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AN UPDATED ENUMERATION OF BAMBUSOIDEAE IN CENTRAL HIGHLANDS, VIETNAM

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ABSTRACT

Bamboos are widely distributed in a variety of habitats in the Central Highlands. Different researchers treat species differently, leading to ambiguous reporting of generic and infrageneric taxa. Following extensive research, this paper is an updated enumeration report on the bamboos that have been found there. The result has recorded 29 species of bamboo belonging to 15 genera. The Bambusoideae grow naturally in almost all regions, in an altitudinal range that extends from 200 m up to 2,160 m. Bamboo in the Central Highlands is distributed in three vegetation types: degraded natural forests in valleys and mountain gorges, along rivers (twenty-one species); primary forest, mixed with broadleaved trees (six species); and dry dipterocarp forest (two species).

Keywords: Bambusoideae, Central Highlands, distribution, morphological characters.

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INTRODUCTION

Bamboos are a member of the grass family Poaceae, subfamily Bambusoideae. This group has diversity in its growth, morphogenesis, taxonomy, distribution, and ecology. Besides that, bamboo has many uses in the lives of people, such as construction (flooring, roofing designing, and scaffolding), furniture, and food. Still, many classification systems of Bambusoideae have been proposed mainly based on morphological features. Munro (1868) described 170 species of bamboo arranged into 21 genera, 3 divisions. Gamble (1896) covered 15 genera and 115 species in 4 groups. According to Camus (1913), who statistically summarized the information in Munro and Gamble's studies, there are 490 species and 33 genera of bamboo worldwide. According to the majority of modern classification systems, bamboo is divided into 67 genera and 9 subtribes (Dransfield & Widjaja, 1995; Li, 1997; Soderstrom & Ellis, 1987). Ohrnberger (1999) states that bamboo has 110 genera and 1,110–1,140 species. According to Bamboo Phylogeny Group (2012), bamboo includes 1,482 species belonging to 119 genera and three tribes: Arundinarieae (546 species), Bambuseae (812 species), and Olyreae (124 species). The new research was presented by Soreng et al. (2017), which revealed that bamboo has 1,670 species in 125 genera, 15 subtribes, and 3 tribes.

In Vietnam, several authors have studied the taxonomy of the Bambusoideae such as Balansa (1890) with 7 species, 5 genera; Camus & Camus (1923) with 73 species, 13 genera (Central Highlands 3 species); Ho (2000) with 124 species, 23 genera (Central Highlands 15 species), Ban (2005) with 127 species, 4 varieties, 29 genera and Nghia (2005) with 216 species, 25 genera. However, the number of species is different between the authors. Besides, the number of species could not be counted precisely at that time because the specimens rarely had flowers.

The Central Highlands are made up of plateaus between 500 m and 1,500 m above sea level, mountains from 500 m to 2,400 m, and lowlands and plains with valleys between 140 and 500 m that influence the highland climate. The geography of the area slopes gradually from the east to the west and is part of the Indochina block's Truong Son orogenic belt. The Central Highlands can be considered central to migratory waves of plants from areas with different climates in the plant evolution. It is a hub of biodiversity in Vietnam, with various vegetation from tropical to temperate climes to the hot, dry climate of the Asian continent (Ban, 1984). A relatively significant height difference greatly affects the distribution of flora and fauna in general and the species of the Bambusoideae in particular.

Recently, many new species were recorded in the Central Highlands. Still, there have been no studies on the diverse species, distribution, and morphological characteristics of bamboo in this area. The present study aims to update the enumeration and morphological diversity of Bambusoideae in the Central Highlands, Vietnam.

MATERIALS AND METHODS

The species specimens were collected in five provinces in the Central Highlands: Kon Tum, Gia Lai, Dak Lak, Dak Nong, and Lam Dong from 2019−2023. Collected specimens included rhizomes, sections of old culms, mature branch complements, leaves, culm sheaths, and inflorescences. Specimens were processed according to the method of Jain & Rao (1977) and deposited in the Herbarium of Tay Nguyen Institute for Scientific Research. For each species, 5−10 duplicates were collected, photographs were taken, and the coordinates, habitat, and other information required to identify the species were recorded. Species identification was based on morphological characters reported by Pham Hoang Ho (2000), and Nguyen Hoang Nghia (2006). The morphological characters were

compared with herbarium specimens deposed in herbaria of the Institute of Ecology and Biological Resources, Vietnamese Academy of Forest Sciences as well as with digital images available in databases of the Muséum National d'Histoire Naturelle (https://science.mnhn.fr/), Royal Botanic Gardens Kew (K), the Chinese Virtual Herbarium (http://www.cvh.ac.cn/), Royal Botanic Gardens Kew (http://apps.kew.org/), JSTOR Global Plants (https://plants.jstor.org/).

RESULTS

Enumeration

The current work, based on an extensive taxonomic study of Bamboo over more than four years from 2019 to 2023, lists a total of 29 species in 15 genera. The species composition and distribution of Bambusoideae in the Central Highlands are presented in Table 1.

The result shows that Bambusoideae in the Central Highlands includes twenty-nine species belonging to fifteen genera (Table 1). The genus *Gigantochloa* has the highest number of species with six, followed by the genera *Schizostachyum* with four species, the genera *Bambusa* and *Melocalamus* with three species for each genus, and the genera *Vietnamosasa* and *Yersinochloa* with two species for each genus. The majority of genera, which are represented by only one species each, are *Annamocalamus*, *Chimonocalamus*, *Cochinchinochloa*, *Khoonmengia*, *Kinabaluchloa*, *Nianhochloa*, *Maclurochloa*, *Thyrsostachys*, and *Yushania*.

