BAMBOOS OF ASSAM

KEY TO GENERA

1a Culm-sheaths papery; culms flattaned on one side ............... Phyllostachys

1b Culm-sheaths coriaceous to crustaceous; culms cylindrical:

2a Auricles of the culm-sheaths usually large; imperfect blades more or less triangular ............... Bambusa

2b Auricles of the culm-sheaths usually small or absent:

3a Culms distant; culm-sheaths wavy at top; imperfect blades linear or sickle-shaped ............... Melocanna

3b Culms tufted:

4a Culms climbing, scandent or semiscandent:

5a Culms zigzag, hollow ............... Dinochloa

5b Culms otherwise, solid to subsolid ............... Melocalamus

4b Culms arborescent:

6a Culm-sheaths generally deciduous; nodes prominent; internodes thick-walled:

7a Culms dark green, striped ............... Gigantochloa

7b Culms without stripes:

8a Culms from a thick rhizome, usually creeping underground and stoloniferous; culm-sheaths rather narrow ............... Oxytenanthera

8b Culms from a thick rhizome, not creeping; culm-sheaths rather large; imperfect blades much broader, almost occupying top of the sheath ............... Dendrocalamus

6b Culm-sheaths persistent (usually on lower part); imperfect blades narrow, subulate, median on the top of the sheath; internodes thin-walled ............... Schizostachyum
Bambusa Schreber


Type: Bambusa arundinacea (Retzius) Willd.

Evergreen or deciduous, erect, arborescent or shrubby or rarely climbing, sometimes thorny. Culms mostly medium sized, seldom large, form a thick rhizome, usually caespitose, occasionally stoloniferous from creeping underground rhizomes. Culm-sheaths various, usually broad, often auricled; imperfect blades broad and triangular in shape. Leaves small to moderate-sized, rarely large, linear or oblong-lanceolate, acuminate, petiole-like base short, leaf-sheaths variously auricled. Inflorescence generally a large leafless compound panicle bearing spikelets in heads in spicate branchlets, sometimes leafy panicles or paniculate spikes. Spikelets with one or many fertile flowers, usually supported by 1-3 empty glumes with an imperfect floret at the base or at the apex; flowering glumes or lemmas ovate-lanceolate, many-veined, usually mucronate, glabrous, coriaceous; paleas 2-keeled, glabrous, usually ciliate on keels, generally entire at the tip; lodicules 3, membranous, generally obtuse, ciliate. Stamens 6; filaments free, often exserted; anthers narrow; tip obtuse or apiculate or penicillate. Ovary oblong or obovate, hairy at the apex; style long or short; stigma 1-3, plumose or hairy. Caryopsis oblong or linear-oblong, acute or obtuse, furrowed on one side; pericarp thin, adherent; embryo conspicuous.

Distribution: 73 species, Central and Eastern Asia, Malaya (Bahadur 1979); 85 species, all native to Old World tropics, southeast Asia principal centre of distribution (Farrelly 1984); 91 species, southern and eastern Asia inclusive of New Guinea and the Pacific Islands, and Australia (?) (Ohnberger & Goerrings 1985; Seethalakshmi & Kumar 1998); more than 100 species, tropical Asia, America and Africa (Clayton & Renvoize 1986). 70 species, China, Bangladesh, Myanmar, India, Thailand, Java,
15 species in India and 12 in northeastern India (Bahadur 1979); 21 species, 1 variety in India and 11 species and 1 variety in northeastern India (Varmah & Bahadur 1980); 22 species in India and 17 species in northeastern India (Biswas 1988); 15 species in India and all are known to occur in northeastern India (Majumdar 1989); 21 species, 2 varieties in India and 13 species, 1 variety in northeastern India (Anonymous 1991); 23 species, 1 variety in India and 19 species in northeastern India (Tewari 1992); over 25 species in India and 19 species, 1 variety in northeastern India (Shukla 1996); 26 species in India and 16 in northeastern India (Seethalakshmi & Kumar 1998).

The number of species of *Bambusa* occurring in Assam is 11 (Varmah & Bahadur 1980; Anonymous 1991). According to Biswas (1988) the number of species is 13, while according to Tewari (1992) the number of species occurring in Assam is 14.

In the present investigation 18 species, 1 variety and a forma have been recorded.

