A synopsis of Bambusoideae (Poaceae) in Lombok, Indonesia

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Abstract. Damayanto IPGP, Rustiami H, Miftahudin, Chikmawati T. 2020. A Synopsis of Bambusoideae (Poaceae) in Lombok, Indonesia. Biodiversitas 21: 4489-4500. There is little documentation of bamboo on Lombok. Non-native Indonesian bamboos have been reported occurring in Lombok. As such, suspicious bamboo specimens and information in those reports need to be examined and possibly re-determined. This study aimed to provide updated taxonomical information of bamboo species in Lombok and to investigate the accuracy of previous studies regarding the existence of several non-native Indonesian bamboo species on the island (i.e. they do not have original distribution in Indonesia). Data from fieldwork were combined with specimens in Herbarium Bogoriense to create a synopsis of bamboo in Lombok and to develop an identification key to the species. Eleven species of bamboo in Lombok were reported from this study, namely Bambusa glaucocephyla, B. maculata, B. multiplex, B. spinosa, B. vulgaris, Dendrocalamus asper, Guadua angustifolia, S. jaculans, S. juculans, Schizostachyum brachycladum, S. lima, and Thysostachys siamensis. Several doubtful species (B. altissiata, B. ventricosa, Guadua angustifolia, S. jaculans, Pseudosasa japonica) were presented to clarify the existence of non-native Indonesian bamboo in Lombok. Moreover, there is not enough evidence to state Dinochloa sp. occurred in Lombok. The results of this study can be used by stakeholders for bamboo identification and as the baseline taxonomic account for future studies and conservation of bamboo species in Lombok.

Keywords: Bamboo, diversity, identification key, Indonesia, Lombok

INTRODUCTION

Lombok is an island in the Lesser Sunda archipelago, flanked by the islands of Bali and Sumbawa. The island is administratively located in West Nusa Tenggara Province, Indonesia. Many parts of the island have mountainous terrain with the highest point is Mt. Rinjani with an altitude of 3726 meters above sea level (m asl). From the ecoregion perspective, Lombok is categorized as Indonesian bamboo species on the island (i.e. they do not have original distribution in Indonesia). Data from fieldwork were combined with specimens in Herbarium Bogoriense to create a synopsis of bamboo in Lombok and to develop an identification key to the species. Eleven species of bamboo in Lombok were reported from this study, namely Bambusa glaucocephyla, B. maculata, B. multiplex, B. spinosa, B. vulgaris, Dendrocalamus asper, Guadua angustifolia, S. jaculans, Schizostachyum brachycladum, S. lima, and Thysostachys siamensis. Several doubtful species (B. altissiata, B. ventricosa, Guadua angustifolia, S. jaculans, Pseudosasa japonica) were presented to clarify the existence of non-native Indonesian bamboo in Lombok. Moreover, there is not enough evidence to state Dinochloa sp. occurred in Lombok. The results of this study can be used by stakeholders for bamboo identification and as the baseline taxonomic account for future studies and conservation of bamboo species in Lombok.

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Keywords: Bamboo, diversity, identification key, Indonesia, Lombok
Table 1. Bamboo diversity studies in certain area of Lombok, West Nusa Tenggara Province, Indonesia

| Location                        | Numbers of species found | References                      |
|---------------------------------|--------------------------|---------------------------------|
| Central Lombok                  | 14                       | Peneng et al. (2005)             |
| Tiu Pupus riverbank, North Lombok | 9                        | Huzaemah et al. (2016)          |
| Meninting riverbank, West Lombok | 8                        | Putri et al. (2016)              |
| Senaru forest, North Lombok     | 5                        | Rini et al. (2017)               |
| Kedome riverbank, East Lombok   | 5                        | Mentari et al. (2018)            |
| Senggigi, West Lombok           | 5                        | Rizkillah (2018)                 |
| Peak of Mt. Pujut, Mandalika,   | 1                        | Susan et al. (2018)              |
| Central Lombok                  |                          |                                 |
| Semoya riverbank, West Lombok   | 7                        | Munawarah et al. (2019)          |
| Lombok                          |                          |                                 |
| Keremit riverbank, East Lombok  | 7                        | Santi et al. (2019)              |

Bamboo fruit can be a caryopsis or bacoid (Judziewicz et al. 1999). Bamboo naturally occurs in all continents except Europe and Antarctica (Clark et al. 2015). There are 1670 species and 125 genera of bamboo in the world (Soreng et al. 2017). Among these, 176 species of 24 genera are found in Indonesia (Widjaja 2019). The first report of bamboo diversity in Lombok was by Prawiroatmodjo and Padmono in 1976. Several years later, Widjaja (2001a) published a guidebook of bamboos in the Lesser Sunda Islands. Widjaja (2001a) reported six species of bamboos in Lombok. Based on a checklist of Lombok flora (Rustiami and Sulistyantingsih 2020), there is only one bamboo species (Bambusa vulgaris) that occurred in Lombok. Several bamboo studies have been carried out locally in Lombok (Table 1).