In the Central Highlands, the Bambusoideae grow naturally in almost all regions, in an altitudinal range that extends from 200 m up to 2,160 m. Some species are only found at altitudes over 1,500 m, such as *Chimonocalamus bidoupensis*, *Khoonmengia honbaensis*, *Kinabaluchloa wrayi*, *Nianhochloa bidoupensis*, *Schizostachyum langbianense*, and *Yushania schmidiana*. Most species are distributed at altitudes below 1,500 m (twenty-three species).

Bambusoideae is distributed in three vegetation types, including degraded natural forest in valleys and mountain gorges, along rivers with twenty-one species (72.41%); dry dipterocarp forest with two species (6.90%), and primary forest mixed with broadleaved trees with six species (20.69%). Details of the distribution for species are in Table 1 and Figure 1. This is the first research about the distribution of Bambusoideae in Central Highlands Vietnam.

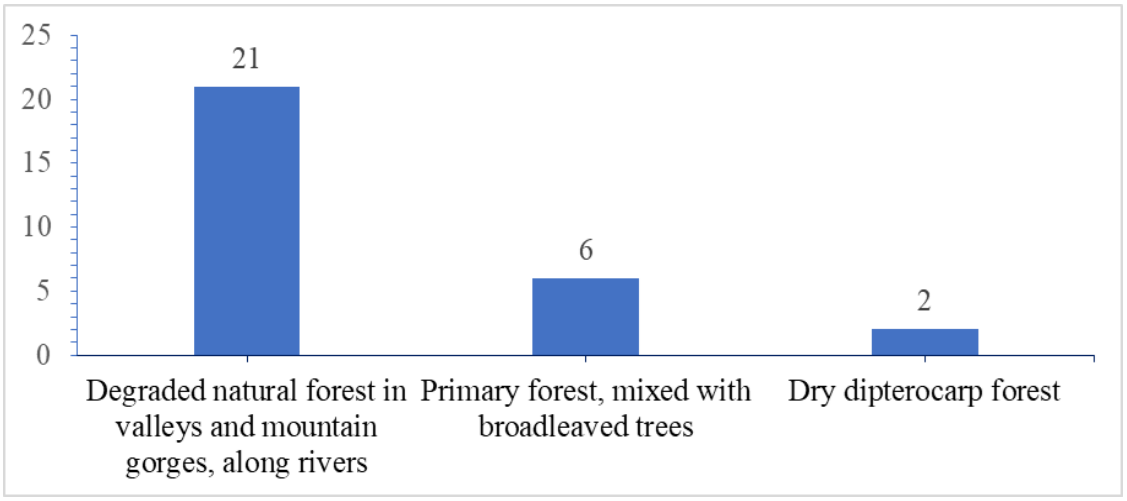

Figure 1. Vegetation of Bambusoideae in Central Highlands

Table 1. List of taxa in subfamily Bambusoideae reported from Central Highlands

No.	Species	Elevation (m)	Distribution	Vegetation
1	*Annamocalamus kontumensis* H. N. Nguyen, N. H. Xia & V. T. Tran	500–1,200	Lo Xo pass (Kon Tum)	Degraded natural forest in valleys and mountain gorges, along rivers
2	*Bambusa bambos* (L.) Voss	400–950	Lam Dong, Dak Lak (Dak Nong)	Degraded natural forest in valleys and mountain gorges, along rivers
3	*Bambusa gurgandii* K. M. Wong & M. H. Diep	350–800	Lo Xo pass (Kon Tum)	Degraded natural forest in valleys and mountain gorges, along rivers
4	*Bambusa procera* A. Chev. & A. Camus.	200–850	Dam Rong (Lam Dong)	Degraded natural forest in valleys and mountain gorges, along rivers
5	*Chimonocalamus bidoupensis* N. H. Nghia & V. T. Tran	1,500–1,600	Lac Duong (Lam Dong)	Primary forest, mixed with broadleaved trees
6	*Cochinchinochloa braiana* H. N. Nguyen & V. T. Tran	1,000–1,200	Di Linh, Bao Lam (Lam Dong)	Degraded natural forest in valleys and mountain gorges, along rivers
7	*Gigantochloa cochinchinensis* Camus	400–900	Dak Lak; Dak To (Kon Tum); Bao Loc (Lam Dong)	Degraded natural forest in valleys and mountain gorges, along rivers
8	*Gigantochloa densa* (A. Camus) Nguyen	400–1,200	Ngoc Linh, Tu Mo Rong (Kon Tum)	Degraded natural forest in valleys and mountain gorges, along rivers
9	*Gigantochloa multifloscula* H. N. Nguyen, N. H. Xia & V. T. Tran	200–800	Cat Tien, Da Huoai, Bao Loc (Lam Dong)	Degraded natural forest in valleys and mountain gorges, along rivers
10	*Gigantochloa parvifolia* (Brandis ex Gamble) Nguyen	600–800	Kon Tum	Degraded natural forest in valleys and mountain gorges, along rivers
11	*Gigantochloa poilanei* (A. Camus)	500–700	Ngoc Hoi, Lo Xo pass (Kon Tum)	Degraded natural forest in valleys and mountain gorges, along rivers
12	*Gigantochloa tenuispiculata* A. (Camus) Nguyen	200–600	Lam Dong	Degraded natural forest in valleys and mountain gorges, along rivers
13	*Khoonmengia honbaensis* N. H. Xia, Y. H. Tong & X. R. Zheng	1,500–1,600	Lac Duong (Lam Dong)	Primary forest, mixed with broadleaved trees
14	*Kinabaluchloa wrayi* (Stapf) K. M. Wong	1,550–1,600	Lac Duong (Lam Dong)	Primary forest, mixed with broadleaved trees

