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Bamboo Flora of Garo Hills in Meghalaya, India

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Abstract

The present communication deals with different species of bamboo occurring in Garo hills of Meghalaya along with their vernacular names, identifying characters, distribution and local uses.

Key words: Bamboo, Identification, Garo hills, Meghalaya.

INTRODUCTION

Bamboos are arborescent grasses belonging to the subfamily Bambusoidea of Poaceae, with 75 genera and 1250 species in World (Soderstrom & Ellis 1987). There are approximately 900 species belonging to 65 genera in Asia, of which 128 species representing 23 genera are recorded in India (Seethalakshmi & Kumar 1998). They are naturally distributed in all the states except Jammu and Kashmir and attain their maximum growth in the monsoon forests of north-eastern region forming a rich belt of variety and density.

The state of Meghalaya is situated in between 25° 472 - 26° 102 North latitude and 89° 452 - 92° 472 East longitude. The state comprising of the Garo, Khasi and Jaintia hills covering an area of 22549 sq km with picturesque hill-landscape, plateaus, plains, and lakes. So its varied topography and high annual precipitation makes the state one of richest bamboo diversity belt of the country.

Although several botanical expeditions were undertaken to various parts of Meghalaya, starting from Buchanam Hamilton (1820- '24) to till date, but adequate attention was not paid to the bamboos due to their complexity and non-availability of flowers. Moreover many areas are still remaining poorly explored or unexplored especially in respect of bamboos. Considering the socio-economic importance of bamboos, knowledge of their correct taxonomic identification, distribution, availability, etc is of paramount importance. The present attempt is the first step in this direction to prepare a complete inventory of the bamboos occurring in Garo Hills, providing details, such as current accepted names, vernacular names, identifying characters, distribution and their local uses.

MATERIALS AND METHODS

During 2008 – 2009, extensive field surveys were undertaken for taxonomical study of bamboos in Garo hills of Meghalaya. In the field, while collecting plant materials, elaborate notes were made on the habit, and character of different parts. Collection, pressing and preparation of herbarium specimens were done as per the recommended procedure of Jain & Rao (1977). Provisional identification of the specimens was made with the help of available literature and was later confirmed by matching with the authentic specimens housed in various herbaria viz., CAL and ASSAM.

RESULTS

Exploration of the Garo Hills has resulted in the documentation of 16 species of bamboo belonging to 6 genera and has been enumerated below along with their vernacular name, identifying characters, distribution and local uses.

Bambusa arundinacea (Retzius) Willdenow, Sp. Pl. 2: 245. 1799; Munro in Trans. Linn. Soc. 26(1): 103. 1868. *Bambos arundinacea* Retzius, Obs. Bot. 5: 24,1789. *Bambusa bambos* (L.) Voss. Besch. Pflanzen deutsche Gaerten 2: 584. 1896. *Arundo bambos* L. Sp. Pl. 81. 1753.
Local name: *Wah-Kanteh*
Identifying characters: A very densely tufted bamboo with spiny branches, triangular blade covered with dark brown velvety hairs on inner side.
Exiccatus: Tura, 14.03. 2008, *TP 0030*
Distribution: CHINA, INDIA, INDONESIA, JAVA, MYANMAR, SRI LANKA, THAILAND; Throughout India, ascending to 1200 m msl; Garo hills: Bhalughat, Tura, Rongenggiri, Angratoli.
Local uses: House construction, handicrafts, furniture, handle of tools etc.

Bambusa balcooa Roxburgh, Hort. Beng. 25, 1814; et Fl. lnd. 2: 196. 1832; Munro in Trans. Linn. Soc. 26 (1): 100. 1868. *Dendrocalamus balcooa* (Roxburgh) Voigt, Hort. Suburb. Cal. 718. 1845.
Local names: *Borua, Wam-noh*
Identifying characters: Stout culms, culm-sheaths longer than broad, covered with appressed dark hairs on outer surface, auricles absent or very small.
Exiccatus: Bhalughat , 17, 03, 2008, TP 0037
Distribution: BANGLADESH, INDIA, INDONESIA; INDIA: Eastern U.P., Bihar, West Bengal, Assam, Nagaland, Arunachal Pradesh, Meghalaya, Tripura, Manipur; Meghalaya: Tura, Barangapara, Bhalughat, Chambalgiri.
Uses: Construction of houses, making house hold articles, scaffolding, agricultural implements etc.

Bambusa jaintiana R. Majumdar in Karthikeyan *et al*., Fl. Ind. Enum. 274. 1989; Seethalakshmi & Kumar, Bamboos of India 53, 1998.
Local names: *Wathibok, Wathese, Kolongki*
Identifying characters: Glabrous, dull green or orange colour culms up to 8 m high and 2-4 cm in diameter and glabrous culm-sheaths with small auricles.
Exiccatus: Tura, 14.08.2008, *TP 0031*.
Distribution: INDIA, MYANMAR; Assam, Meghalaya; Garo hills: Tura peak, Chambalgiri, Songsek, Phulbari, Bhalughat.
Local uses: Making baskets, mats; constriction of houses and other general purposes.

