailed analysis of branches, leaves, flowers, fruits, and seeds; then compared with the literature to determine their scientific name, and used to construct the key. The genus description is compiled from the species descriptions; Scientific names were standardized according to *Checklist of plant species of Vietnam* [4] and updated based on *Plants of the World Online/Kew science* [14].

Assessment of conservation status: The level of threat was evaluated based on *Decree No. 84/2021/ND-CP* [15], the *Vietnam Red Book part II – Plants* (2024) [16]; and the *IUCN Red list* (2025) [17]. Information on plant resources was referenced from the *Plant Resources of Vietnam* [18]; *Plant Resources of South-East Asia (PROSEA)* [19], *Checklist of medicinal plants in Vietnam* [20] and the *Medicinal Plants and Remedies of Vietnam* [21].

Information on distribution, habitat and ecology was based on specimens and was referenced from the document.

3. Results and discussion

3.1. Characteristics of the genus *Combretum* in Vietnam

COMBRETUM Loefl. 1758, nom. cons.

Loefl. 1758. Iter Hispan.: 308, nom.cons.; Gagnep. 1920. Fl. Gen. Indoch. 2: 734; A. W. Exell, 1949. Fl. Males. Ser. I, 4: 533; Lecompte, 1969. Fl. Camb. Laos Vietn. 10: 32; Hsu Ting-Chi, 1984. Fl. Reip. Pop. Sin. 53(2): 19; Chen Jie & Nicholas J. Turland, 2007. Fl. China, 13: 316; I. M. Turner, 2020. Webbia., 75(2): 263; Nannapat Pattharahirantricin & Manop Poopath, 2022. Thai For. Bul. (Bot.), 50(1): 56.

Vietnamese names: Trâm bầu, Chum bầu, Tim bầu.

Description:

Woody climber, up to 30 m tall (*C. latifolium*) or straggling shrubs when lacking climbing support, rarely small tree up to 12 m (*C. micranthum*, *C. quadrangulare*). Stems to 3 cm in diameter (*C. punctatum*). Young branchlets winged, or not winged or decurrent; glabrous or hairy, sparsely to densely scaly. Young parts and fruits contain tannins.

Leaves simple, entire; opposite or sometimes with leaves subopposite (*C. griffithii*, *C. pilosum*, *C. wallichii*), verticillate (*C. trifoliatum*, *C. wallichii*); glabrous or hairy; lower surface often scaly and often with domatia (shaped tufted hairs in axils of lateral veins); usually petiolate; stipules absent. Petiole sometimes persisting after the fall of the leaf forming a thorn.

Inflorescence axillary or extra-axillary; simple spikes (*C. deciduum*, *C. griffithii*, *C. wallichii*), branched spikes (*C. latifolium*, compound spikes (*C. punctatum*) or raceme (*C. griffithii*), or an elongated or subcapitate (*C. sundaicum*) or terminal and axillary often leafy panicles (*C. pilosum*); glabrous or hairy, often scaly. Bracts generally dropping before anthesis (*C. acuminatum*, *C. latifolium*, *C. punctatum*, *C. quadrangulare*, *C. sundaicum*, *C. trifoliatum*) or bracts persisting to anthesis and beyond.

Flowers bisexual, actinomorphic, 4- merous (*C. acuminatum*, *C. griffithii*, *C. latifolium*, *C. micranthum*, *C. punctatum*, *C. quadrangulare*, *C. sundaicum*, *C. tetralophum* and *C. wallichii*) or 5- merous (*C. deciduum*, *C. pilosum*, *C. trifoliatum*). Calyx tube (receptacle) glabrous or hairy, usually divided into a lower part adnate to the ovary and an upper part terminating in 4 or 5 calyx lobes. Petals 4 or 5, small or showy, white, yellow, orange, red or purple; exceeding calyx lobes; glabrous or hairy, occasionally scaly. Stamens usually twice as many as petals, usually exserted; anthers dorsifixed, versatile. Disk intra-staminal, glabrous or hairy, with or without a free margin. Ovary inferior, unilocular with usually 2(-6) pendulous ovules; style simple, free, usually exserted, rarely very short.

