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Review Article

A REVIEW ON THE GENUS *BAMBUSA* AND ONE PARTICULAR SPECIES *BAMBUSA VULGARIS* IN SABAH (MALAYSIA)

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ABSTRACT

Bamboos are often and widely viewed only on their mechanical and constructions as well as for ornamental and decorative purposes. The curative and medicinal property of bamboos are overlooked or completely ignored and level of official and medical research is almost non-recognised. There are approximately 75 known bamboo genera in the world, and nine are documented and found in Sabah, Malaysia. The genera of Sabah bamboos are *Bambusa, Dendrocalamus, Dinochloa, Gigantochloa, Racemobambos, Schizostachyum, Sphaerobambos, Thyrsostachys* and *Yushania.* The distribution and habitat depend solely on geographical factors and hence leads to diversified discoveries from areas in Sabah such as Beluran, Kinabatangan, Tambunan, Ranau, Kundasang etc.. The genus *Bambusa* consists of six species in Sabah, namely *B. blumeana, B. heterostachya, B. multiplex, B. tuldoides, B. vulgaris* and one unknown species that looks similarly to *B. mutabilis* from South China. Compared to other genera, *Bambusa* is the most typical Sabah bamboos due to its importance not only in Sabah but also around the globe. *Bambusa vulgaris* is the commonest species of Sabah Bamboos as it can be found in all over the tropics, wild, naturalized or even cultivated. In this review, *Bambusa vulgaris* is emphasised most due to its availability, possible medicinal and chemical properties as well as its significance for Sabahan.

Key Words: bamboo, *Bambusa*, *Bambusa vulgaris*, Sabah, Sabahan.

INTRODUCTION

Sabah is the easternmost state of Malaysia located on the island of Borneo.[1] "Land below the Wind" is the designated title for Sabah as it lies below the typhoon belt. Sabah's topography is rugged, with Mount Kinabalu, at 4,101 metres, dominating the surrounding landscape.[2] Sabah is diversified with resources of flora and fauna, as well as one of the world's largest rainforests. Bamboo is one of the abundant forest inventory in Sabah and always been associated with traditional and rural life. It is very significant to Sabahan, they even created Magunatip or Sabah Bamboo dance which up to this present day is still available and performed during innumerable occasions. The irrefutable importance of Sabah bamboos are their mechanical and constructions as well as ornamental and decorative purposes[3] which ranging from handicrafts, utensils, baskets, bird cages, poultry coops, musical instruments to water pipes, bridges, house construction and even scaffolding.[4,5,6]

Bamboos in Sabah are distributed based on various tropic profiles and are growing wild, naturalized and even cultivated in various districts in Sabah such as Beluran, Kinabatangan, Tambunan, Ranau, Kundasang, Tenom, Keningau so on and so forth. Bamboos are of the grass family, Gramineae and form Bambuseae [7], a tribe of the subfamily Bambusoideae.[8] They can be distinguished from other grasses by their woody culms or stems, complex aerial and underground branching systems, stalked leaf blades, specialized sheaths on young stem, and specialized leaf anatomy.[9] Globally, there are approximately 75 genera[10] found and documented in which nine genera are discovered in Sabah for the time being. The genera are *Bambusa* (six species), *Dendrocalamus* (one species), *Dinochloa* (nine species), *Gigantochloa* (two species), *Racemobambos* (six species), *Schizostachyum* (seven species), *Sphaerobambos* (one species), *Thyrsostachys* (one species) and *Yushania* (one species).