**KEY TO SPECIES**

1a Culms thorny:

2a Culms and branches very densely tufted forming unpenetrable look; auricles of the culm-sheaths small or inconspicuous; nodes of the branches with 2-3 recurved, short spines ............... *B. arundinacea*

2b Culms and branches loosely tufted; auricles of the culm-sheaths large, unequal, wavy; lower branches with 2-3 recurved or straight, longer spines ............... *B. teres*

1b Culms without spines:

3a Ventral surface of the leaf blades whitish or glaucescent:

4a Culm-sheaths glabrous:

5a Auricles of the culm-sheaths small; culms not more than 15m high and 8cm in diameter:

6a Auricles of the culm-sheaths minute; culms not more than 6m high and 3cm in diameter ............... *B. multiplex*
6b Auricles of the culm-sheaths small; culms more than 6m high and 3cm in diameter .......... \textit{B. jaintiana}

5b Auricles of the culm-sheaths large, unequal:

7a Culms not more than 13m high and 5cm in diameter; lower nodes without rootlets:

8a Imperfect blade of the culm-sheaths longer than the sheath; culms upto 13m high and 5cm in diameter .......... \textit{B. pseudopallida}

8b Imperfect blade of the culm-sheaths shorter than the sheath; culms upto 12m high and 3cm in diameter .......... \textit{B. sp. 1}

7b Culms more than 13m high and 5cm in diameter; lower nodes with rootlets .......... \textit{B. sp. 3}

4b Culm-sheaths hairy on outside:

9a Culm-sheaths with black, appressed hairs on outside:

10a Auricles of the culm-sheaths small; imperfect blades wavy, sparsely hairy:

11a Culms shrubby; not more than 8m high and 3.5cm in diameter .......... \textit{B. sp. 4}

11b Culms arborescent; more than 8m high and 4cm in diameter .......... \textit{B. pallida}

10b Auricles of the culm-sheaths large; imperfect blades not wavy; culm-sheaths densely hairy:

12a Auricles of the culm-sheaths rounded, naked .......... \textit{B. auriculata}

12b Auricles of the culm-sheaths wavy, fringed with ciliae:

13a Culms with an angular band at lower 2nd to 4th internodes; nodes rooting upto a few; culm-sheaths broader than long .......... \textit{B. sp. 2}

13b Culms uniformly very straight with a white ring just above the nodes; nodes rooting only at ground level; culm-sheaths usually as broad as long .......... \textit{B. tulda}

9b Culm-sheaths with golden or chocolate-brown hairs on outside:
14a Culm-sheaths with chocolate-brown hairs on outside; imperfect blades orange-yellow, spreading at right angle to the axis ............ B. cacharenis

14b Culm-sheaths with golden hairs on outside; imperfect blades not spreading; nodes of the culms with white ring of hairs and waxy powder ............ B. burmanica

3b Ventral surface of the leaf blades green or without white crusts:

15a Young culms gray or greyish-green, white scurfy, thickly branched above; imperfect blades reflexed; leaves pale green ............ B. polymorpha

15b Young culms dark green (with yellow stripes in B. vulgaris var. vittata), glabrous; imperfect blades erect, leaves dark green:

16a Culm-sheaths covered with appressed, scattered, black hairs on outside; auricles unequal, wavy ............ B. nutans

16b Culms stout; culm-sheaths covered with dark brown hairs on outside; auricles subequal:

17a Culms strong, walls thick; culm-sheaths large, longer than broad, covered with some patches of appressed hairs on outside; auricles usually small ............ B. balcooa

17b Culms not very strong, walls thin; internodes green or striped with yellow or pitcher-shaped; culm-sheaths broader than long, covered with thick, appressed hairs on outside; auricles large with pale, wavy stiff bristles ............ B. vulgaris


Kotoha banh, Kata bank (Ass.); Baroowa, Behor, Ketuari, Ketwa (Beng.); Spiny bamboo, Thorny bamboo (Eng.); Wah kanteh (Garo); Saneibi (Mani.).