Bambusa pallida Munro in Trans. Linn. Soc. 26 (1): 97. 1868; Gamble in Ann. Roy. Bot. Gard. Cal. 7: 37, t. 35. 1896; Seethalakshmi & Kumar, Bamboos of India: 67. 1998.
Local name: *Wago*
Identifying characters: White powdery young culms, culm-sheaths with two small, fringed auricles and long triangular-acuminate, sparsely hairy, waxy, deciduous, broad based imperfect blades covering the whole top of the sheath.
Exiccatus: Tura, 15. 03. 2008, *TP 0034*.
Distribution: BHUTAN, INDIA, MYANMAR; Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, West Bengal; Garo hills: Tura
Local uses: Construction of houses, making basket, mats, wall hangers etc.

Bambusa tulda Roxburgh, Hort. Beng. 25. 1814; et Fl. Ind. 2: 193. 1832; Munro in Trans. Linn. Soc. 26 (1): 91. 1868; Seethalakshmi & Kumar, Bamboos of India : 79, t. 22. 1998.
Local names: *Wati, Wagi*
Identifying characters: Numerous longitudinal white striped on the internodes, especially on the lower ones, culm-sheath with two unequal auricles, the larger one is continuous with the blade and the other rounded upward and heart shaped triangular blade with hairy inside.
Exiccatus: Baghmara, 22.03.2008, *TP 0048*.
Distribution: BANGLADESH, INDONESIA, INDIA, MYANMAR, THAILAND; Assam, Bihar, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura; Garo hills: Baghmara, Rongrenggiri, Adugiri, Gulpani, Phulbari, Tura, Nohkrek

Local uses: Making baskets, domestic animal enclosure, arrow, paddy storage bin, bird traps etc.

Bambusa vulgaris Schrader *ex* Wendland, Collect. Pl. 2: 26 , t. 47. 1810; Munro in Trans. Linn. Soc. 26(1): 106. 1868; Seethalakshmi & Kumar, Bamboos of India : 83, t. 23. 1998.
Local name: *Wamanna*
Identifying characters: Culms erect upto 20 m high, bright green, dark brown hairs on outer surface of culm-sheaths.
Exiccatus: Baghmara, 22. 08. 2008, *TP 0049*.
Distribution: BANGLADESH, CHINA, INDIA, INDONESIA, SRI LANKA; Cultivated in Northeast India; Garo hills: Phulbari, Tura, Baghmara.
Local uses: Making basket, furniture, domestic animal enclosure etc.

Dendrocalamus hamiltonii Nees *et* Arnott ex Munro in Trans. Linn. Soc. 26(1); 151. 1868; Gamble in Ann. Roy. Bot. Gard. Cal. 7: 84, t. 74. 1896; Seethalakshmi & Kumar, Bamboos of India: 109, t. 30. 1998.
Local name: *Wanok*
Identifying characters: Pendulous dull green culms central branch dominating, up to 4.5 cm in diameter, leaf sheath with long, obliquely truncate ligule and white rings below and above the nodes.
Exiccatus: Tura, 15. 03. 2008, *TP 0032*.
Distribution: BHUTAN, INDIA, MYANMAR, NEPAL; West, Central and Eastern India; Throughout Garo hills up to 1500 m.
Local uses: Construction of houses, making furniture, handicrafts, baskets, rope, mats, winnowing fans, firewood, agricultural implements; as containers for water, milk, and other edible items, paddy storage bin, fishing traps etc. Tender shoots edible.

Dendrocalamus sikkimensis Gamble in Ann. Roy. Bot. Gard. Cal. 7: 82. 1896; Seethalakshmi & Kumar, Bamboos of India: 126, t.38. 1998.
Local name: *Wadah*
Identifying characters: Dark golden- brown hairs on outer surface of culm-sheaths, auricles large, falcate, bearing long golden bristles.
Exiccatus: Rongmalgiri, 25.03.2008, *TP 0041*.
Distribution: BHUTAN, INDIA; Arunachal Pradesh, Meghalaya, Nagaland, Sikkim, West Bengal; Garo hills: Tura peak, Nohkreh, Darbok, Rongmalgiri, Sasatgiri.
Local uses: Making containers for water, milk, and other edible items.