Table 1: hierarchy of Sabah bambusa (BAMBUSA Schreb)

Hierarchy	Name
Kingdom	Plantae
Subkingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliophyta
Class	Liliopsida
Subclass	Commelinidae
Order	Cyperales
Family	Gramineae
Subfamily	Bambusoideae
Genus	*Bambusa* Schreb
Species	*blumeana* Schult *heterostachya* (Gamble) Holttum *multiplex* (Loureiro) Raeuschel ex J.A & Schult *tuldoides* Munro unknown sp. *vulgaris* Schrader ex Wendland

In this review, the genus *Bambusa* is emphasized predominantly due to its abundant availability, possible medicinal and chemical properties[11, 12] as well as its significance for Sabahan both in traditional and contemporary uses.[13] The hierarchy of Sabah Bamboos for the genus *Bambusa* is shown in table 1.[14]

Approximately 157 species from the genus *Bambusa* are documented throughout the world. The distribution varies tropically and is native to countries like Pakistan, India, Sri Lanka, Nepal, Bhutan, Bangladesh, Burma, Thailand, Laos, Kampuchea, Vietnam, China, Japan, Malaysia, Singapore, Indonesia, Philippines, Papua New Guinea, Australia, and Madagascar.[15, 16] The genus *Bambusa* is found throughout tropical Asia, comprising about 37 species, where nine are recognised in Sabah. *Bambusa* bamboos range from

medium to large-sized species and are widespread among villagers and cultivators all over the tropics, planted or naturalized in wasteland or river banks. In Sabah, the commonest usage of this genus is as poles or scaffoldings.

Bambusa bamboos can be easily distinguished from other bamboos based on their characteristics and habitat. The significant characteristics obviously seen among *Bambusa* bamboos are they are closely tufted, culms erect, hollow with relatively thick walls and usually glabrous. Branch complement of several branches with the middle branch dominant and producing branches at each node. Culm sheaths usually covered with dark hairs, as well as with well-developed auricles; blades erect, usually triangular. Inflorescence borne on branches of leafless culms.[17] Other particular characteristics differs in each species. Distributions and habitat of *Bambusa* bamboos vary tropically.[18] They are usually found growing in open areas in the lowlands or on hill sides, on various types of soil, but are found abundantly in moist places like river banks.

There are six species of bamboo from the genus *Bambusa* are recognized and documented in Sabah, namely *B. blumeana, B. heterostachya, B. multiplex, B. tuldoides, B. vulgaris* and one unknown species that looks similarly to *B. mutabilis* from South China. Each bamboo species listed here will be briefly explained but *B. vulgaris* is the most given emphasised on in this review on matters distribution, habitat, morphology, microbiological study, pharmacology study, chemical study as well as known domestic uses.

1. *BAMBUSA BLUMEANA* Schult

Local names*:* Tongkungon (Kadazan, Dusun), kawayen (Murut), *bambu*/buluh duri (Malay). [17]

Morphology

Culms: Bambusa blumeana is a thorny bamboo with slightly arching green culms of 15-25 m tall. The internodes are 25-35 cm long, with 8-15 cm in diameter and an average wall thickness of 2-3 cm. At the base of the culms, wall thickness is mostly solid, especially in dry areas or poor soils. Lower culm nodes show a ring of aerial roots, with a grey or brown ring below and above the sheath scar.[19]

Branches: Branches usually occur from the middle of the culm to the top, and have several to many clustered branches with 1-3 larger dominant branches that are markedly longer and thicker. Branches from the lower nodes are solitaire and densely interwoven with tough, sharp, curved thorns.[19]

Leaves: Leaves are lance-shaped and on average 10-20 cm long and 12-25 mm wide. [19]

Distribution: Native in Malaysia, wild, naturalised or cultivated, In Sabah is found planted near the rivers in villages Tambunan and Keningau, also found growing naturalized by the field in Tenom . [17]



Figure 1: *Bambusa blumeana* Schult

Uses: In Sabah this species is rarely utilised, because it is not very common. [17]

2. *BAMBUSA HETEROSTACHYA* (Gamble) Holttum

Local names: Malay Dwarf, Buluh telang, buluh galah [17, 20]

Morphology

Characteristics: Open tufted bamboo; culms about 7 m tall, diameter 3-6 cm at the base, erect, straight, internodes 30-80 cm long, with dark hairs below nodes when young, glabrous by age, nodes not swollen; young shoot purplish green.[14] Branch complement several at each node. Culm sheaths green, covered with dark or black hairs; blades erect, light green when young, narrowly to broadly triangular, detached from the sheath at maturity, with scattered dark brown hairs.[21]

Distribution: This species is only widely known in cultivation in Peninsular Malaysia .It is introduced in Sabah, planted on the grounds of the Ulu Dusun Agricultural Station and in the Pamol Oil Palm in Beluran.