Deciduous or evergreen and very densely tufted, thorny. **Culms** bright green, shining, variable in length reaching upto 30m high and 18cm in diameter, branched from the base upwards, lower branches long spreading with 2 - 3 recurved spines on the nodes; nodes slightly swollen, lower nodes rooting; internodes variable in length, upto 45cm long, often faintly angular; lower internodes slightly grooved and flattened on one side, walls thick, 3 - 4cm, cavity small. **Culm-sheaths** variable in shape and size, 15 - 35cm long and 18 - 35cm broad at base, coriaceous, lower developing ones often striped and upper ones orange-yellow, glabrous to pubescent with dark-brown hairs, deciduous, top striate and somewhat rounded, margins plaited; ligule continuous with sheath top, margin fringed with whitish cilia; auricle inconspicuous; imperfect blades triangular, concave with involute, ciliate margins, upto 10cm long, outer surface with dense dark-brown to black hairs, inner surface glabrous, shining, greenish-yellow when young, base cordate, tip acute, margins decurrent on the sheath. **Leaves** linear-lanceolate or linear, very variable in size, 6 - 22cm x 1- 3cm, rounded at the base into a short, often swollen, petiole-like base ±2 mm long, apex acute, glabrous above except for a few long hairs near the base, glabrous or puberulous beneath, margins scabrous and ciliate towards base, main vein narrow, pale, secondary veins 4 - 6, intermediate 7 - 9, transverse veinlets none, but regular pellucid glands at intervals; leaf-sheaths glabrous or slightly pubescent with silvery hairs, ending in a thick, often ciliate callus and a short auricle furnished with a few stiff, curved, silvery, deciduous bristles, edges ciliate; ligule short. **Inflorescence** a large panicle, often formed by whole culms, branchlets spicate with loose clusters of about 5 pale spikelets; rachis variable, usually stiff, shining, smooth, sometimes dull, striate, occasionally angular and soft, almost fistular. **Spikelets** lanceolate, acute, 1- 2.5cm x 4 mm, sessile, glabrous except for the prominent ciliate edges of
Fig. 1. *Bambusa arundinacea*
A- Leafy twig x 2
B- Flowering twig x 2
Bambusa arundinacea

1. Culm-sheath
2. Flowering twig
the palea, consisting of 2, 1 or no empty-glumes, then 3 - 7 flowers, the lower ones hermaphrodite, the upper male only, finally 1 - 3 imperfect flowers; empty and flowering glumes ovate-lanceolate, acute or mucronate, many-nerved, glabrous, 4 - 6 mm long; palea slightly longer, 2-keeled, ciliate on the keels, sub-acute; lodicules 3, small hyaline, ovate, fimbriate on the edges, 1 usually longer and more acute, 1- to 3- nerved. Stamens exserted, drooping, filaments slender; anthers yellow, obtuse, sometimes with apiculate bristles. Ovary elliptic-oblong, glabrous except at the tip; style short, glabrous, soon dividing into 3 long, plumose stigmas. Caryopsis oblong, 4-8mm long, smooth, grooved on one side, ending in a short beak formed by the base of the style, always surrounded by the persistent glume and palea, embryo conspicuous. (Fig.1; Photo. 1 & 2).

Chromosome number : 2n = 70 – 72 (Parthasarathy 1946; Janaki Ammal 1959).


Distribution : (a) CHINA, INDIA, INDONESIA, JAVA, MYANMAR, SRI LANKA and THAILAND, introduced in WEST INDIES; (b) Throughout India in plains, ascending to 1250 msl, commonly cultivated in N. W. India in the plains;(c) Cultivated in the districts of upper Assam and frequently under cultivation and wild in the hills and hillocks of lower Assam.

Note : The nomenclature of this species, the type species of the genus Bambusa Schreber, has been a subject of attention since 1753 when Linnaeus provided the first validly published name Arundo bambos for it (Linnaeus 1753).