No.	Species	Elevation (m)	Distribution	Vegetation
15	*Maclurochloa locbacensis* N. H. Nguyen & V. T. Tran	850–950	Bao Lam (Lam Dong)	Degraded natural forest in valleys and mountain gorges, along rivers
16	*Melocalamus blaoensis* H. N. Nguyen & V. T. Tran	850–950	Bao Lam (Lam Dong)	Degraded natural forest in valleys and mountain gorges, along rivers
17	*Melocalamus kbangensis* N. H. Nguyen & V. T. Tran	900–1,100	Kbang (Gia Lai), Lo Xo pass (Kon Tum)	Degraded natural forest in valleys and mountain gorges, along rivers
18	*Melocalamus truongsonensis* N. H. Nguyen & V. T. Tran	250–1,100	Truong Son road, Ngoc Linh (Kon Tum)	Degraded natural forest in valleys and mountain gorges, along rivers
19	*Nianhochloa bidoupensis* H. N. Nguyen & V. T. Tran	1,750–1,800	Lac Duong (Lam Dong)	Primary forest, mixed with broadleaved trees
20	*Schizostachyum yalyense* N. H. Xia, V. T. Tran et H. N. Nguyen	400–700	Gia Lai (Kon Tum)	Degraded natural forest in valleys and mountain gorges, along rivers
21	*Schizostachyum langbianense* (Chevalier et A. Camus) N. H. Xia, V. T. Tran & H. N. Nguyen	1,600–1,900	Lac Duong (Lam Dong)	Primary forest, mixed with broadleaved trees
22	*Schizostachyum ninhthuanense* N. H. Xia, V. T. Tran et H. N. Nguyen	300–1,000	Don Duong (Lam Dong); Ngoan Muc pass (Ninh Thuan)	Degraded natural forest in valleys and mountain gorges, along rivers
23	*Schizostachyum locbacense* V. T. Tran	1,000–1,040	Bao Lam (Lam Dong)	Degraded natural forest in valleys and mountain gorges, along rivers
24	*Thyrsostachys siamensis* (Munro) Gamble	350–1,100	Lam Dong, Dak Nong, Dak Lak, Gia Lai (Kon Tum)	Degraded natural forest in valleys and mountain gorges, along rivers
25	*Vietnamosasa darlacensis* N. T. Quyen	300–700	Gia Lai, Dak Lak (Lam Dong)	Dry dipterocarp forest
26	*Vietnamosasa pusilla* (A. Chev. & A. Camus) N. T. Quyen	300–700	Gia Lai, Dak Lak (Lam Dong)	Dry dipterocarp forest
27	*Yersinochloa dalatensis* H. N. Nguyen & V. T. Tran	1,100–1,500	Da Lat, Lac Duong (Lam Dong)	Degraded natural forest in valleys and mountain gorges, along rivers
28	*Yersinochloa nghiana* V. T. Tran	1,100–1,130	Di Linh (Lam Dong)	Degraded natural forest in valleys and mountain gorges, along rivers
29	*Yushania schmidiana* (A. Camus) Ohrnb.	2,000–2,160	Lac Duong (Lam Dong)	Primary forest, mixed with broadleaved trees

Morphological characteristics

The Bambusoideae in Central Highlands is diverse in morphological characteristics. These bamboos possess a pachymorph rhizome system, except some species including *Kinabaluchloa wrayi*, *Chimonocalamus bidoupensis*, *Yushania schmidiana*, which are leptomorphic. Bamboos have two habits: erect (*Annamocalamus*, *Bambusa*, *Chimonocalamus*, *Giagantochloa*, *Kinabaluchloa*, *Schizostachyum*, *Thyrostachys*, *Vietnamosasa*, and *Yusania*) or culms and branches clambering/scrambling or hanging over nearby vegetation or trees (*Cochinchinocholoa*, *Khoonmengia*, *Melocalamus*, *Maclurochloa*, *Nianhochloa*, and *Yersinochloa*). In the Central Highlands, bamboo has four styles of mid-culm branch complements: many branches subequal, nondominant (*Annamocalamus*, *Kinabaluchloa*, *Schizostachyum)*; several branches with the one dominant *(Bambusa, Cochinchinochloa, Gigantochloa, Khoonmengia, Maclurochloa, Melocalamus, Thyrsostachys, Vietnamosasa, Yersinochloa, Yushania*); 3–4 of subequal branchlets, sub-equaling internode *(Nianhochloa)* and mid-culm branch complement with 3 subequal branches at **e**ach node, 3–5 at upper culm nodes *(Chimonocalamus)*. The inflorescences of Bambusoideae are readily recognizable by semelauctant (determinate) or iterauctant (indeterminate). The diversity of morphological characteristics of Bambusoideae in Central Highlands is shown in Figure 2 and Table 2.

