



Bambusa andhricum sp. nov. (Poaceae), a new species from the eastern ghats of Andhra Pradesh, India

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Abstract

A new species, *Bambusa andhricum* sp. nov. (Poaceae), is described from Andhra Pradesh, India. The new species is morphologically allied to *Bambusa tulda*, but differs distinctly in several diagnostic characters, including branching pattern, culm height, culm sheath morphology, auricle bristles, and nodal ring characteristics. The molecular divergence provides preliminary evidence supporting the recognition of *B. andhricum* as a distinct taxon. A detailed description, along with photographic documentation and Barcode Sequence analysis, is provided.

Keywords: Bambusoideae, woody bamboo, Poaceae, Andhra Pradesh, Taxonomy

Introduction

Bamboos, belonging to the sub-family Bambusoideae of the family Poaceae, are of considerable ecological, social, and economic importance. They are widely used as construction materials, household utensils, vegetables, and as raw materials for paper, handicrafts, and musical instruments (Zhang *et al.*, 2012; Ahmad *et al.*, 2023) ^[1, 12]. Globally, bamboos comprise nearly 1,700 species distributed in about 136 genera, and classified into three tribes: the tropical Bambuseae Kunth ex Dumort., the temperate Arundinarieae Asch. & Graebn., and the herbaceous Olyreae Kunth ex Spenn. (Sungkaew *et al.*, 2009 ^[9]; Kelchner & Bamboo Phylogeny Group 2013; Clark & de Oliveira, 2018; Soreng *et al.*, 2022) ^[2, 5, 8].

The genus *Bambusa* Schreber was first described in *Genera Plantarum* (ed. 8: 236, 1789), with *Bambusa arundinacea* (Retz.) Willd. as the type species. The genus is widely distributed in tropical and subtropical regions of Asia, Africa, and America and reports approximately 158 species (Vorontsova *et al.*, 2017). In India, 29 species of *Bambusa* have been reported (Kumari & Singh, 2020) ^[6], of which only two species are distributed in Andhra Pradesh (Pullaiah *et al.* 2018) ^[7].

Material and Methods

During an assessment of bamboo diversity in Andhra Pradesh, the authors collected an interesting bamboo species from Pamuleru in the Maredumilli forest of Alluri Sitharama Raju district, Andhra Pradesh, India, on 13 August 2019. The fresh specimens were collected and preserved in 80% ethanol; later, the herbarium specimens were prepared according to the standard methodology by Jain & Rao, (1977) ^[3]. The voucher specimens were deposited in the Herbarium of the Department of Botany, Yogi Vemana University, Kadapa. Critical examination of both fresh and dried specimens revealed that the collected material is morphologically allied to *Bambusa tulda* but differs consistently in several diagnostic characters and does not conform to any known species of the genus *Bambusa*. Furthermore, comparative analyses of DNA sequences with

related bamboo species supported its distinct taxonomic status by revealing unique nucleotide variations. Based on combined morphological and molecular evidence, the species is described as a new species, *Bambusa andhricum* sp. nov.

Taxonomic Treatment

Bambusa andhricum P.V. Chalapathi Rao & A. Madhusudhana Reddy *sp.nov.* (Figure 1).

Type: India. Andhra Pradesh, Alluri Sitharama Raju Dist., Pamuleru vagu 345m (Maredumilli forest) 13th August 2019 P.V. Chalapathi Rao & A. Madhusudhana Reddy 5382 (Holotype: CAL; Isotypes: BSID, YVUH).

Diagnosis

Bambusa andhricum differs from *B. tulda* (Table 1) in characteristic branching pattern, with five branches, three prominent and the middle one dominant and two smaller ones deflexed (vs. normal branching pattern); culm sheath auricles unequal and dissimilar, wavy and undulated (vs. Oval, taller than wide; slightly wavy); fine bristles (vs. dense shorter ciliate); blade base rounded (vs. cordate); ligule having hairs in small groups at base underneath the blade (vs. narrow ligule); node lacking distinct ring above and below the nodal line (vs. distinct ring present).