Figure 2: *Bambusa heterostachya* (Gamble) Holttum

Uses: Used in pollinating the flowers and harvesting the fruits of palm oil trees. [17]

3. *BAMBUSA MULTIPLEX* (Loureiro) Raeuschel ex J.A & Schult

Local names: Hedge Bamboo, *Bambu* China, buluh pagar [17, 22]

Morphology

Characteristics: Densely tufted bamboo; culms erect or arching, 2.5-7 metre tall, diameter 1.5-2.5 cm at the base, with relatively thick walls, internodes 30-60 cm long, covered with white wax when young, smooth, glabrous, nodes not swollen, branch complement several at each node.[10] Culm sheaths smooth, glabrous, light green when young, becoming stramineous, apex rounded; blades narrowly to broadly triangular, tapering to the tip, widened at the base to the full width of the sheath apex, extending to narrow auricles; ligule very short.[22] Leaf blades 6.5-14 x 1-1.5 cm, base cuneate or rounded, glabrous; sheaths glabrous; auricles small with fine bristles. Inflorescence usually borne on leafless branches. Spikelet's slender, more or less cylindrical when young, 15-22 mm long (or more), consisting of 2 glumes and up to 10 florets; lemma glabrous; pale glabrous, keels slightly fringed; lodicules 3. [17]

Distribution and habitat: Native to China.[23] This bamboo can be found growing on all kinds of soil, from low elevation to about 2000 m altitude in the tropics. [17] Common in Sabah as the hedge bamboo. *Bambusa multiplex* is planted as hedges all over the tropics.



Figure 3: Bambusa *multiplex* (Loureiro) Raeuschel Ex J.A & Schult

Uses: The culms are often used as fishing rods.

4. *BAMBUSA TULDOIDES* Munro
Local name: Buddha's Belly Bamboo **Synonym:** *Bambusa ventricosa* [3]
Morphology
Characteristics: Open-tufted bamboo; culms about 2 m (normally) or 50 cm (in dwarf state) long, diameter 2-2.5 cm at the base, dull or glossy green, internodes cylindrical or swollen; branch complement of few branches, with the middle branch dominant. Culm sheaths glabrous, green becoming stramineous; blades erect, triangular, slightly barrowed at the base, usually glabrous; auricles small with long spreading bristles along the edge.[17]
Distribution: Native to southern China, introduced elsewhere as an ornamental plant, especially the dwarf variety.[3]



Figure 4: *Bambusa tuldoides* Munro

Note: In Sabah, this species is not common. A plant of the dwarf variety will retain the dwarf character if planted in a pot, but the clump will produce cylindrical culms when planted in the ground.[24]

5. *BAMBUSA SP.*
A yet to be identified species of *bambusa* found cultivated in a village of Kudat, which shares similarities with *Bambusa mutabilis* McClure [24] from South China. Characteristics are culms are about 7 m tall, and about 3 cm in diameter, slender, and the branches are borne from the mid culm nodes upwards.[17]

6. *BAMBUSA VULGARIS* Schrader ex Wendland
There are several varieties of *Bambusa vulgaris.*[14] In Sabah; two most common varieties are the green-culm and the yellow-culm. The yellow-culm variety is usually planted as an ornamental, whereas the green-culm is found growing spontaneously or naturalised by roadsides or along rivers and paddy fields.[25] This species of Sabah can be recognised from distance by its fan-like structure of the young culms with their branches.[17] At times, it is difficult to identify bamboo species by viewing the culms only, however for *Bambusa vulgaris,* it is possible to get recognised only by observing its culm. *Bambusa vulgaris* will grow on any kind of soil, from low elevation to 300 m altitude, but usually found commonly along rivers.