Dendrocalamus strictus (Roxburgh) Nees in Linnaea 9: 476. 1834; Munro in Trans. Linn. Soc. 26(1): 147. 1868; Seethalakshmi & Kumar, Bamboos of India : 129, t. 40. 1998. *Bambusa stricta* Roxburgh, Corom.Pl.1.58, t.80, 1798.
Identifying characters: Tufted, sub-arborescent, solid or semi-solid culms and culm- sheaths with erect, triangular, imperfect blades which are densely ciliate within.
Exiccatus: Baghmara, 22.03.2008, *TP 0050*.
Distribution: CHINA, INDIA, INDONESIA, JAVA, MYANMAR, NEPAL; Throughout India; Garo hills: Rongrenggiri, Baghmara.
Local uses: Making walking sticks, furniture, fishing rods, scaffolding, bridges etc.

Gigantochloa albociliata (Munro) Kurz in For. Fl. Brit. Burma 2: 555. 1877; Seethalakshmi & Kumar, Bamboos of India : 152, t. 46. 1998. *Oxytenanthera albo-ciliata* Munro in Trans. Linn. Soc. 26 (1): 129. 1868. *Pseudotenantherea albociliata* (Munro) R. Majumdar in Kartheyan et al, Fl. Ind. Enum. Mono. 280. 1989.
Identifying characters: Grayish-green with white stripes culms, presence of oblique nodes and culm sheaths with very long ligule and reflexed blades.
Exiccatus: Rongram, 23.03.2008, *TP 0039*.
Distribution: CHINA, INDIA, MYANMAR; Arunachal Pradesh, Assam, Meghalaya, Tripura; Garo hills: Samanda, Rongram.
Local uses: Baskets making; tender shoots edible.

Gigantochloa rostrata Wong in Malay. Forester 45(3): 349. 1982; Seethalakshmi & Kumar, Bamboos of India : 163, t. 52. 1998. *Gigantochloa maxima* var. *minor* Holttum in Gard. Bull. Singapore 16: 116. 1958. *Gigantochloa nigrociliata* (Buese) Kurz, For. Fl. Brit. Burma 2: 566. 1877. *Bambusa nigrociliata* Buese in Miq. Pl. Jungh. 389. 1854. *Oxytenanthera nigrociliata* (Buese) Munro in Trans. Linn. Soc. 26 (1): 128. 1868.

Local name: *Wasut*

Identifying characters: Medium sized culms having prominent nodes, scabrous and rough (upper part), thick-walled internodes with yellowish stripes (lower ones) and striate, ciliate edged culm-sheaths covered on the back with appressed stiff, dark-brown hairs

Exiccatus: Trua, 15,03, 2008, *TP 0036*.

Distribution: BANGLADESH, INDIA, INDONESIA, THAILAND; Assam, Bihar, Meghalaya, Karnataka, Orissa; Garo hills: Rongrenggiri, Tura, Phulbari area.

Local Uses: Construction of huts, making baskets, household articles etc.

Melocanna baccifera (Roxburgh) Kurz, Prelim. Report Fl. Pegu, Append. B, 94. 1875; Seethalakshmi & Kumar, Bamboos of India: 169: t. 54. 1998. *Bambusa baccifera* Roxburgh in Hort. Beng. 25. 1814. *Melocanna bambusoides* Trinius in Sprengel, Neue Entdeck. Pflanzenk. 2: 43, 1821.

Local names: *Watrai , Wa -sith*

Identifying characters: Erect, 10 – 20 m high, distant culms and culm-sheaths having wavy and hard sheath proper with linear- lanceolate, sickle shaped imperfect blade.

Exiccatus: Tura, 13 ,03, 2008, *TP 0035*.

Distribution: BAGLADESH, INDIA, MYANMAR; Assam, Manipur, Meghalaya, Mizoram, Tripura, Sikkim, West Bengal; Garo hills: Throughout Garo hills, upto 1500 m.

Local Uses: This species is extensively used in building huts, making mats, baskets, domestic animal enclosure etc.

Schizostachyum dullooa (Gamble) R. Majumdar in Karthikeyan et al., Fl. Ind. Enum. Mono. 281. 1989; Seethalakshmi & Kumar, Bamboos of India : 240, t. 80. 1998. *Teinostachyum dullooa* Gamble in Ann. Roy. Bot. Gard. Cal. 7 : 101, t. 89. 1896. *Neohouzeaua dullooa* (Gamble) A. Camus in Bull. Mus. Nat. Hist. Paris 28: 100. 1922.

Local name: *Wadrow*

Identifying characters: Erect, thin walled 10-20 m high culms and deciduous culm-sheaths with appressed golden hairs on the outer surface, and narrow, subulate, recurved imperfect blade.

Exiccatus: Nokrek, 09.12.2009, *TP0052*.

Distribution: BANGLADESH, BHUTAN, INDIA, MYANMAR; Assam, Manipur, Meghalaya, Nagaland, Sikkim, West Bengal; Garo hills: Nokrek, Siju, Rongrenggiri, Balpakram National Park .