This study aimed to provide updated taxonomical information of bamboo species in Lombok and to investigate the accuracy of previous studies regarding the existence of several non-native Indonesian bamboo species in the island (i.e. they do not have original distribution in Indonesia). This investigation is important as some studies mentioned bamboo species that have never been officially reported occurring in Lombok or even in Indonesia, for example, Bambusa ventricosa (Peneng et al. 2005), Guadua angustifolia, Schizostachyum jaculans (Putri et al. 2016; Huzaemah et al. 2016; Santi et al. 2019) and Pseudosasa japonica (Rizkillah 2018). Therefore, those specimens need to be examined and possibly re-determined. The results of this study can be used by stakeholders for bamboo identification and as the baseline taxonomic account for future studies and conservation of bamboo species in Lombok.

**MATERIALS AND METHODS**

**Study period and area**

Fieldwork was conducted in March 2018 and November 2019 in Lombok Island, West Nusa Tenggara Province, Indonesia. Geographically, Lombok Island was located at 8°13'34.8" S to 8°56'47.7" S and 115°49'40.6" E to 116°43'12.1" E with an altitude of 0-3726 m. Several areas with chances of finding bamboos were visited (Table 2 and Figure 1).
Procedures
The method of collection of bamboo prescribed by McClure (1945) and Rugayah et al. (2004) and collection of herbarium specimens by Djarwaningsih et al. (2002) was followed. Since bamboo are rarely flowering (Janzen 1976), the sterile material was also collected. Supporting data was recorded and photographs of the fresh specimens were taken. All specimens were stored in the Herbarium Bogoriense (BO), Research Center for Biology, Indonesian Institute of Sciences (LIPI).

The specimens were then identified by matching with BO specimens and using literature on bamboo of the Lesser Sunda Islands (i.e. Soenarko 1977; Dransfield 1996; Dransfield and Widjaja 1995; Wong 1995; Widjaja 1987, 1997, 2001a, b; Widjaja et al. 2004, 2005; Damayanto and Widjaja 2016). Observations of BO specimens were also carried out from other locations (if needed).

Data analysis
Morphological characters were analyzed and described descriptively. From these sources, a synopsis of bamboo in Lombok was created and arranged alphabetically. An identification key to the species was developed. Herbarium abbreviation followed Holmgren et al. (1981) and Girmansyah et al. (2006, 2018) or website sweetgum.nybg.org. The accepted status of every species was determined by following Vorontsova et al. (2016) or websites such as ipni.org, powo.science.kew.org, tropicos.org, etc. Distribution map of the bamboo in Lombok was also produced from this study.

RESULTS AND DISCUSSION

Results
In this study, we recorded 11 species of bamboo found in Lombok Island: Bambusa glauca, B. maculata, B. multiplex, B. spinosa, B. vulgaris, Dendrocalamus asper, Gigantochloa apus, G. atter, Schizostachyum brachycladum, S. lima, and Thysrostachys siamensis.

Identification key to the bamboo species of Lombok

1. Branch complements with several sub-equal slender branches ........................................... 2
2. Culm internodes more than 50 cm long; culm-sheaths blade narrowly lanceolate and deflexed, auricles not prominent (<1 mm) .................. Schizostachyum lima
3. Culm-sheaths covered with white hairs ................................................................. Thyrsostachys siamensis
4. Branches bearing spines ............... Bambusa spinosa
5. Branches without spines .................. Bambusa vulgaris
6. Culms slightly zigzag .......................... 6
7. Culms relatively straight/erect .......... 9
8. Culms up to 5 m high, 1.5-2.5 cm in diameter; leaves spreading over the branch ................ 7
9. Young shoots green with yellow stripes on the sheath; culms green with yellow stripes when young, becoming green with brown spots when mature ................. Bambusa maculata
10. Young shoots green or yellow; culms green with or without inflated internodes in the lower part or yellow with green stripes ........... Bambusa vulgaris

Table 2. The locations of the fieldwork in Lombok Island, West Nusa Tenggara, Indonesia

| District            | Sub-district | Village     | Coordinate                  | Altitude (m asl.) | Major surrounding landscape                  |
|---------------------|--------------|-------------|-----------------------------|-------------------|-----------------------------------------------|
| Central Lombok      | Jongat       | Sukarana    | 8°41'57.9" S, 116°12'09.2" E | 80-100            | Paddy field and settlement                    |
| Central Lombok      | Pujut        | Mertak      | 8°53'38.0" S, 116°21'59.0" E | 15-100            | Secondary forest                              |
| Central Lombok      | Pujut        | Tanak Awu   | 8°45'52.4" S, 116°15'46.7" E | 90-100            | Paddy field and settlement                    |
| Central Lombok      | Southwest Praya | Batubolong | 8°42'41.4" S, 116°12'50.0" E | 80-90             | Paddy field and settlement                    |
| Central Lombok      | Komang      | Wajagesang  | 8°36'00.5" S, 116°22'11.5" E | 380-500           | Bamboo garden                                 |
| East Lombok         | Sikur        | Kembang Kuning | 8°31'57.9" S, 116°25'30.6" E | 670-700           | Bamboo garden                                 |
| Mataram             | Ampenan      | Dayan Peken | 8°34'22.3" S, 116°04'41.8" E | 10-15             | Settlement                                     |
| Mataram             | Maraman      | Cakranegara | 8°35'04.8" S, 116°07'30.8" E | 25-35             | Settlement                                     |
| West Lombok         | Labu Api     | Bagik Polak | 8°38'08.7" S, 116°07'34.6" E | 20-30             | Bamboo garden                                 |
| West Lombok         | Kurupan      | Kurupan     | 8°40'21.1" S, 116°10'16.9" E | 30-40             | Paddy field and settlement                    |
| West Lombok         | Gerung       | Beleke      | 8°39'35.5" S, 116°07'50.6" E | 20-25             | Paddy field and settlement                    |
| West Lombok         | Batu Layar   | Meninting   | 8°33'16.0" S, 116°04'32.0" E | 5-10              | River                                         |
| West Lombok         | Lembar       | Marije      | 8°47'28.0" S, 116°03'11.0" E | 200-250           | Shrubs and dry field                         |
10a. Young shoots green; auricles of culm-sheaths rim-like, 1-3 mm high .................... Gigantochloa apus