Key to the species of Bambusoideae in Central Highlands

1a. Leptomorph rhizome……..*Yushania schmidiana*
1b. Pachymorph rhizome……..2
2a. Pericarp thick, fleshy……..3
2b. Caryopsis……6
3a. Culm erect…….*Annamocalamus kontumensis*
3b. Culm scrambling/climbing…….4
4a. Blade sheath erected…….*Melocalamus kbangensis*
4b. Blade sheath reflexed……..24
5a. Culm sheaths swollen at base…….*Melocalamus blaoensis*
5b. Culm sheaths without swollen at base……...*Melocalamus truongsonensis*
6a. Culm erect……...7
6b. Culm scrambling/climbing……...24
7a. Branches several with the middle one dominant……8
7b. Branches subequal branches, nondominant……..19
8a. Filaments joined in a tube……..…9
8b. Filamens free……14
9a. Blade sheath reflexed……*Gigantochloa poilane*
9b. Blade sheath erected……10
10a. The two edges of the sheath proper are not high……...*Gigantochloa cochinchinensis*
10b. The two edges of the sheath proper are high……..11
11a. Blade sheath short……*Gigantochloa tenuispiculata*
11b. Blade sheath elongated……...12

12a. Culm sheath elongated……...*Gigantochloa densa*
12b. Culm sheath triangular……...*13*
13a. 2 fertile florets……..*Gigantochloa parvifolia*
13b. 4-5 fertile florets…….*Gigantochloa multifloscula*
14a. Culm sheaths persistent……..15
14b Culm sheaths deciduous……17
15a. Bamboos moderately sized……*Thyrsostachys siamensis*
15b. Bamboos small sized……..16
16a. Culm-sheaths 3–5 cm long……...*Vietnamosasa pusilla*
16b. Culm-sheaths 22–25 cm long……...*Vietnamosasa darlacensis*
17a. Nodes with a hairs……...*Bambusa gurgandii*
17b. Nodes without a hairs…….18
18a. Branches and nodes with thorns……*Bambusa bambos*
18b. Branches and nodes without thorns……..*Bambusa procera*
19a. Nodes without hairs or thorns…….*20*
19b. Nodes with hairs or thorns……..23
20a. Floret 2……...*Schizostachyum locbacense*
20b. Floret 1……...21
21a. Lodicules 1…….*Schizostachyum yalyense*
21b. Lodicules 3…….22
22a. The apical part of the culm leaf sheath proper horizontal or only slightly concave……
……*Schizostachyum langbianense*
22b. The apical part of the culm leaf sheath proper distinctly concave……..
……..*Schizostachyum ninhthuanense*
23a. Nodes with hairs……...*Kinabaluchloa wrayi*
23b. Nodes with thorns……...*Chimonocalamus bidoupensis*
24a Branches subequal branches, nondominant……*Nianhochloa bidoupensis*
24b. Branches several with the middle one dominant……25
25a. Basal part of culm internode thick swollen patella……..*Cochinchinochloa braiana*
25b. Basal part of culm internode not swollen……..26
26a. Bud wholly sunken into culm……..*Khoonmengia honbaensis*
26b. Bud not sunken into culm……...27
27a. Two perfect florets……...*Maclurochloa locbacensis*
27b. One perfect floret……28
28a. Culm-leaves blade reflexed……..*Yersinochloa dalatensis*
28b. Culm-leaves blade erect……..*Yersinochloa nghiana*

