

Bambusa pallida (Poaceae: Bambusoideae), a new record for Bhutan

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Bambusa pallida Munro, an attractive species found from natural lowland forests of southern districts of Bhutan to Thailand, and newly recorded for Bhutan, is described, illustrated, and lectotypified. The morphological characters by which it can be separated from other species are given. This species can provide useful products and also has potential to be planted as an ornamental horticultural plant in other subtropical regions.

INTRODUCTION

The first taxonomic enumeration of bamboos in Bhutan (Stapleton 1994a; 1994b; 1994c; 1994d; updated in Stapleton 2000) detailed 7 species and subspecies of *Bambusa* Schreb. Most bamboos from the Indian subcontinent were already well known at the time, especially the larger more tropical species, and those from Darjeeling and Sikkim, but bamboos from Burma, remoter parts of the Himalayas and the north-eastern states of India were then, and remain to this day inadequately documented and difficult to identify.

Bhutan is now known to have more than 30 indigenous bamboo species from at least 14 genera, but the identification of several of these is still speculative, and several additional, possibly new species are still under investigation. This rich biodiversity is mostly growing in protected natural and secondary forests, where the bamboos are not threatened, but they are still intrinsically vulnerable. They provide important non-timber forest products, which can contribute significantly to local economies. Further investigation is required for conservation, better utilisation, and forest management.

One particular, rather distinctive bamboo species was noticed during the earlier enumeration (l.c.), but could not be identified at the time. Forestry department staff have since encountered it again, especially during field excursions to the lowland forests of south-western Samdrup Jongkhar District in September, 2018, and it has now been documented, compared to published descriptions and identified.

Bambusa species vary considerably in their size and culm characteristics, making the different species suitable for different purposes, including scaffolding, components of building construction, furniture-making, weaving, or

ornamental hedging. Several species such as *Bambusa textilis* McClure and *B. pallida* Munro are intermediate in size, with straight culms and reasonably strong walls. The leaves are smaller, but can still be collected for winter animal fodder. Such species are also grown extensively in many parts of the world as ornamentals, as their moderate size makes them appropriate for a wide range of situations.

METHODS

As a component of forest inventory activities, field surveys of the bamboos of Samdrup Jongkhar were conducted. Field documentation of significant details of the morphology of rhizomes, culms, culm sheaths, leaves and branches was undertaken, with photographs taken to compare species with the characters given in the earlier enumeration and for international collaboration. Collections have been made for the national herbarium of dried specimens (THIM), and for planting in living collections. Joint review of the information and material collected and comparison with international literature was undertaken to establish the identity of this species, in accordance with Bonn guidelines on access to genetic resources (CBD 2002). No material was transferred and no monetary benefits are involved. Publication is under joint authorship and national capacity has been strengthened.

RESULTS

The bamboo under investigation is of intermediate size with straight culms, no swelling at the nodes, long internodes and relatively strong walls. It has consistent branching and a larger, but not strongly dominant central branch. This combination of characters places it close to *Bambusa nutans* Wall. ex Munro subsp. *cupulata* Stapleton

and Chinese Hedge Bamboo, *B. multiplex* (Lour.) Raeusch. ex Schult. & Schult. f., but it lies between them in size. Its culm sheath blades and auricles are also differently shaped to those of both species.

Description (Fig. 1, Fig. 2). Rhizomes pachymorph (branching sympodial), with short necks. Culms in clumps of 3-12 culms, erect, maximum length 15m, diameter 4-7cm, maximum diameter at breast height 6.3cm, wall 0.9-1cm thick (internodes hollow); nodes solitary in closer succession bearing roots at the lower nodes; internode maximum length 54.5cm, surface with light to dense

covering of white wax at first, becoming lightly matt to slightly glossy, basal internodes with more prominent or browner wax in a ring below the node, sometimes with pale yellow vertical stripes. Branching usually intravaginal, 7-29 branches, successive orders progressively smaller, usually absent at lower nodes, branches erect if impeded by sheath, higher branching more reflexed; buds 1-1.5cm tall, 1.2-2cm wide, keels prominent and ciliate. Culm sheaths with sparse to dense, appressed dark brown hairs at first; base 15-17cm wide; height 29-32.5cm; apex width to 11cm; margins with dense dark brown cilia to 2mm; blade



Figure 1. a-c) Young culms showing long culm sheath blades, long, initially white-waxy internodes and small leaves, d-g) culm sheaths showing tall, broad, triangular, rugose blades and mussel-shaped auricles with long oral setae and serrulate ligule. Photos by SD, from near Samdrup Jongkhar, E Bhutan.

erect, triangular or basally cordate, deciduous, with sparse dark brown hairs at first, apically hard, margins shortly white-ciliate, much longer than sheath from mid-culm upwards, prominently rugose; ligule level to lightly arcuate, short, serrulate; auricles similar, round to mussel-shaped, to 1cm tall, to 2.2cm wide, protruding to 1.2 cm; oral setae wavy, to 2cm long. Leaf sheaths glabrous; margins glabrous; ligule very short; auricles round to mussel-shaped, 1-1.5mm, swollen; oral setae 4-13, 5-15(-20)mm, erect, wavy; pseudopetiole 0.3-0.4cm; blades linear-lanceolate, 6-10(-14), 12-19cm long, 1-2cm wide, glabrous, mid green above, paler and glaucous below, blade to blade gap 1.3-2cm. Shoots occur in June, July and August. Inflorescence not known in Bhutan.