b. Young shoots purplish green; auricles of culm-sheaths rounded or rounded with curved outward, 3.5-7 mm high .................... Gigantochloa multiplex

Synopsis of bamboo in Lombok

**Bambusa glaucophylla** Widjaja, Reinwardtia 11(2): 59 (1997). Type: Indonesia. Kedung Halang, Bogor, Java, E.A. Widjaja s.n. (holotype: BO; Isotype K, L). Figure 2.A.

Description. Young shoots green. Culms up to 5 m high with erect tips, slightly zigzagged, green, glabrous when mature, internodes 20-25 cm long, 1.5-2.5 cm diameter. Branches grow near the ground with a dominant primary branch and several smaller branches, without spines. Culm-sheaths deciduous, covered with brown to black hairs; auricles rounded and slightly curved outward, about 2 mm high, bristles 2-3 mm long; ligule entire, glabrous or slightly hairy; blade triangular and erect. Leaves 5-12 × 1-1.5 cm, green with white stripes along the main nerve, glabrous; auricles rounded and curved outward, glabrous; ligule entire and glabrous.

Habitat and ecology. Cultivated in the home yard at an altitude of 15–90 m. Also found in wet or dry areas (Widjaja 2001a) in gardens, a city park (Widjaja 1997), and a riverbank (Huzaemah et al. 2016).

Distribution in Lombok. Southwest Praya, Central Lombok; Mataram (Widjaja 2001a); Gangga, North Lombok (Huzaemah et al. 2016) (Figure 3).

Vernacular names. Bambu putih (Indonesia) (Widjaja 2001a), san tong hias (Sasak Bayan) (Huzaemah et al. 2016), bambu hias (Central Lombok).

Uses. This bamboo is used for hedges or as an ornamental plant.

Specimen examined. Indonesia: Lombok, Central Lombok District, Jontar Sub-district, Sukarana Village, 8°41′57.9″ S, 116°12′09.2″ E, 30 November 2019, I.P.G.P. Damayanto 1047 (BO).

**Bambusa maculata** Widjaja, Reinwardtia 11(2): 63 (1997). Type: Indonesia. Moluccas, Tongde Village, South Ternate, E.A. Widjaja 4881 (holotype: BO; Isotype K, L, US). Figure 2.B.

Description. Young shoots green with yellow stripes. Culms up to 15 m high, slightly zigzagged, green with yellow stripes when young developing green with brown spots when mature, internodes 30-35 cm long, 4-7 cm in diameter. Branches with a dominant primary branch and several smaller branches, without spines. Culm-sheaths persistent to deciduous, glabrous or covered with dark hairs; auricles rounded and curved outward, up to 5.5 mm high, bristles up to 15 mm long; ligule entire, glabrous; blade triangular, erect to spreading. Leaves-blades 22.5-37.5 × 1-4.5 cm, green, glabrous; auricles inconspicuous, glabrous; ligule denticulate, up to 1 mm high, glabrous.

Habitat and ecology. Cultivated in dry areas in lowlands (Widjaja 1997, 2001a, b) and around riverbanks (Putri et al. 2016; Munawarah et al. 2019) at an altitude of 20-340 m (Huzaemah et al. 2016; Mentari et al. 2018).

Distribution in Lombok. Mataram (Widjaja 2001a); Batukliang, Central Lombok (Peneng et al. 2005); Gangga, North Lombok (Huzaemah et al. 2016); Krua, East Lombok (Mentari et al. 2018); Batu Layar (Putri et al. 2016) and Gunung Sari (Munawarah et al. 2019), West Lombok (Figure 3).

Vernacular names. Bambu tutul (Sasak Bayan) (Huzaemah et al. 2016) or treng borek (Batukliang) (Peneng et al. 2005).

Specimen examined. There was no specimen available, however, the evidence of the existence of this bamboo in Lombok can be seen in Huzaemah et al. (2016), Mentari et al. (2018) and Munawarah et al. (2019).

**Bambusa multiplex** (Lour.) R. E. Schultes. ex Schultes f., Syst. Veg. 7(2): 1350 (1830). Type: Vietnam. Anon. s.n. (holotype P). Figure 2.C.