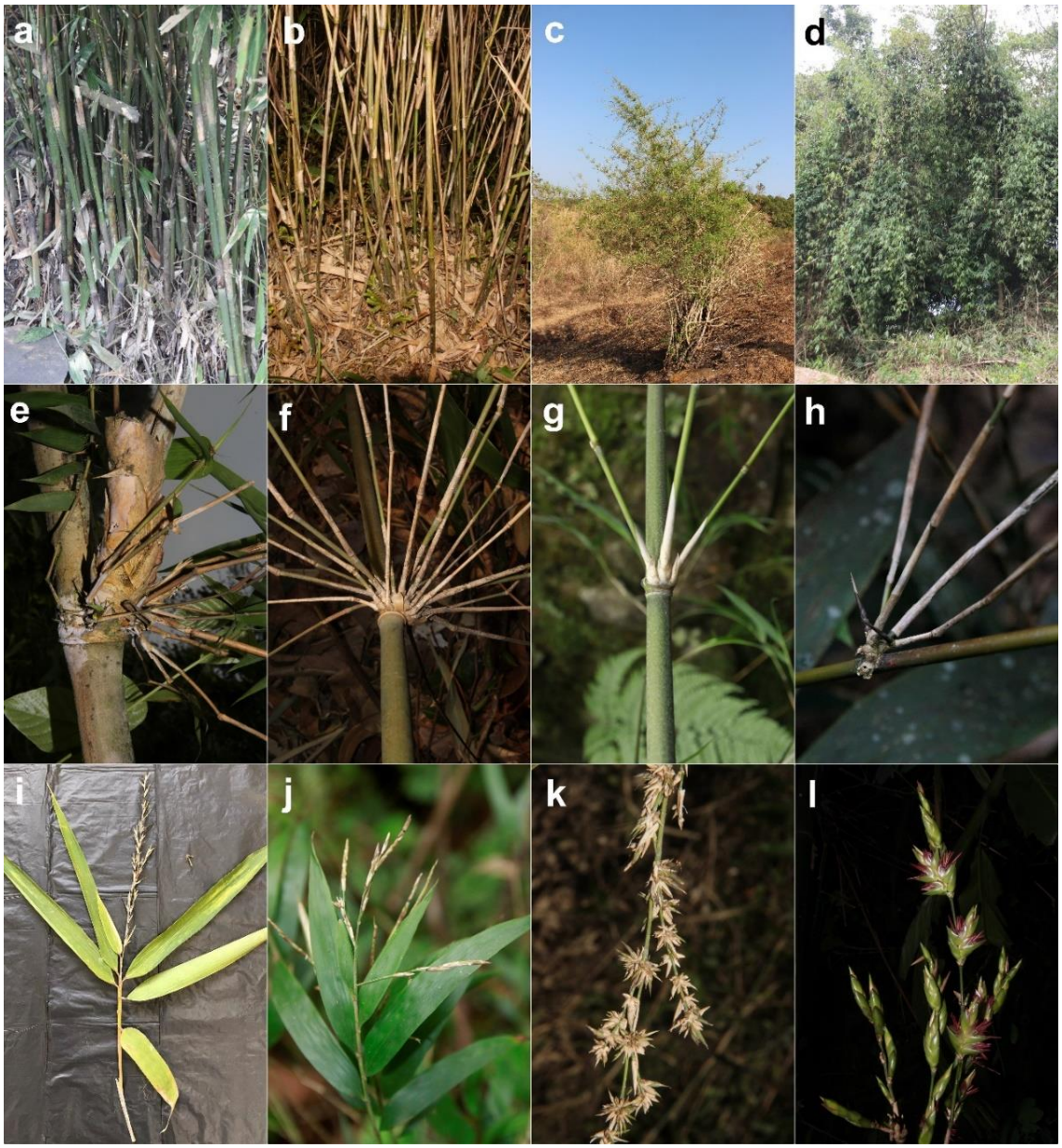

Figure 2. Morphological characteristics of Bambusoideae in the Central Highlands:
a. Pachymorph rhizome (*Annamocalamus kontumensis*), b. Leptomorph (*Yushania schmidiana*);
c. Culm erect (*Vietnamosasa cili*); d. Culm scrambling (*Yersinochloa dalatensis*);
e. Several branches with one dominant (*Melocalamus truongsonensis*);
f. Subequal, nondominant branches (*Schizostachyum yalyense*);
g. 3 subequal branches at each node (*Chimonocalamus bidoupensis*);
h. 4 subequal branchlets (*Nianhochloa bidoupensis*);
i, j. Inflorescences semelauctant (*Schizostachyum locbacense, Chimonocalamus bidoupensis*);
k, l. Inflorescences iterauctant (*Gigantochloa densa, Bambusa gurgandii*)

Table 2. Diversity of morphological characteristics of the species of Bambusoideae in Central Highlands

No.	Species	Rhizome system		Habit		Mid-culm branches			Inflorescence	
		Pachymorph	Leptomorph	Erect	Scrambling/ climbing	Many subequal and one dominant	Many subequal	Three subequal	Semelauctant or determinate	Iterauctant or indeterminate
1	*Annamocalamus kontumensis*	+	-	+	-	+	+	-	-	+
2	*Bambusa procera*	+	-	+	-	+	-	-	-	+
3	*Bambusa bambos*	+	-	+	-	+	-	-	-	+
4	*Bambusa gurgandii*	+	-	+	-	+	-	-	-	+
5	*Chimonocalamus bidoupensis*	+	-	+	-	-	-	+	+	-
6	*Cochinchinochloa braiana*	+	-	-	+	+	-	-	-	+
7	*Gigantochloa multifloscula*	+	-	+	-	-	+	-	-	+
8	*Gigantochloa cochinchinensis*	+	-	+	-	+	-	-	-	+
9	*Gigantochloa densa*	+	-	+	-	+	-	-	-	+
10	*Gigantochloa parvifolia*	+	-	+	-	+	-	-	-	+
11	*Gigantochloa poilanei*	+	-	+	-	+	-	-	-	+
12	*Gigantochloa tenuispiculata*	+	-	-	-	+	-	-	-	+
13	*Kinabaluchloa wrayi*	+	-	+	-	-	+	-	+	-
14	*Khoonmengia honbaensis*	+	-	-	+	+	-	-	+	-
15	*Maclurochloa locbacensis*	+	-	-	+	+	-	-	-	+

No.	Species	Rhizome system		Habit		Mid-culm branches			Inflorescence	
		Pachymorph	Leptomorph	Erect	Scrambling/ climbing	Many subequal and one dominant	Many subequal	Three subequal	Semelauctant or determinate	Iterauctant or indeterminate
16	*Melocalamus blaoensis*	+	-	-	+	+	-	-	-	+
17	*Melocalamus kbangensis*	+	-	-	+	+	-	-	-	+
18	*Melocalamus truongsonensis*	+	-	-	+	+	-	-	-	+
19	*Nianhochloa bidoupensis*	+	-	-	+	-	-	+	-	+
20	*Schizostachyum yalyense*	+	-	+	-	-	+	-	+	-
21	*Schizostachyum langbianense*	+	-	+	-	-	+	-	+	-
22	*Schizostachyum ninhthuanense*	+	-	+	-	-	+	-	+	-
23	*Schizostachyum locbacense*	+	-	+	-	-	+	-	+	-
24	*Thyrsostachys siamensis*	+	-	+	-	+	-	-	+	-
25	*Vietnamosasa darlacensis*	+	-	+	-	+	-	-	+	-
26	*Vietnamosasa pusilla*	-	-	+	-	+	-	-	+	-
27	*Yersinochloa dalatensis*	+	-	-	+	+	-	-	-	+
28	*Yersinochloa nghiana*	+	-	-	+	+	-	-	-	+
29	*Yushania schmidiana*	-	+	+	-	-	+	-	+	-

Note: +: present, -: absent.