Local uses: Making baskets, mats, winnowing fans, rope, bow and arrow, firewood etc.

Schizostachyum helferi (Munro) Majumdar in Karthikeyan et al, Fl. Ind. Enum. Mono. 281.1989; Seethalakshmi & Kumar, Bamboos of India: 246. 1998. *Bambusa helferi* Munro in Trans. Linn. Soc. 26(1): 114. 1868. *Pseudostachyum helferi* (Munro) Kurz in J. Asiat.Soc.Beng. 42: 253. 1872. *Teinostachyum helferi* (Munro) Gamble in Ann. Roy. Bot. Gard. Cal .7: 102, t. 90. 1896. *Neohouzeaua helferi* (Munro) Gamble in Kew Bull: 91. 1923.

Local name: *Wali*

Identifying characters: Tufted, climbing bamboo, dominating middle branch often growing as thick as the culm and hard, brittle culm-sheath bearing long fimbriate ligule.

Exiccatus: Balapakram National Park, 11. 12. 2009, *TP 0054*.

Distribution: INDIA; Arunachal Pradesh, Meghalaya; Garo hills: Rongrenggiri, Tura peak , Siju , Balapakram National Park. Endemic to Eastern Himalaya.

Local uses: Making baskets and rope.

Schizostachyum polymorphum (Munro) R. Majumdar in Karthikeyan *et al*, Fl. Ind. Enum. Mono. 282, 1989; Seethalakshmi & Kumar, Bamboos of India : 225, t. 89, 1998. *Pseudostachym polymorphum* Munro in Trans. Linn. Soc. 26(1): 142, t. 4. 1868.
Local name: *Wachal*
Identifying characters: Slender, sub-scandent, very thin walled culms and culm-sheaths with sparsely appressed black hairs on outer surface and long-acuminate, triangular, deciduous imperfect blades.
Exiccatus: Balpakram National Park, 11. 12. 2009, *TP0055*.
Distribution: BHUTAN, INDIA, MYANMAR, NEPAL; Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, West Bengal; Garo hills: Tura peak, Rongal, Siju , Balpakram National Park .
Local uses: Making baskets, mats and as tying material.

Sinarundinaria griffithiana (Munro) Chao & Renvoize in Kew Bull. 44 (1): 353. 1989; Seethalakshmi & Kumar, Bamboos of India : 271. 1998. *Arundinaria griffithiana* Munro in Trans. Linn. Soc. 26(1): 20. 1868. *Chimonobambusa griffithiana* (Munro) Nakai in J. Arn. Arb. 6: 151, 1925. *Chimonocalamus griffithianus* (Munro) Hsuch & Yi in Acta Bot. Yunn. 1(2) : 83. 1979.
Local name: *Wamana*
Identifying characters: Erect olive-green, 8-10 m high, culms with spiny nodes and culm - sheaths longer than internodes and covered with densely bulbous based hairs on outer surface.
Exiccatus: Nokreh , 09.12.2009, *TP0051*.
Distribution: INDIA; Arunachal Pradesh; Meghalaya; Mizoram, Nagaland, West Bengal; Garo hills: Nokreh. Endemic to NE India.
Local Uses: Making walls, thatching houses and fencing the field

DISCUSSIONS

As much as 16 species of bamboos has been recorded from the Garo hills of the Nertheastern Indian state of Meghalaya based on field survey, herbarium studies and consultation of literature. It is also recorded that the genus *Bambusa* Mutis ex Caldas is the largest one with 6 species. This is followed by *Dendrocalamus* Nees and *Schizostachyum* Nees with 3 species each, *Gigantochloa* Kurz with 2 species, and the remaining two genera, *Melocanna* Trinius and *Sinarundinaria* Nakai, are represented by one species each. However, the present study, could not record the occurrence of *Gigantochloa takserah* E.G. Camus in Garo hills reported by Shukla (1996). Of these *Sinarundinaria griffithiana* is endemic to NE India and *Schizostachyum helferi* is endemic for the Eastern Himalaya. Most of other species recorded from this area are having much wider distribution.

Garo people are expert in making various attractive traditional handicrafts using bamboo, but there is an urgent need to shift the focus from their traditional handicrafts to value added industrial uses like sleeping mats, bamboo chopsticks, agarbati sticks, bamboo furniture, shoot processing etc. which are technology intensive and have grater potential in employment generation. The studies of detail distribution feature also shows that bamboo resources in the Garo hills are depleting due to unplanned management, over exploitation, extensive deforestation etc. Bamboos are the great natural resources, which are so vital for almost all needs of life and important source of the livelihood. So development of an early action plan for conserving all these arboreal grasses, those forms one of the very few important wealth wealth of the region is need of the hour.

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