Distribution. S Bhutan: Samdrup Jongkhar & Phuentsholing. SW Yunnan, Bangladesh, NE India, Myanmar, & Thailand (Li et al. 2006). It grows in natural

lowland mixed forest in Bhutan, associated with *Dendrocalamus hamiltonii* Nees & Arn. ex Munro and *Cephalostachyum latifolium* Munro, at an altitude of around 400-600 m.a.s.l..

CONCLUSIONS

Comparison with descriptions of *Bambusa* species in the Himalayas, NE India and Burma suggest this species fits best with *B. pallida*, as described by Munro (1868) and Gamble (1896), matching a Kew syntype collected by Hooker & Thompson in Jowai, Meghalaya, in 1850 (<http://www.kew.org/herbcatimg/146793.jpg>). As with most bamboo species, characteristics of the culm sheaths are critical for its recognition. The combination of these, in addition to those of the culm internode and leaf sheath



Figure 2. a) Leaf sheath blades paler and glaucous beneath, b) leaf sheath auricles and oral setae, c) culm walls from basal region of culm, d) culm sheath margin, auricle and blade margin all with cilia/setae, e) bud prophyll with broad ciliate keels, f) basal internodes with aerial roots and pale yellow stripes. Photos by SD, from near Samdrup Jongkhar.

separate it well from all other species, but the length and triangular shape of the culm sheath blade and the size and shape of the auricles are distinctive enough to allow recognition of this species on their own.

DISCUSSION

This species looks similar to Chinese Hedge Bamboo, *Bambusa multiplex* when small, but more like *B. nutans* subsp. *cupulata* when larger. It also has some similarity to *B. tulda* Roxb. in the striped basal nodes of some culms. The culm sheaths with dark brown hairs, ciliate margins, and long-triangular rugose blades, and the prominent oyster-shaped sheath auricles distinguish it clearly, as do the long oral setae on the leaf sheath auricles. The spear-like new shoots with erect, rugose blades and dark hairs are also distinctive.

As with many bamboo species it is difficult to identify conclusively without culm sheaths, even if flowers have been found. It is therefore hard to assess the specific status of several other similar species that have been described recently from NE India. *Bambusa pseudopallida* R.B. Majumdar was briefly described from a collection made in Meghalaya, but its description is difficult to compare with this species, even after valuable improvements were made by Kumari & Singh (2010), mainly because proper culm sheaths were not collected, and it could not be relocated in the field. *Bambusa barpatharica* Borthakur & Barooah, *Bambusa mompana* H.B. Naithani, and *Bambusa rangaensis* Borthakur & Barooah have all been included in synonymy of *B. pallida* (Singh & Kumari 2018, Kumari 2019). However, *Bambusa barpatharica* and *B. rangaensis* are both described as having glabrous culm sheaths.

The illustrations for *Bambusa pallida* in Seethalakshmi & Kumar (1998) differ substantially from the species as it is known in Bhutan, and they seem to be in conflict with the description by Gamble (1896) and the Munro syntype specimen cited above. Illustrations for *Bambusa pallida* in Poudyal (2000) from Nepal are also very dissimilar, and appear closer to *Bambusa nutans* subsp. *cupulata*.

Similar plants have been seen near Gaylephu and Phuentsholing, and further investigations can now be undertaken to confirm their identity properly, and to assess their extent. The low number of culms in each clump near Samdrup Jongkhar suggest that they may have flowered there quite recently.

This species is of substantial economic importance, found at least from SW Bhutan to Thailand, and possibly in Laos and Malaysia. It is widely cultivated and exploited. Uses, importance and a protocol for propagation by tissue culture were reported by Beena & Rathore (2012).

The long straight internodes and level nodes in conjunction with small leaves also make it a very attractive bamboo, suitable for planting as an ornamental. Not only is *Bambusa pallida* a high value crop in rural economies across its natural distribution range—it would also definitely make a useful addition to western horticulture.

Bambusa pallida Munro, *Trans. Linn. Soc. London* 26: 97 (1868). Type: India, Meghalaya, Joowye [Jowai], Hooker f. & T.T. Thompson, ix 1850, “Nos. 602 & 607 of Kew Museum” ([K](#), lecto. selected here) .

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