A checklist of the species of Bambusoideae in Central Highlands

***Annamocalamus* H. N. Nguyen, N. H. Xia & V. T. Tran**

***Annamocalamus kontumensis* H. N. Nguyen, N. H. Xia & V. T. Tran**

Typus: Vietnam, Kon Tum province: Ngoc Linh Mountain, Ngoc Linh village, c. 1200 m, 23.II.1995, fl. & fr., Averyanov & al. VH020 (holo-: P [P00451097]).

Vernacular names: Nứa quả thịt.

Distribution: Lo Xo pass (Kon Tum).

Note: Endemic.

***Bambusa* Schreb.**

***Bambusa bambos* (L.) Voss**

Syn.: *Arundarbor agrestis* Kuntze, *Arundarbor arundinacea* (Retz.) Kuntze, *Arundarbor bambos* Kuntze, *Arundarbor maxima* Kuntze, *Arundarbor orientalis* Kuntze, *Arundo agrestis* Lour., *Arundo arborea* Mill., *Arundo bambos* L., *Arundo bambu* Lour., *Arundo excelsa* Salisb., *Arundo indica* Noronha, *Bambos arundinacea* Retz., *Bambos arundo* J. F. Gmel., *Bambos bambos* (L.) W. F. Wright, *Bambos quinqueflora* Stokes, *Bambusa agrestis* Poir., *Bambusa arundinacea* Willd., *Bambusa arundo* Wight ex Steud., *Bambusa bambos f. gigantea* (Bahadur) S. S. Jain & S. Biswas, *Bambusa bambusa* Huth, *Bambusa neesiana* Arn. ex Munro, *Bambusa orientalis* Nees, *Gigantochloa maxima* Kurz.

Typus: Sri Lanka, Hermann fol. 15.

Vernacular names: Tre gai.

Distribution: Lam Dong, Dak Lak, Dak Nong.

***Bambusa gurgandii* K. M. Wong & M. H. Diep**

Typus: M. H. Diep, C. K. Le, J. Gurgand et al. MH 100 (holo-: SING [SING0210902 shoot & leafy branch, SING0210903 culm sheath, SING0210904 inflorescence and leafy branch, SING0202907 pseudospikelets in spirit]!; iso-: G!, IBSC!, K!, P!, PBB!, US!, VNM!).

Vernacular names: Lồ ô.

Distribution: Lo Xo pass (Kon Tum).

***Bambusa procera* A. Chev. & A. Camus**

Typus: A. Chevalier No30.359, Loc Ninh.

Vernacular names: Lồ ô.

Distribution: Dam Rong (Lam Dong).

***Chimonocalamus* Hsueh & T. P. Yi**

***Chimonocalamus bidoupensis* H. N. Nguyen & V. T. Tran**

Typus: Vietnam, Lam Dong province: Lac Duong district, Yangly waterfall, 12°10’29”N, 108°32’2”E, 1565 m a.s.l., 11 Feb 2017, H.N. Nguyen & V.T. Tran VAFS 0460 (holotype: DLU; iso VNMN, VTN, SING).

Vernacular names: Sặt Bidoup.

Distribution: Lac Duong (Lam Dong).

Note: Endemic.

***Cochinchinochloa* H. N. Nguyen & V. T. Tran**

***Cochinchinochloa braiana* H. N. Nguyen & V. T. Tran**

Typus: V.T. Tran, T.T. Hoang & H.N. Nguyen 312012 (holo VAFS; iso (VNMN-Vietnam National Museum of Nature)), Vietnam, Lamdong province, Di Linh district, Braian mountain, Suoi Lanh, elevation 1,130 m asl, N11°26’44”E, 108°04’07”.

Vernacular names: Tre leo Braian.

Distribution: Di Linh, Bao Lam (Lam Dong).

Note: Endemic.

***Gigantochloa* Kurz ex Munro**

***Gigantochloa cochinchinensis* Camus**

Typus: Polanei 41274, Binh Loi, Gia Dinh (Vietnam).

Vernacular names: Le miền nam, Mạy sang lo, Tre la ha.

Distribution: Dak Lak; Dak To (Kon Tum); Bao Loc (Lam Dong).

***Gigantochloa densa* (Camus) Nguyen**

Typus: Pierre 6661.

Vernacular names: Le hoa dày.

Distribution: Tu Mo Rong (Kon Tum).

***Gigantochloa multifloscula* H. N. Nguyen, N. Xia & V. T. Tran**

Typus: Vietnam. Prov. Dong Nai province, Cat Tien, Km 145 on the road Saigon to Dalat, fl. 25.I.1953, Schmid 1506 (holo-, P!).

Vernacular names: Mum.

Distribution: Cat Tien, Da Huoai, Bao Loc (Lam Dong).

***Gigantochloa parvifolia* (Brandis ex Gamble) Nguyen**

Syn.: *Pseudoxytenanthera parvifolia* (Brandis ex Gamble) Nguyen, *Oxytenanthera parvifolia* Brandis ex Gamble.