Description

Arboreal, erect, clump-forming bamboo. Rhizome pachymorph. Culms, 10-15 m high, 5-6 cm in diameter, dark green with white powdery mass; nodes even, whitish below but not ringed; internodes terete, 30-60 cm long, hollow; bud ovate; branching starts from lower nodes. There are five branches. The middle branch prominent and woody with three subequal, ca 1 cm in diameter. Culm-sheaths deciduous, triangular, shorter than internodes, yellowish brown, thick, crestaceous; sheath proper 22-23 cm long, 30-32 cm broad at base, attaining into 18-20 wide triangularly convex top; blackish hairs appressed on sides on outer surface glabrous smooth on inner surface; imperfect blade

persistent, erect, nearly equal or longer than sheath proper. Triangular, cuspidate with many fold, rounded at undulating bas, continuing into unequal auricles and terminating into incurved, pointed apex, striate, glabrous on both surfaces except hairy at incurved apex on inner surface, margins smooth, except a very few short cilia at base near auricle only; ligule 2-3 mm long, unevenly serrated, ciliate at mouth, with short hairs, indistinct group, at base underneath the blade; auricles dissimilar, wavy, undulated, shorter rounded, another elongated, three times of shorter one, somewhat decurrent, bearing ca 5 mm long, fine bristles. Leaves 9-10 per twig; leafblades lanceolate, 20-30 cm long, 2.2-3.2 cm broad, lower unequally rounded and apical attenuate at base, gradually and acuminate terminating

into cetaceous, scabrous, ca 5 mm long pointed apes; glabrous on adaxial surface except few scabrid nerves along one margin, sparse fine hairy usually on one half on abaxial surface first, afterword nearly glabrous; midrib prominent raised, very fine ciliate 9n lower onethird, glabrous upwards, secondary viens, 10-12 pairs, tertiary 7-9, no cross viens overrated on both margins; leaf-sheath lowest 8-10 cm long glabrous, striate, keeled, ending into rounded, shining, smooth callus, smooth at margins; ligule 0.5-1 mm long, slightly oblique, minutely ciliate near petiole otherwise glabrous; auricles roundedly elongate bearing ca 5 mm long deciduous, straight bristles, one pointing upwards and the other downwards and short, rounded in upper leaf-sheaths.



Fig 1: A. Habit B. Branching pattern C. Leaves D. Culm sheath F. Nodes G. Branching stem

Table 1: Morphological comparison of *Bambusa tudla* Roxb. and *Bambusa andhricum* sp. nov.

Character	<i>Bambusa tudla</i> Roxb.	<i>Bambusa andhricum</i> sp. nov.
Culm	Up to 7 m high	10-15 m high
Culm sheath auricles	Oval, taller than wide; slightly wavy	Unequal and dissimilar; wavy and undulated; one rounded and short, the other elongated.
Auricle bristles	Dense, short, ciliate bristles	Fine bristles, ca. 5 mm long
Outer surface of auricles	Pubescent	Slightly pubescent
Culm base	Some culms with faint yellow stripes	Yellow stripes absent
Culm	Slightly crooked	Straight
Culm cavity	Often small; walls are very thick	Always large
Culm wall thickness	Very thick	Moderately thick
Branching pattern	Normal branching pattern	Distinct branching pattern with five branches
Dominant branch	The middle branch is not markedly dominant	Middle branch dominant; two smaller lateral branches are reflexed
Nodal ring	Distinct ring present	A distinct ring above and below the nodal line is absent
Branching position	From upper nodes	Branching starts from lower nodes

Flowering & fruiting: Not seen

Distribution & Habitat: Very scattered distribution along the Pamuleru stream, moist deciduous forest occupied an area of 162 ha.

Etymology: The new species is named after the state of Andhra Pradesh, India.

Barcode Sequence analysis

The chromatograms were edited and trimmed using *BioEdit* software (Hall, 1999) [4]. The edited sequences were aligned using *Clustal W* (Thompson *et al.*, 1994) [10]. Species-specific nucleotide differences observed in the Multiple Sequence Alignment (MSA) of the *psbA-trnH* barcode region – Confirmation of Species Status.

Table 2: DNA barcoding comparison between *Bambusa andhricum* sp. nov and other allied species.