Description. Young shoots green and glabrous. Culms up to 7 m high with arching tips, slightly zigzagged, green or yellow, internodes 30-50 cm long, 1-2.5 cm in diameter. Branches grow near the ground with sub-equal several branches and a dominant primary branch hardly prominent, without spines. Culm-sheaths deciduous and glabrous; auricles rim-like or inconspicuous with bristles up to 3 mm long; ligule irregularly toothed and glabrous; blade triangular and erect. Leaves-blades 5-12 × 0.5-1.5 cm, usually at the end of a branch, green, slightly hairy on the lower surface; auricles small, bristles up to 5 mm long; ligule irregularly toothed.

Habitat and ecology. Grows along the riverbank (Huzaemah et al. 2016; Putri et al. 2016), near roads and cultivated in cities at an altitude of 15–335 m.

Distribution in Lombok. Mataram City; Kuta and Praya, Central Lombok (Peneng et al. 2005); Gangga, North Lombok (Huzaemah et al. 2016); Batu Layar, West Lombok (Putri et al. 2016) (Figure 3).

Vernacular names. Treng cina (Peneng et al. 2005), san tong hias cina (Sasak Bayan) (Huzaemah et al. 2016), bambu cina (Indonesia) (Widjaja 2001a, b), or bambu hias (Mataram).

Specimens examined. Indonesia: Lombok, along the road from Kuta to Mataram, 8°51′22.5″ S, 116°11′05.5″ E, 20 February 2005, H. Tobe & N. Utami Tobe1251 (BO); Lombok, Mataram City, Ampenan Sub-district, Dayan Peken, Near Ampenan River, 8°34′22.3″ S, 116°04′41.8″ E, 30 November 2019, I.P.G.P. Damayanto 1053 (BO).

**Bambusa spinosa** Roxb., Hort. Bengal.: 25 (1814). Type: India (probably). Roxburgh s.n. (BM). Figure 2.D.

Description. Young shoots yellowish-green, covered with scattered black hairs, sometimes green with yellow stripes in the culm-sheath. Culms up to 25 m high, slightly zigzagged, green, internodes 25-30 cm long, 5-10 cm in diameter. Branches grow near the ground with a dominant primary branch and several smaller branches, bearing stout straight or curved spines. Culm-sheaths deciduous; auricles on either side of the base of the blade, up to 5 mm high, bristles up to 25 mm long; ligule up to 3 mm high with
bristles in the outer parts; blade narrowly lanceolate, erect in basal and apical sheaths, spreading to deflexed in middle sheaths. Leaves-blades 15–20 × 1.5–2 cm, green; auricles small with few bristles about 3 mm long; ligule truncates with short bristles.

Habitat and ecology. Grows in wet and dry areas (Widjaja 2001a) and in a Mt. Tunak Nature Tourism Park at an altitude of 15–20 m.

Distribution in Lombok. The western part of Lombok (Widjaja 2001a); Pujut, Central Lombok. This species was also seen in Lembar around Marije Village, West Lombok (Figure 3).

Vernacular names. Treng greng (Pujut) (Peneng et al. 2005) or bamba dari (West Lombok).

Specimen examined. Indonesia: Central Lombok, Pujut Sub-distrik, Mt. Tunak Nature Tourism Park, 8 March 2018, H. Rustiami 2220 (BO).

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Figure 2. Culms (left), culm-sheaths (right) and young shots (inset) of Bambusa glaucophylla (A), B. maculata (B), B. multiplex (C), B. spinosa (D), B. vulgaris var. vulgaris (E) and B. vulgaris var. striata (F)
**Bambusa vulgaris** Schrad. ex Wendl., Coll. Pl. 2: 26 (1808). Type: India. “Bambusa vulgaris Wend.,” ex herb. Wendland Nos. 13986-13989 (GOET!). Figure 2.Ε-F.

Description. Young shoots green or yellow, covered with brown to black hairs. Culms up to 20 m high, slightly zigzagged, green with or without inflated internodes in the lower part or yellow with green stripes, internodes 20-30 cm long, 6-9 cm in diameter. Branches with a dominant primary branch and several smaller branches, without spines. Culm-sheaths deciduous, covered with dark brown to black hairs; auricles rounded and curved outward, up to 10 mm high, bristles up to 7 mm long; ligule toothed, up to 3 mm high with short bristles; blade broadly triangular and erect. Leaves-blades 8-30 × 1-4 cm, green; auricles small with few bristles about 2 mm long; ligule entire or sub-entire.

Habitat and ecology. This bamboo grows in the forest (Rini et al. 2017), along the riverbank (Putri et al. 2016; Mentari et al. 2018), the roadside and cultivated in villages at an altitude of 15-1100 m.

Distribution in Lombok. Bayan (Rini et al. 2017) and Gangga (Huzaemah et al. 2016), North Lombok; Batu Layar (Putri et al. 2016) and Narmada (Peneng et al. 2005), West Lombok; Keruak (Mentari et al. 2018) and Sembulan, East Lombok; Praya, North Batukliang (Peneng et al. 2005), Kopang and Pujut, Central Lombok (Figure 3).