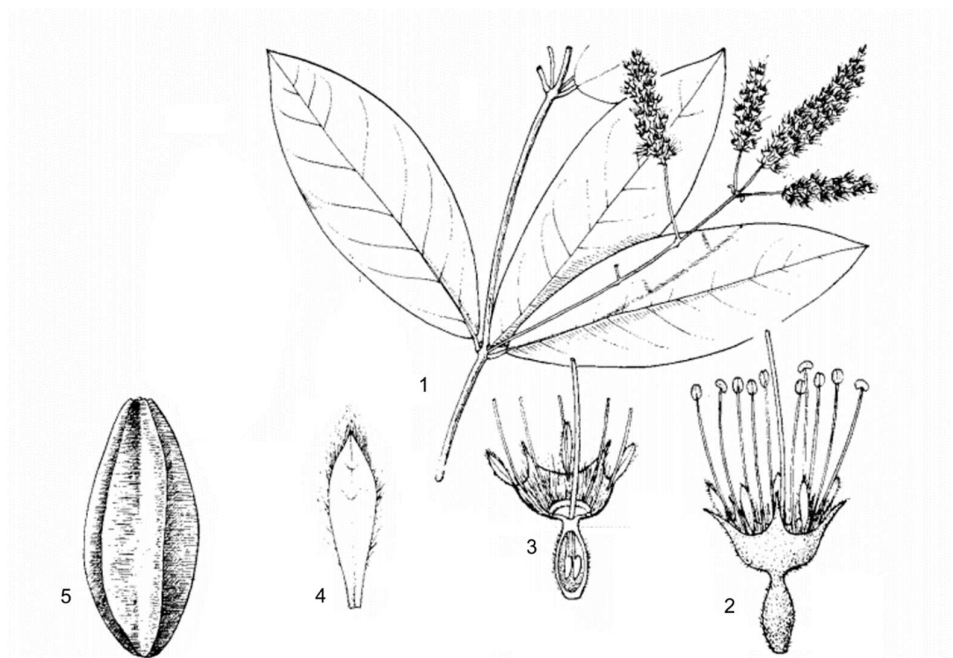


Figure 1. *Combretum trifoliatum*.

1. habit; 2. flower; 3. flower (longitudinal section); 4. petal; 5. fruit (Source: O. Lecompte, 1969)

Fruits: Pseudocarp, dry, indehiscent, often shortly stipitate, 4-winged/ridged (*C. acuminatum*, *C. griffithii*, *C. latifolium*, *Combretum micranthum*, *C. punctatum*, *C. quadrangulare*, *C. sundaicum*, *C. tetralophum* and *C. wallichii*) or 5-winged/ridged (*C. deciduum*, *P. pilosum*, *C. trifoliatum*,). Wings equal, papery, transversely striate. Endocarp not sclerenchymatous.

Seeds: 1-seeded, sessile or stipitate, without endosperm; embryo green, oily, with folded cotyledons.

Typus: *Gaura fruticosa* Loefl. 1858 = *Combretum fruticosum* (Loefl.) Stuntz, 1914

Distribution: The genus *Combretum* comprises approximately 250 species, distributed across tropical and subtropical regions ((except Australia), mostly in South Africa, America and Asia, and Madagascar [3], [11]. In Vietnam, 11 species and 1 variety have been recorded, occurring throughout the country, as: Lang Son province, Bac Ninh province, Phu Tho province, Ha Noi city, Ninh Binh province, Quang Tri province, Hue city, Quang Ngai province, Gia Lai province, Khanh Hoa province, Lam Dong province, Tay Ninh province, Dong Nai province, Ho Chi Minh city, Vinh Long province, Dong Thap province, An Giang province, Ca Mau province. Among them, *Combretum micranthum* is widely cultivated in Ho Chi Minh city [4].

Habitat and Ecology: Species commonly occur along riverbanks, on the margins of primary forests and in secondary forests; mostly between sea-level and about 100 m, *C. latifolium* up to 1000 m, and *C. punctatum* up to 1600 m. Flowers are insect-pollinated. The flowering season typically spans from January to June, sometimes from October to December. Seed are dispersed by wind and water. [4], [11].

Resource value: Among 11 species and 1 variety belong to genus *Combretum* in Vietnam, no *Combretum* species are currently listed in Decree No. 84/2021/ND-CP [15] or in the Vietnam Red Book (2024) [16]; *Combretum micranthum* and *Combretum quadrangulare* were assessed on The IUCN Red List of Threatened Species in 2025, but at Least Concern (LC) [17].