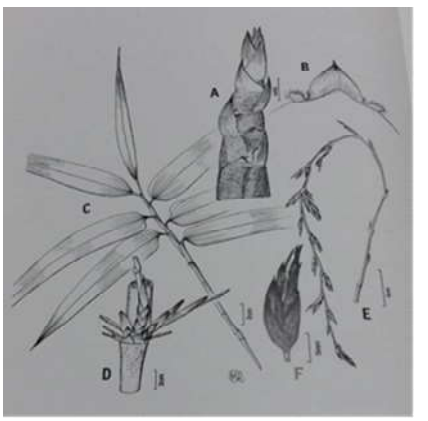


Figure 5: different parts of *Bambusa vulgaris*

A – Culm shoot, B – Culm Sheath, C – Leafy branch, E – Flowering branch, F – Spikelet

Vernacular names: Tamalang or tambalang (Dusun, Murut, Kadazan). The yellow-culm variety is known as tamalang silau (Dusun) and *bambu* kuning (Malay). [17, 26]
Morphology
Culms: *Bambusa vulgaris* culms are bright green, glossy, erect below and arching above and have an average height between 10-20 m. Internodes are 25-35 cm long, and have an average diameter of 4-10 cm.[8] Wall thickness ranges between 7-15 mm. Nodes are prominent, of which the lower ones often with a narrow ring of roots and covered with brown hairs.[27]
Branches: Several clustered branches with 1-3 larger dominant branches. Branches usually occur from mid-culm to top.[28]





Figure 6: *Bambusa vulgaris* Schrader Ex Wendland

Leaves: Narrow leaves which are on average 15-25 cm long and 2-4 cm wide.[27]

Distribution: Available and common throughout Sabah.

Domestic Uses: The culms are strong but not straight,[10] and are used for poles, building bridges, masts, rudder and etc.[17] It is also used as horse feed, however it may cause poisoning in horses if were given excessively.[29]

Chemical constituents

Sources of a complete literature and document on the chemical constituents and compositions of *Bambusa vulgaris* are rather limited. Phytochemical constituents of the leaves of *Bambusa vulgaris* [30] is a proximate correlation for estimating chemical constituents of this particular species. The green-culm variety contains coumarins, cyanogenic glycosides, and saponins. The yellow-culm variety showed the same contents as the green variety with the absence of saponins.

Biological study

Throughout the world, various studies on biological properties of the bamboo plant have been carried. Even so, the number of studies performed on *Bambusa vulgaris,* especially studies on biological properties, which comprise of biological and microbiological are too few and non-significant. It has been found that chloroform extract of the leaves is used against *Mycobacterium tuberculosis*. [26] In another study, it was found that kidney troubles can also be cured.[31] Other than that, the plant also possesses antibacterial and antimalarial[32, 33] as well as anthelminthic activities[34] and it is one of the commonest properties of the Poaceae/Gramineae family. Another recorded possible use is for reproductive systems, which are potential antifertility agents [35] and abortifacient activity.[36, 37] pertaining to endocrine system, the plant also capable of hypoglycaemic activity.[38]

CONCLUSION

Bamboos are considered as one of the forest inventories in Sabah. Sabah bamboos are being utilised intensively both for the traditional and as well as the contemporary uses. Alas, researches and studies on Sabah bamboos are only centred on their usage as ornamental or constructive purposes, where their medicinal and chemical values are nearly non-recognised. Due to a widespread availability of Sabah bamboos, for instance, the genus *Bambusa,* it provides sufficient resources for any forthcoming analyses and studies to be done.

To conclude, there is yet a great deal of exploration and scrutiny required on Sabah bamboos. Therefore, with this review, we hope it will contribute insight on Sabah bamboos over and above to elucidate that there is a possibility of medicinal and chemical properties to be discovered from them.

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