Vernacular names. Aur (Sasak Bayan) or aur kuning (Sasak Bayan) (Huzaemah et al. 2016), treng aur gading (North Batukliang) or treng aur hijau (North Batukliang) (Peneng et al. 2005), bambu kuning or bambu ampel (Bayan) (Rini et al. 2017), aur ketu (East Lombok), tereng tali, tereng aur and tereng galah (Central Lombok).

Specimens examined. Indonesia: Lombok, Kopang, 14 June 1964, Sun Hong-Fan 9092 (BO); East Lombok, Sembulan Sub-district, Sembulan Village, 8°21’7.27” S, 116°31’5.07” E, 22 August 2000, R. Mulyati, Rugayah, Pratiwi, & Hamzah 606 (BO); Lombok, Kuta, along the the road from Kuta to Mataram, 8°51’22.5” S, 116°11’05.5” E, 20 February 2005, H. Tobe & N. Utami Tobe1250 (BO); Central Lombok, Pujut Sub-district, Mertak Village, “tereng tali”, 13 March 2018, H. Rustiani s.n. (BO); Central Lombok, Pujut Sub-district, Mertak Village, “tereng aur”, 13 March 2018, H. Rustiani s.n. (BO); Central Lombok, Pujut Sub-district, Mertak Village, “tereng galah”, 13 March 2018, H. Rustiani s.n. (BO); Central Lombok, Pujut Sub-district, Tanak Awu Village, 8°45’52.4” S, 116°15’46.7” E, 30 November 2019, I.P.G.P. Damayanto 1044 (BO); West Lombok, Labu Api Sub-district, Bagik Polak Village, 8°38’08.7” S, 116°07’34.6” E, 30 November 2019, I.P.G.P. Damayanto 1051 (BO).

Notes. There are two varieties of this bamboo in Lombok, **B. vulgaris** var. **vulgaris** (Figure 2.E) and var. **striata** (=viata) (Figure 2.F). In Indonesia, there are three varieties of **B. vulgaris**, var. **vulgaris** (green culm), var. **striata** (yellow culm with green stripes) and var. **wamin** (green culm with inflated internodes) (Widjaja 2001b).

**Dendrocalamus asper** (Schult.f.) Backer ex Heyne. Nutt. Pl. Ned.-Ind. 2(1): 301 (1927). Type: Unknown [Based on Syst. Veg. 7(2): (1830) (as **Bambusa aspera** Schult.f.) was noted “In Amboina et Haamchela ad montium pedes”). Figure 4.A.

Description. Young shoots purplish-black, covered with velvety brown to black hairs. Culms up to 30 m high, erect, green, dark green, purplish-green or greyish-green, when young covered with velvety golden-brown appressed hairs, later glabrous, internodes 35-50 cm long, 12-15 cm in
diameter, aerial root appears from the base to the upper part of the culm. Branches grow about 1.5-3 m from the ground with a dominant primary branch and several smaller branches, without spines. Culm-sheaths deciduous and covered with velvety dark brown to black hairs; auricles prominent and sometimes crimped, up to 8 mm high, bristles up to 4 mm long; ligule irregularly toothed, up to 9 mm high with short bristles; blade lanceolate, erect first and later deflexed. Leaves-blades 20-30 × 2-4 cm, green; auricles small or absent and glabrous; ligule entire and very short.

Habitat and ecology. Grows in the garden, along with the riverbank (Putri et al. 2016; Munawarah et al. 2019) and the forest (Rini et al. 2017; Rini 2018) at an altitude of 212-1100 m.

Distribution in Lombok. Gangga (Huzaemah et al. 2016) and Bayan (Rini et al. 2017; Rini 2018), North Lombok; Batukliang, Central Lombok (Peneng et al. 2005); Batu Layar (Putri et al. 2016) and Gunung Sari (Munawarah et al. 2019), West Lombok; Sembalun and Sikur, East Lombok (Figure 5).

Vernacular names. *Trenq petung* (Sikur) (Rini et al. 2017), *pring galah* (East Lombok) or *petang* (East Lombok).

Specimens examined. Indonesia: East Lombok, Sembalun Sub-distrik, Sembalun Village, 8°21′7.27″ S, 116°31′5.07″ E, 22 August 2000, R. Mulyati, Ruyagiah, Pratiwi, & Hamzah 605 (BO); East Lombok, Sikur Sub-distrik, Kembang Kunung Village, 8°31′57.9″ S, 116°25′30.6″ E, 2 December 2019, I.P.G.P. Damayanto 1057 (BO).

*Gigantochloa apus* (Schult.f.) Kurz, Nat. Tijdschr. Ned. Ind. 27: 226 (1864). Type: Indonesia. Java, G. Salak, Blume s.n. (holotype M; isotype L). Figure 4.B.

Description. Young shoots green, covered with brown and black hairs. Culms up to 30 m high, erect, greyish-green to bright or yellowish-green, covered with white wax when young, shiny, glabrous, internodes 30-50 cm long, 6-14 cm in diameter; aerial root appears only in the base part of the culm. Branches usually grow upper half from the ground with a dominant primary branch and several smaller branches, without spines. Culm-sheaths not easily fall, green and covered with dark brown to black hairs when young, turning yellow-brown and glabrous when mature; auricles rim-like, up to 3 mm high, bristles 6-7 mm long; ligule toothed, up to 4 mm high, glabrous; blade ovate-triangular, spreading to deflexed. Leaves-blades 15-40 × 2-9 cm, green; auricles small, rounded and glabrous; ligule up to 4 mm high, entire and glabrous.