All *Combretum* species are valued for their ability to improve soil quality and prevent erosion; nine species are utilized in traditional medicine (*C. acuminatum*, *C. griffithii*, *C. latifolium*, *C. micranthum*, *C. pilosum*, *C. quadrangulare*, *C. sundaicum*, *C. tetralophum*, *C. trifoliatum*) [4], [18]-[21] and *Combretum micranthum* is used ornamentally.

Notes: According to Plants of the World Online/Kew science [14]: *Combretum parviflorum* Reichb ex DC 1828 is a synonym of *Combretum micranthum* G.Don, 1824; *Combretum ternatum* (Wall. ex C. B. Clarke) O. Lecompte, 1969 is a synonym of *Combretum wallichii* var. *ternatum* (Wall. ex C. B. Clarke) Govaerts, 1999.

3.2. Dichotomous key to the species of *Combretum* Loefl. in Vietnam

1A. Flowers 5-merous. Fruits 5-winged or 5-ridged.

2A. Leaves verticillate, usually 3 per node. Inflorescences simple spikes, densely elongate. Fruits 5-ridged. 1. *C. trifoliatum*

2B. Leaves opposite or subopposite. Inflorescences compound spikes, panicle or fascicles. Fruits 5-winged.

3A. Leaves with tufted hairs in axils of lateral veins on lower surface. Inflorescences simple spikes, in fascicles. Style glabrous. Fruits with stipe up to 1 cm long.....2. *C. deciduum*

3B. Leaves without tufted hairs in axils of lateral veins on lower surface. Inflorescences in densely compound spikes. Style puberulous. Fruits with stipe up to 2 mm long 3. *C. pilosum*

1B. Flowers 4-merous. Fruits 4-winged or 4-ridged.

4A. Erect shrub or tree.

5A. Young branchlets terete, not thornlike. Leaves without scales overlapping on lower surface4. *C. micranthum*

5B. Young branchlets are four-angled; petiole sometimes persistent and thornlike. Leaves with scales overlapping on lower surface..... 5. *C. quadrangulare*

4B. Straggling shrub or woody climber.

6A. Fruits 4-ridged.

5A. Leaves 10-17 x 4-7 cm in size, glabrous; petiole 10 mm, glabrous...6. *C. acuminatum*

5B. Leaves 5-7 x 2-3 cm in size, hairs on faces; petiole 4 mm, hairs7. *C. tetralophum*

6B. Fruits 4-winged.

7A. Leaves opposite. Fruits with the width shorter than the height.

8A. Inflorescences simple elongate spikes, cylindric or compound spikes forming a panicle.

9A. Branchlets, petioles, flowers and fruit usually with densely overlapping scales. Leaves shorter than 8 cm 8. *C. punctatum*

9B. Branchlets, petioles, flowers and fruits with scales not overlapping. Leaves longer than 10 cm.

10A. Leaves axils of lateral veins with small rounded pits or pocket glands on lower surface. Inflorescences broadly cylindric spike. Flower infundibuliform.....9. *C. latifolium*

- 10B. Leaves axils of lateral veins without pits or pocket glands on lower surface.
Inflorescences raceme. Flowers campanuliform or cupuliform 10. *C. griffithii*
- 8B. Inflorescences dichasially compound spike, flower-bearing like subcapitate.....
..... 11. *C. sundaicum*
- 7B. Leaves verticillate. Fruits with the width longer than the height
..... 12. *C. wallichii* var. *ternatum*

4. Conclusions

The genus *Combretum* Loebl. in Vietnam comprises 11 species and 1 variety, distributed in both primary and secondary forests across the country. Among them, *Combretum micranthum* is cultivated ornamentally. All species are woody climbers or scandent shrubs when lacking climbing support, rarely small tree and robust-with highly diverse morphological characteristics. They play important ecological roles in forest ecosystems and are mainly utilized for medicine.

In this study, the key morphological characteristics of the genus *Combretum* in Vietnam were described, and a summary was provided of its distribution, habitat, ecology and resource value, and a taxonomic key for identifying taxa of *Combretum* present in the flora of Vietnam.

Acknowledgments

This research is funded by Hanoi Pedagogical University 2 Foundation for Sciences and Technology Development under Grant Number: SV.2025.HPU2.09. We are also thankful to Professor Tran The Bach and scientists from the Institute of Biology; scientists from Vietnam National University, Hanoi and National Institute of Medical Materials, Hanoi, Vietnam, our colleagues in Faculty of Biology, Hanoi pedagogical University 2 for sending us valuable materials for reference useful to this research.