In 1789, Retzius and Schreber decided that the Arundo bambos Linn. represents a new genus distinct from Arundo. Retzius (1789) named the new genus as Bambos employing the specific epithet arundinacea, while Schreber (1789) named it Bambusa without citing any species representing the type of the genus. The type specimen of the Bambos arundinacea Retz. was misplaced at the Retzius' herbarium at Lund in Switzerland and consequently McClure (1946) on the basis of Retzius' description and other evidence concluded that the Retzius' specimen resembled Bambusa vulgaris Schrad. ex Wendl. and not B. arundinacea Willd., the thorny bamboo. McClure (i.c.), therefore, choose the illustration of "Illy" in Hortus Indicus
Malabaricus of Rheede (1678 - 1703) as the type of thorny bamboo and because, in his opinion, this was the only one synonym under *Arundo bambos* Linn. (Linnaeus 1753) which gave any clear indication of a species. Rheede had mentioned thorny branches in his description and also the name "Illy", which is still commonly used by the people for the thorny bamboo in South India. McClure (l.c.), thus regarded *A. bambos* Linn. as typifying the thorny bamboo of India and advocated the use of the combination *Bambusa bambos* (Linn.) Voss. Following the views of McClure (1946) several authors (Soderstrom 1985; Soderstrom & Ellis 1988; Bennet & Gaur 1990b; Tewari 1992; Seethalakshmi & Kumar 1998) continue to use this combination. The rediscovery of the type sheet of *Bambos arundinacea* Retz. by Dr. T. Norlindh, Keeper of the Botanical Museum at Lund and subsequent examination of the same by Holttum (1956a, 1956b) revealed that the sheet contained two flowering branches belonging to two different species. He discussed the identity of the two elements and of the opinion that the specimen on the left side of the sheet was what was later called as *Bambusa vulgaris* Schrad. ex Wendl. and the one on the right (without stamens) was the thorny bamboo of India and called *Bambusa arundinacea* Willd. by Roxburgh (1795 - 1819, 1832), Munro (1868), Gamble (1896) and others. McClure (1957) also agreed with the views of Holttum in this regard. Holttum (1956a, 1956b) suggested that the specimen on the right hand side of the sheet be selected as the type of the thorny bamboo. Retzius' species *Bambos arundinacea* was transferred to *Bambusa* by Willdenow in 1799. Although the generic names *Bambos* Retz. (Retzius 1789) and *Bambusa* Schreber (Schreber 1789) were published in the same year, Schreber's citation of the name *Bambos* under synonym of *Bambusa* points to the prior publication of *Bambos* Retz. However, the name *Bambusa* (an orthographic variant of *Bambos*) has been conserved against *Bambos*. Therefore, the suggestion of Holttum to continue the use of the name *Bambusa arundinacea* (Retz.) Willd. as the correct name against the name *Bambusa bambos* (Linn.) Voss. for the thorny bamboo seems to be justified and it also conforms to Art. 7.4 of the Berlin Code (1988). A detail discussion in this regard has been provided by Sharma & Singh (1994).

The account of flowering of bamboos (Blatter 1930, 1931a, 1931b) has recorded about 18 gregarious flowering of this species from different parts of India starting
from 1804 from West Coast of India and 1913 - 15 from Coorg district. After analysing all the flowering records available from its natural zone he has concluded that flowering cycle of this species is 30 - 34 years. He also pointed out that at Dehra Dun, where this species had been planted, it has a cycle of 45 years. The latest gregarious flowering and the one previous to that recorded from some parts of Karnataka showed that flowering cycle ranged between 44 - 49 years (Bennet & Gaur 1990b). Gadgil (1980) reported the gregarious flowering during 1977 - 79 from Coorg district of Karnataka. In Ganjam district of Orissa latest gregarious flowering was reported after a full cycle of 10 years in 1976 (Das 1976). Gaur (1987) has mentioned that the period of flowering cycle of this species as 30 - 45 years. However, it was reported to flower every year in Thailand (Anantachote 1987).

In Assam Valley this species flowered gregariously during 1974 - 77 resulting in almost disappearance of the species from certain parts of lower Assam and the present vegetation was regenerated from the seeds set after last gregarious flowering (Gupta 1982). During the present investigation one whole clump and a few culms of another clump in Bor Azara village near Nalbari town of Nalbari district of lower Assam were found in flowering condition during 1996 - 97 (Barooah 1999).

In Assam, this species is occurring in varied habitats ranging from low land flooded during rainy season to dry hills. It is observed that clumps occurring in dry plains and hills are deciduous, while the clumps occurring in other habitats are more or less evergreen.

It is also observed that the new shoots slightly bend initially towards the centre of the clump to a certain height and then spreading outwards from the clump during shooting months. It is for this reason the culms of this species are seldom straight and interlocked with each other so much so that it is very difficult to extract them.

The species can be easily identified for its branching habit. The nodes of the lower 2/3rd of the culms bear long branches with long lashing branchlets forming unpenetrable groves.

Use: This is one of the major commercial species not only in India but also in Java, Thailand and Indonesia. It is also one of the most useful bamboo for construction...
(Yudodibroto 1987; Vivekanandan 1987; Widjaja & Risyad 1987). In many Asian countries this is the main species for paper mills.