Habitat and ecology. Grows in the forest (Rini et al. 2017) along the riverbanks (Huzaemah et al. 2016; Putri et al. 2016; Mentari et al. 2018) and Masbagik, East Lombok; Batu Layar (Putri et al. 2016) and Gunung Sari (Munawarah et al. 2019), West Lombok; North Batukliang (Peneng et al. 2005), Kuta, Jongat, and Southwest Praya, Central Lombok (Figure 5).

Vernacular names. *Santong biais* (Sasak Bayan) (Huzaemah et al. 2016), *bambu santong* (Rini et al. 2017), *treng galah* (North Batukliang) (Peneng et al. 2005; Munawarah et al. 2019) and *tereng gerang* (Lombok Tengah).

Specimens examined. Indonesia: Central Lombok, Kuta, along the road from Kuta to Mataram, 8°51′22.5″ S, 116°11′05.5″ E, 20 February 2005, H. Toke & N. Utami Tobe1249 (BO); Central Lombok, Pujit Sub-distrik, Mertak Village, “tereng gerang”, 13 March 2018, H. Rustiamy s.n. (BO); Central Lombok, Southwest Praya Sub-distrik, Batubolong Village, 8°42′41.4″ S, 116°12′50.0″ E, 30 November 2019, I.P.G.P. Damayanto 1045 (BO); Central Lombok, Jongat Sub-distrik, Sukarana Village, 8°41′57.9″ S, 116°12′09.2″ E, 30 November 2019, I.P.G.P. Damayanto 1047 (BO); East Lombok, Masbagik Sub-distrik, Paokmontong Village, Dasan Malang Sub-Village, 28 November 2019, S. Sumarti & M. Rahayu 833 (BO).

Schizostachyum brachycladum (Kurz ex Munro) Kurz, J. Asiat. Soc. Bengal. Pt. 2, Nat. Hist. 39: 89 (1870).
Type: Indonesia. Buitenzorg (now Bogor), Java, Anon. s.n. (Syntype K!). Figure 4.D.

Description. Young shoots yellowish-green or yellow, covered with brown hairs. Culms up to 12 m high, erect, green or yellow with green stripes, internodes 30-50 cm long, 5-10 cm in diameter. Branches with several sub-equal slender branches, without spines. Culm-sheaths 17-18 × 17-18 cm, covered with light brown to brown hairs; auricles small up to 1 cm high, bristles up to 5 mm long; ligule entire, up to 2 mm high and glabrous; blade 4-5 × 4-5.5 cm, broadly triangular, erect. Leaves-blades 20-35 × 4-6 cm wide, green; auricles small, less than 1 mm high, bristles up to 8 mm long; ligule entire, up to 1 mm high and glabrous.

Habitat and ecology. Cultivated in the city and found in riverbanks at an altitude of 15-316 m (Munawarah et al. 2019).

Distribution in Lombok. West Lombok (Peneng et al. 2005; Munawarah et al. 2019), Central Lombok, and Mataram (Figure 5). This bamboo is widespread in Lombok.

Vernacular names. *Treng gading, tereng kuning* (green culm) or *tereng aur* (yellow culm) (Sasak) (Munawarah et al. 2019), *bambu lemang* (green culm) and *bambu gading* (yellow culm).

Specimen examined. Indonesia: Central Lombok, Southwest Praya Sub-distrik, Batulobong Village, 8°42'41.4" S, 116°12'31.1" E, 30 November 2019, I.P.G.P. Damayanto 1046 (BO).

Notes. Widjaja et al. (2005) mentioned that *S. brachycladum* has two “varieties”, with either a green culm or yellow culm with green stripes. The latter is found in Lombok as ornamental plant and is cultivated in cities.

**Schizostachyum lina** (Blanco) Merr., Amer. J. Bot. 3: 62 (1916). Type: Unknown (probably Philippines). Figure 4.E.

Description. Young shoots green, covered with brown hair. Culms up to 10 m high, erect, green and internodes 50-120 cm long, 3-4 cm in diameter. Branches with several sub-equal slender branches, without spines. Culm-sheaths 17-18 × 7-8 cm, covered with brown to dark brown hairs; auricles not prominent, bristles up to 7 mm long; ligule short with bristles; blade 10-23 × 5-10 cm, narrowly lanceolate, deflexed. Leaves-blades 20-30 × 4-7 cm wide, green; auricles small, less than 1 mm high, bristles up to 8 mm long; ligule irregularly toothed, up to 1 mm high.

Habitat and ecology. Cultivated in villages up to 500 m asl. This bamboo is rare and only found in cultivation.

Distribution in Lombok. Kom pang, Central Lombok (Figure 5).

Vernacular names. *Treng buluh* (Kompang).

Specimen examined. Indonesia: Central Lombok, Kompang Sub-distrik, Wajagesang Village, Dasan Baru Sub-Village, 8°36'00.5" S, 116°22'11.5" E, 3 December 2019, I.P.G.P. Damayanto 1060 (BO).