Typus: Yoonzaleen Valley in Burma, Brandis, D., 3, 1880.

Vernacular names: Le lá nhỏ.

Distribution: Kon Tum.

***Gigantochloa poilanei* (A. Camus) Nguyen**

Syn.: *Pseudoxytenanthera poilanei* (A. Camus) Nguyen, *Oxytenanthera poilanei* (A. Camus) Nguyen.

Typus: Poilane 1339, 1920, Quang Tri (Vietnam).

Vernacular names: Le poilane.

Distribution: Ngoc Hoi, Lo Xo pass (Kon Tum).

***Gigantochloa tenuispiculata* (Camus) Nguyen**

Typus: Poilane 649, Dinh - Ba Ria (Vietnam).

Syn.: *Oxytenanthera tenuispiculata* Camus, *Pseudoxytenanthera tenuispiculata* (Camus) Nguyen.

Vernacular names: Tre la ha.

Distribution: Duc Trong, Bao Loc (Lam Dong).

***Khoonmengia* N. H. Xia, Y. H. Tong & X. R. Zheng**

***Khoonmengia honbaensis* N. H. Xia, Y. H. Tong & X. R. Zheng**

Typus: Vietnam, Khanh Hoa, Hon Ba Nature Reserve, 1500 m, 17 October 2017, N. H. Xia et al. BVN2017048 (holotype, IBSC!; isotypes, SING!, VNM!).

Vernacular names: Tre leo Hòn Bà.

Distribution: Lac Duong (Lam Dong).

Note: Endemic.

***Kinabaluchloa* K. M. Wong**

***Kinabaluchloa wrayi* (Stapf) K. M. Wong**

Syn.: *Bambusa wrayi* Stapf, *Cephalostachyum chevalieri* A. Camus.

Typus: Malay Peninsula, Perak, Gumong Inas, Wray 4166.

Vernacular names: Tre lông Bidoup.

Distribution: Lac Duong (Lam Dong).

***Maclurochloa* K. M. Wong**

***Maclurochloa locbacensis* H. N. Nguyen & V. T. Tran**

Typus: Vietnam. Lam Dong province, Bao Lam district, Loc Bac commune, alt. 935 m a.s.l., 11°44’05.9”N, 107°42’16.5”E, 22 Aug. 2005 H.N. Nguyen & V.T. Tran VAFS 0444 (holotype VAFS, Herbarium of the Vietnamese Academy of Forest Science, Hanoi; isotype DLU, Herbarium of Dalat University).

Vernacular names: Giang Lộc Bắc.

Distribution: Bao Lam (Lam Dong).

Note: Endemic.

***Melocalamus* Benth.**

***Melocalamus blaoensis* H. N. Nguyen & V. T. Tran**

Typus: HN-LN 0423 (holo HN-LN: Herbarium of the Forest Science Institute of Vietnam, Hanoi), Vietnam, Lam Dong province, Bao Lam district, Loc Bac commune.

Vernacular names: Tre quả thịt Lộc Bắc.

Distribution: Bao Lam (Lam Dong).

Note: Endemic.

***Melocalamus kbangensis* H. N. Nguyen & V. T. Tran**

Typus: HN-LN 0426 (holo HN-LN: Herbarium of the Forest Science Institute of Vietnam, Hanoi), Vietnam, Gia Lai province, Kbang district, Kon Ha Nung Forest Station.

Vernacular names: Tre quả thịt Kon Hà Nừng.

Distribution: Kbang (Gia Lai), Lo Xo pass (Kon Tum).

Note: Endemic.

***Melocalamus truongsonensis* H. N. Nguyen & V. T. Tran - Blumea 55, 2010: 129–138**

Typus: HN-LN 0425 (holo HN-LN: Herbarium of the Forest Science Institute of Vietnam, Hanoi), Vietnam, Quang Nam province, Song Thanh Nature Reserve.

Vernacular names: Tre quả thịt Trường Sơn.

Distribution: Truong Son road, Ngoc Linh (Kon Tum).

Note: Endemic.

***Nianhochloa* H. N. Nguyen & V. T. Tran**

***Nianhochloa bidoupensis* H. N. Nguyen & V. T. Tran**

Typus: Vietnam. Lam Dong province, Bidoup Mountain, Hon Giao Peak, elevation 1650 m a.s.l., 108°42’54.7”E, 12°11’12.8”N, VI.2006, H.N. Nguyen, V.T.Tran 62006601 (holo-, FSIV! [Herbarium of Forest Science Institute of Vietnam]).

Vernacular names: Tre leo Bidoup.

Distribution: Lac Duong (Lam Dong).

Note: Endemic, considered as Critically Endangered (CR).

***Schizostachyum* Nees**

***Schizostachyum langbianense* V. T. Tran, N. H. Xia & H. N. Nguyen**

Typus: Vietnam. Lam Dong province: Lac Duong district, Lang Bian mountain, 12°02’65.4’, 108°26’27.8’’, alt. 1879 m, 11 October 2008, V.T. Tran & N.H. Nghia 460 (holotype: VAFS!; isotypes: DLU!, IBSC!, SING!).

Vernacular names: Nứa Langbiang.

Distribution: Lac Duong (Lam Dong).

Note: Endemic.