S.No.	Taxon	Nucleotide differences in <i>psbA-trnH</i> barcode
1	<i>Cephalostachyum pergracile</i> (Voda veduru)	Identical sequences
2	<i>Pseudostachyum polymorphum</i> (Bongu veduru)	Identical sequences
3	<i>B. teres</i> (Vinti veduu) Reported as <i>B. nutans</i> previously	Identical sequences with <i>B. teres</i>
4	<i>B. tulda</i> (Jarika Veduru)	The sequences are similar to other <i>B. tulda</i> specimens
5	<i>Bambusa andhricum</i> sp. Nov. (Kampa Veduru) This is an interesting species; more studies, especially on flowering and fruiting materials, are required.	An additional 116-168 bp deletion in <i>Bambusa andhricum</i> sp. Nov. is different from other <i>B. tulda</i> specimens

Matching with the DNA barcodes of known species

1. *Pseudostachyum polymorphum* (Bongu veduru)

Species/Abbrv	Group Name	Sequence
1. Schizostachyum_polymorphum_Aizawl_NEM_plantations_psbA-trnH		*****
2. Schizostachyum_polymorphum_AP_psbA-trnH		*****

2. *Cephalostachyum pergracile* (Voda veduru)

Species/Abbrv	Group Name	Sequence
1. Cephalostachyum_pergracile_AF1_psbA-trnH		*****
2. Cephalostachyum_pergracile_AF2_psbA-trnH		*****
3. Cephalostachyum_pergracile_Aizawlnorth		*****
4. Cephalostachyum_pergracile_KFRI		*****

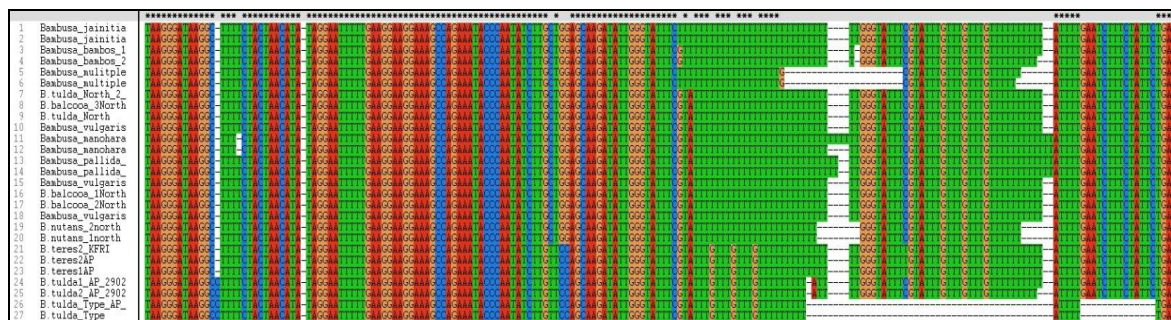
3. *Bambusa teres* (Vinti veduu) - Reported as *B. nutans* previously as per morphological similarities.

Species/Abbrv	Gr	DNA Sequences	Translated Protein Sequences
1. Bambusa_teres2_KFRI		*****	*****
2. Bambusa_teres2AP		*****	*****
3. Bambusa_teres1AP		*****	*****

4. *B. tulda* (Jarika veduru): The sequences are similar to other *B. tulda* specimens. However, there are some distinct morphological differences.

Species/Abbrv	Group Name	Sequence
1. Bambusa_tulda_North		*****
2. Bambusa_tulda_North(2)		*****
3. B.tulda_Type AP_29039		*****
4. B. tulda_Type AP_29040		*****
5. B. tulda AP_29021		*****
6. B. tulda AP_29023		*****
7. Bambusa_tulda1_KFRI		*****
8. Bambusa_tulda2_KFRI		*****

5. *Bambusa andhricum* sp. nov. (Kampa veduru): An additional 116-168 bp deletion in *Bambusa andhricum* different from other *B. tulda* specimens



Conclusion

The psbA-trnH DNA barcode analysis revealed no nucleotide variation in *Cephalostachyum pergracile*, *Pseudostachyum polymorphum*, and *Bambusa teres*, indicating identical sequences among the analysed samples. The sequence of *Bambusa tulda* was also consistent with other reported *B. tulda* specimens, supporting its taxonomic identity. In contrast, *Bambusa andhricum* sp. nov. exhibited a distinct additional deletion of 116–168 bp in the psbA-trnH region compared with *B. tulda* and other related taxa. This molecular divergence and taxonomically related data provide preliminary evidence supporting the recognition of *B. andhricum* as a distinct taxon.

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