**Thrysostachys siamensis** Gamble, Ann. Roy. Bot. Gard. (Calcutta) 7: 59 (1896). Type: Thailand. *Kurz* s.n. (lectotype K!). Figure 4.F.

Description. Young shoots pale green to purplish-green, glabrous. Culms up to 10 m high, erect, pale green to greyish green, covered with persistent old culm-sheaths, internodes 10-30 cm long, 2-7 cm in diameter. Branches grow from mid-culm nodes upwards with a dominant primary branch and several smaller branches, without spines. Culm-sheaths persistent, covered with white hairs; auricles inconstant, conspicuous or very small; ligule entire and glabrous; blade narrowly triangular and erect. Leaves-blades 7-14 cm × 5-8 mm, pale green; auricles very small or not seen and glabrous; ligule entire and glabrous.

Habitat and ecology. Grows along the riverbank at an altitude of 14-167 m (Mentari et al. 2018; Munawarah et al. 2019) and cultivated in cities.

Distribution in Lombok. Gangga, North Lombok (Huzaemah et al. 2016); Kera uk, East Lombok (Mentari et al. 2018); Batu Layar (Putri et al. 2016) and Gunung Sari (Munawarah et al. 2019); West Lombok; Mataram City (Figure 5). This bamboo is widespread across Lombok.

Vernacular names. *Santong hias cina* (Sasak Bayan) (Huzaemah et al. 2016) or *tereng cina* (Sasak Batu Penyu) (Munawarah et al. 2019) or *treng jakarta*.

Specimens examined. Indonesia: West Lombok, Gerung Sub-distrik, Belee Village, 8°39'35.5" S, 116°07'50.6" E, 30 November 2019, I.P.G.P. Damayanto 1050 (BO); West Lombok, Gerung Sub-distrik, Belee Village, 8°39'35.5" S, 116°07'50.6" E, 30 November 2019, I.P.G.P. Damayanto 1050 (BO); Mataram City, Cakranegara Sub-distrik, West Cakranegara, Lingkungan Jeruk Manis, 8°35'04.8" S, 116°07'30.8" E, 30 November 2019, I.P.G.P. Damayanto 1052 (BO).

**Doubtful species**

*Bambusa albusiata* and *Bambusa ventricosa* McClure

*Bambusa albusiata* mentioned by Peneng et al. (2005) was never reported as a species name of bamboo (see Vorontsova et al. 2016; ipni.org). Peneng et al. (2005) also suggested *B. ventricosa* was found in Lombok Tengah. This bamboo was reported from China to Vietnam (Vorontsova et al. 2016) and it has never been reported from Indonesia (Widjaja 2019). There were no descriptions available, no specimens, and no photographs of these bamboos. These bamboos are therefore not included in this paper.

**Dinochloa sp.**

Santi et al. (2019) reported *Dinochloa* sp. found in Lombok. Unfortunately, they did not provide a description of the species. *Dinochloa* has never been reported previously in Lombok. There was not enough evidence to include this bamboo in this paper.

**Guadua angustifolia** Kunth

Putri et al. (2016) reported *Guadua angustifolia* found in Meninting River, West Lombok. *Guadua angustifolia* originated from South America (Judzewicz et al. 1999). Londono (2001) mentioned this bamboo had been introduced to Indonesia and cultivated in Java and Bali (Widjaja 2019). The description of *‘Gdl. angustifolia’* in Putri et al. (2016), however, was incomplete. The important
morphological characters to identify this bamboo in the photograph of Putri et al. (2016) was also not clear and there was no specimen mentioned. We also did not found this bamboo during our fieldwork around Meninting River, West Lombok.

Although we do not include the *Guadua angustifolia* in this paper, we found information that plantlets of *Guadua angustifolia* from tissue culture have been traded in Indonesian online stores (see TBNV 2018). *Guadua angustifolia* has been listed on a list of bamboo species sold by a bamboo tissue culture company, PT. Bambu Nusa Verde, located in Yogyakarta, Java (see BNV 2019). Based on personal communication with the staff of PT. Bambu Nusa Verde (Mrs Hana), *Guadua angustifolia* has been exported to other countries and only occasionally purchased locally, including in Bali and Lombok. This increases the chances that *Guadua angustifolia* is found on Lombok—this however needs confirmation.

**Figure 4.** Culms (left), culm-sheaths (right) and young shoots (inset) of *Dendrocalamus asper* (A), *Gigantochloa apus* (B), *G. atter* (C), *Schizostachyum brachycladum* (D), *S. lima* (E) and *Thyrsostachys siamensis* (F)
**Figure 5.** Distribution of *Dendrocalamus asper*, *Gigantochloa apus*, *G. atter*, *Schizostachyum brachycladum*, *S. lima* and *Thyrsostachys siamensis* in Lombok, West Nusa Tenggara, Indonesia

*Schizostachyum jaculans* Holtttum

*Schizostachyum jaculans* was reported from Lombok by Huzaemah et al. (2016), Putri et al. (2016) and Santi et al. (2019). This bamboo, however, is from Peninsular Malaysia (Dransfield 1995). Holtttum (1953) reported that *S. jaculans* has a culm with 3.5 cm in diameter, culm-sheath auricles absent and replaced by long bristles and ligule of leaf-sheath small and glabrous. This is different from ‘*S. jaculans*’ described by Huzaemah et al. (2016), Putri et al. (2016), and Santi et al. (2019). Based on the photographs of this bamboo in Lombok, it is very similar to *S. lima* or *S. silicatum* Widjaja. We did not find *S. jaculans* during our fieldwork. Therefore, this bamboo is not included in this paper.