***Schizostachyum locbacense* V. T. Tran**

Typus: Vietnam, Lam Dong province, Bao Lam district, Loc Bac commune, P40 slope, elevation 1,033 m, 11°43’50”N, 107°43’53”E, 22 Feb. 2022, V.T. Tran DLU 0462 (holotype Dalat University [DLU!]; isotypes-VNMN!, Tay Nguyen Institute for Scientific research [VTN]!).

Vernacular names: Nứa Lộc Bắc.

Distribution: Bao Lam (Lam Dong).

Note: Endemic.

***Schizostachyum ninhthuanense* N. H. Xia, V. T. Tran et H. N. Nguyen**

Typus: Vietnam, Ninh Thuan province, Ninh Son district, Ngoan muc Pass, elevation 962 m a.s.l., 11°50’503”N, 108°39’319”E, 15 Dec 2008, H. N. Nguyen, V. T. Tran (holotype: FSIV 1512200804661, isotype: IBSC 151220080466).

Vernacular names: Nứa Ninh Thuận.

Distribution: Don Duong (Lam Dong); Ngoan Muc pass (Ninh Thuan).

Note: Endemic.

***Schizostachyum yalyense* N. H. Xia, V. T. Tran et H. N. Nguyen**

Types of name: Vietnam, Gia Lai province, Yaly River, elevation 642 m a.s.l., 14°09’010”N, 107°53’372”E, Jul 2005, H. N. Nguyen, V. T. Tran (holotype: FSIV 06200504662, isotype: IBSC 0620050466).

Vernacular names: Nứa Yaly.

Distribution: Gia Lai, Kon Tum.

Note: Endemic.

***Thyrsostachys* Gamble**

***Thyrsostachys siamensis* Gamble**

Syn.: *Arundarbor regia* Kuntze, *Arundinaria siamensis* Kurz, *Bambusa regia*

Thomson ex Munro, *Bambusa siamensis* Kurz ex Munro, *Thyrsostachys regia* (Munro) Bennet.

Typus: Kurz s.n.; Thailand LT designated by Stapleton, Taxon 47: 739 (1998).

Vernacular names: Tầm vông.

Distribution: popular in Central Highlands.

***Vietnamosasa* T. Q. Nguyen**

***Vietnamosasa darlacensis* Nguyen**

Typus: Vietnam. Đak Nong: Yok Don, 12°52’49”N, 107°48’01”E, 200 m elevation, 30 May 2012, My Hanh DIEP 285 (neotype here designated: P02280067!; isoneotypes P02280069!, P02280068!, P02280066!, P02280065!, P02280064!, P02280063!; K!, KUN!, MO!, SING!, RUPP!, VNM!).

Vernacular names: Le đuôi chồn, Le ri, Le gai.

Distribution: Duc Co (Gia Lai), Yok Don (Dak Lak), Duc Trong (Lam Dong).

***Vietnamosasa pusilla* (A. Chev. & A. Camus) T. Q. Nguyen**

Syn.: *Chimonobambusa pumila* Nakai, *Arundinaria pusilla* A. Chev. & A. Camus, *Chimonobambusa pusilla* (A. Chev. & A. Camus) Nakai, *Neomicrocalamus pusillus* (A. Chev. & A. Camus) Demoly.

Typus: Vietnam. Annam: Lang bian, Dran, 1000–1200 m elevation, A. Chevalier 40600.

Vernacular names: Le cỏ Lang Hanh.

Distributuon: Duc Trong (Lam Dong).

***Yersinochloa* H. N. Nguyen & V. T. Tran**

***Yersinochloa dalatensis* H. N. Nguyen & V. T. Tran**

Typus: Vietnam, Lam Dong province, Da Lat City, Elephant mountain, 1400 m a.s.l., 11°52’19”N, 108°26’03”E, V. T. Tran, H. N. Nguyen 062005, June 2005, (holotype: Vietnam Academy of Forestry Science, isotype: DLU).

Vernacular names: Tre leo Đà Lạt.

Distribution: Da Lat, Lac Duong (Lam Dong).

Note: Endemic.

***Yersinochloa nghiana* V. T. Tran**

Typus: Vietnam. Lam Dong province, Di Linh district, Brain Mountain, E, 1216 m a.s.l., 11°27’25”N, 108°3’41”E, 10 Sep 2022, V. T. Tran DLU 0463 (holotype DLU!; isotype VNMN!, VTN!).

Vernacular names: Tre leo Nghĩa.

Distribution: Di Linh (Lam Dong).

Note: Endemic.

***Yushania* P. C. Keng**

***Yushania schmidiana* (A. Camus) Ohrnb.**

Syn.: *Arundinaria schmidiana* A. Camus, *Borinda schmidiana* (A. Camus) Stapleton, *Sinarundinaria schmidiana* (A. Camus) C. S. Chao & Renvoize.

Typus: Viet Nam, Annam, sommet du Lang-bian, vers 2000 m, Feb 1950, Schmid 570.

Vernacular names: Sặt Langbiang.

Distribution: Lac Duong (Lam Dong).

CONCLUSION

Bambusoideae in the Central Highlands, including 29 species belonging to 15 genera, is distributed from an elevation of 200–2,160 m in three types of vegetation: degraded natural forest in valleys and mountain gorges along rivers; dry dipterocarp forest, and primary forest mixed with broadleaved trees. The results also show a diversity of bamboo morphology about rhizome, habit, mid-culm branches, and inflorescence.

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