References

- [1] Pehr Loebling [Loebl.], *Iter Hispanicum* [Iter Hispan.], p. 308, Stockholm, 1758.
- [2] Robertus Brown [R.Br.], *Prodromus Florae Novae Hollandiae*, Vol. 1. p.351, p.404, Londini, 1810.
- [3] Takhtajan Armen L., *Diversity and Classification of Flowering Plants*, pp. 332, pp. 339–340, New York, 2009, doi: 10.1007/978-1-4020-9609-9.
- [4] Nguyen Tien Ban, *Checklist of plant species of Vietnam* [Checkl. Pl. Sp. Vietn.], Vol. II, p. 882–885. Hanoi: Agriculture Publishing House, 2005.
- [5] N. N. Thin, *Methods of plant research*, 171 p. Hanoi: Hanoi National University, 2007.
- [6] Pham Hoang Ho [Phamh.], *An illustrated Flora of Vietnam* [Illustr. Fl. Vietn.], Vol. 2, pp. 103–106. Ho Chi Minh: Ho Chi Minh City Publishing House, 2003.
- [7] Gagnepain F. in H. Lecomte [Gagnep.], *Flore Générale de l'Indo-Chine* [Fl. Gen. Indoch.], 2, p. 734–747, Paris, 1920.
- [8] Lecomte O. [Lecomte], “Combretum,” *Flore du Cambodge Laos et du Viet-Nam* [Fl. Camb. Laos Vietn], 10: pp. 32–61, Paris, 1969.
- [9] Hsu Ting-Chi, “Combretum,” *Flora Reipublicae Popularis Sinicae* [Fl. Reip. Pop. Sin.], 41, pp. 19–30, Peikin, 1984.
- [10] Chen Jie & Nicholas J. Turland, “Combretum,” *Flora of China* [Fl. China], 13, pp. 316–320, USA: Science Press & Missouri Botanical Garden Press, 2011.
- [11] Exell A. W., “Combretaceae,” *Flora Malesiana* [Fl. Males.], ser. I, 4, pp. 533–544, The Netherlands, 1949.
- [12] Ian M. Turner, “A synopsis of the native Combretaceae in the Malay Peninsula,” *Webbia. Journal of Plant Taxonomy and Geography*, vol. 75, no. 2, pp. 263–280, Nov. 2020, doi: 10.36253/jopt-8891.
- [13] Nannapat Pattharahirantricin & Manop Poopath, “A new species and taxonomic notes on the genus Combretum (Combretaceae) in Thailand,” *Thai Foresets Bull. Bot.* 50(1), vol. 50, pp. 56–65, 2022, doi:

- 10.20531/tfb.2022.50.1.06.
- [14] Plants of the World Online/Kew science [Online]. Available: <https://powo.science.kew.org/> [Accessed: March. 10, 2026].
- [15] Governments, *Decree No. 84/2021/ND-CP on Amendments to Governments Decree No. 06/2019/ND-CP dated September 22, 2021 on Management of Endangered, Rare and Precious of forest fauna and flora and observation of Convention on International Trade in Endangered species of wild fauna and flora*. Hanoi: 16 Le Hong Phong, Ba Dinh, 2021.
- [16] Ministry of Science and Technology, *Vietnam Red data Book (Part II-Plant)*, Hanoi: Natural Science and Technology Publishing House, 2024.
- [17] IUCN, The IUCN red list of threatened species [Online]. Available: <http://www.iucnredlist.org> [Accessed: March 11, 2026]
- [18] Tran Minh Hoi, *Plant Resources of Vietnam*, 198 p. Ha Noi: Natural Science and Technology Publishing House, 2013.
- [19] Haron, N.W. in: van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors), *Plant Resources of South-East Asia (PROSEA)*, 12-Medicinal and poisonous plants, pp. 199–203, Wageningen: Pudoc, 2001.
- [20] National Institute of Medical Materials, *Checklist of medicinal plants in Vietnam*, pp. 214–215, 1106, Ha Noi: Science and Technics Publishing House, 2016.
- [21] Do Tat Loi, *Medicinal Plants and Remedies of Vietnam*, pp. 169–170, Ha Noi: Medical Publishing House, 2004.