*Pseudosasa japonica* (Siebold & Zucc. ex Steud.) Makino ex Nakai

Rizkillah (2018) reported that *P. japonica* occurred in Senggigi, West Lombok. This bamboo is common in Korea and Japan (Vorontsova et al. 2016) and has never been reported from Lombok previously. Vorontsova et al. (2016) and Ariati et al. (2019) reported that *P. japonica* was introduced in Java, although Widjaja (2001b, 2019) never mentioned this species in Java. Only *P. amabilis* (McClure) Keng f. has been introduced to Cibodas Botanic Garden, Java (Widjaja 2001b; Widyatmoko et al. 2010) and also Bali ‘Eka Karya’ Botanic Garden, Bali (Widjaja 2019). A photograph and a description of *P. japonica* from Rizkillah (2018) clearly showed that it is *Thyrsostachys siamensis*.

**Discussion**

There are 176 species and 24 genera of bamboo in Indonesia (Widjaja 2019). Of those, only about 6% (11) of species and 21% (5) of genera were found in Lombok based on the results of this study. The diversity of bamboo in Lombok is still relatively low compared with some regions in Indonesia (Figure 6). Bamboos in Lombok reach 58% (11) of the total bamboo species in Lesser Sunda Islands (LSI) (19 species). There are no endemic bamboo species in Lombok. This may be because Lombok is not as large as the other Indonesian islands (Figure 6).

Bamboo diversity in Lombok is higher (11 species) than other Indonesian small islands (eight to nine species) (Figure 7). For example, Peleng Island in Central Sulawesi which covers almost half the area of Lombok (see Hasanah 2017; BPSNPTB 2018) is reported to have eight species and six genera of bamboos (Damayanto and Rahmawati 2020), even Bengkalis Island in Riau with an area of only 8.5% of Lombok (see BPSKB 2018; BPSNPTB 2018) is reported to have nine species and five genera of bamboos (Rijaya and Fitmawati 2019).

Lowland regions with warmer temperatures and high rainfall usually have high species richness (Sinuauer 2010). Bamboo diversity in several islands in Indonesia does not appear to be limited by rainfall (Figure 7). For instance, Lombok has a higher number of bamboo species than Selayar Islands, South Sulawesi, although annual rainfall in Lombok is about 33% lower than Selayar (BPS 2017; Liana et al. 2017). This is likely because bamboo is found in a wide range of habitats from dry to humid areas, swamps, marginal land, dry or regularly flooded riverbanks (Dransfield and Widjaja 1995), and from lowlands up to highlands up to 4300 m asl (Clark 2006). Rainfall is therefore unlikely to limit Bamboo species richness.
found at an altitude of about 500 m (Figure 8). Based on the interviews with residents in Lombok, *S. lima* was rarely found and it was rarely collected in our exploration. There is no information about *S. lima* reported before in Lombok, except a report of Rini et al. (2017) who mentioned that *S. lima* (locally known as bambu bilis) can be found in Senaru Forest, North Lombok. They, unfortunately, did not provide a complete description and the photos presented were also not very clear.

Other species, such as *B. glaucophylla*, *B. multiplex*, *S. brachycladum* and *T. siamensis* are ornamental bamboo (Widjaja 2001b), so distributions are mostly in urban areas which are usually located in the lowlands of Lombok. On the other hand, *B. spinosa* is found in the dry areas of southern Lombok which is coastal lowland.

It can be concluded that there are 11 species of bamboos (*Bambusa glaucophylla*, *B. maculata*, *B. multiplex*, *B. spinosa*, *B. vulgaris*, *Dendrocalamus asper*, *Gigantochloa apus*, *G. ater*, *Schizostachyum brachycladum*, *S. lima*, and *Thysostachys siamensis*) in Lombok, Indonesia. *Bambusa vulgaris* is the most widespread bamboo, while *S. lima* is rare.

**ACKNOWLEDGEMENTS**

The curator of Herbarium Bogoriense (BO), Research Center for Biology, Indonesian Institute of Sciences (LIPI) is acknowledged for the permission given to access the herbarium specimens. Thanks go to Ruslan ‘Ucang’ (librarian of Research Center for Biology, LIPI) for help finding references. Sincere thanks go to Tri Mulyaningi and Evy Aryanti (Mataram University), Ni Made Meila Anggarawati, Dita Ervian Widja Mataram, and Hana (Bambu Nusa Verde) for valuable information, Dita Ervian (librarian of R Center for Plant Conservation, Bogor Botanic Gardens, Bogor. BNV [Bambu Nusa Verde]. 2019. PT Bambu Nusa Verde: plants in stock. drive.google.com/file/d/1IQyPJtxdZhyHGgePgAWhfPI4woJQQ5g8/view?usp=drivesdk.

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