Lal et al (1952) have shown that various marketable products such as curry, candy, chutney, pickle, etc. could be prepared out of the young shoots. In Manipur this species and *Dendrocalamus giganteus* are the main species whose young shoots are used as vegetable and also for preparing a delicacy called *Soibum* by fermenting the tender shoots (Singh 1986). Tabasheer (*Banslochan*), a calcareous deposit in the culms is used in Ayurvedic medicine (Shukla and Das 1981). The culms have great demand as containers for toddy in Madya Pradesh (Sharma & Tomar 1964). The seeds are used as substitute of rice (Ambasta 1986; Jain 1991). The shoots are used as antifertility, abortifacient and applied to wound, while the leaves are eaten in curry (Jain 1991). Leaves are used as fodder for buffaloes and elephants (Holland 1919).

In Assam this species is not preferred for house building and construction work for the usual bent culms. However, the paper mills of the state mostly use this species. It is also recorded that the young shoots are eaten in similar way as that of *Bambusa balcooa* in some parts of Assam, especially in Darrang and Nalbari districts. Gait (1926) recorded that capitals and other strategic installations of the Ahom Kings were fortified by planting this species as live fencing.


Tall, tufted, evergreen. Culms 10 - 17 m high, 5 - 7cm in diameter, glossy green, scurfy when young, yellowish when old, branches curving downwards, nodes
Fig. 2. *Bambusa auriculata*
Leafy twig \( \times 2 \)
brown, strigose, internodes up to 80cm long, the lower ones shorter, but not less than 40cm, walls thick. **Culm-sheaths** 21 - 32cm x 20 - 26cm, attenuate upwards and convexly truncate to about 10cm in breadth, thickly black ciliate on the margins, outer surface covered with appressed black or tawny bristles except for a vacant patch down the middle, inner surface glabrous; imperfect blades 16 - 23cm x 8 - 12cm, triangular, acute, base slightly rounded, striate on both sides, hairy within, densely appressed-hairy without in two longitudinal streaks which leave the middle line free; ligule 5mm high, sharply dentate; auricles rounded, naked, often dark-green when fresh. **Leaves** lanceolate or linear-lanceolate, 20 - 40cm x 2.6 - 6cm, rounded or attenuate into a 2.5 - 5mm long petiole-like base, ending above in a long twisted scabrous point, smooth above except the scabrous points on marginal veins, minutely puberulous beneath when young, afterwards glabrous or roughish, often glaucous, one or both edges scabrous, main-vein yellow, shining, prominent, secondary veins 8 - 12, intermediate 6 - 7, pellucid glands between, which give the appearance of transverse veinlets when dry; leaf-sheaths smooth, faintly striate, polished, hairy at first, somewhat keeled, ending in a smooth callus and a small thick rounded, glossy, naked auricle which is often dark in colour. **Flowers and fruits** not seen. (Fig. 2).

**Exsiccata:** Goalpara, Shimalutala, June 14, 1997, C. Barooah 2810; Tinsukia, near Margherita, August 20, 1997, C. Barooah 2591.

**Distribution:** (a) **BANGLADESH, INDIA and MYANMAR**; (b) Assam; (c) Barpeta, Darrang, Goalpara, Kamrup, Nalbari and Sonitpur districts where the species is occurring only under cultivation and not recorded in wild state.

**Note:** In absence of flowering material the taxonomic status of this species remained uncertain for some time. Munro (1868) included this species under *Bambusa vulgaris* Schrad. ex Wendle. while Brandis (1906), Camus (1913) and Blatter (1929) treat it as synonymous of *Oxytenanthera nigrociliata* Munro. Although Kurz (1875, 1877) placed it under *Gigantochloa* he, however, pointed out that the naked rounded auricles of the culm-sheaths and leaf-sheaths and the peculiar arrangement of bristles in patches on the sides of the culm-sheaths and of the imperfect blades, leaving a middle line free are distinctive of the species. These characteristics were subsequently confirmed by Gamble (1896) and recognised as

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a distinct species different from *Bambusa vulgaris*. The present author also could not find any flowering material and the identity of the species has been based on the characters mentioned above.

**Use**: Except use of dried culms as fuel no other use has been recorded for this species during the present investigation.


*Bhaluka banh, Rai Bhaluka* (Ass.); *Balku ban*, *Boro ban* (Beng.); *Wamnah*(Garo); *Kappa-kaipho* (Kar.).

Tall, stout, caespitose, evergreen. **Culms** 15 - 25cm in height and 8 - 16cm in diameter, green when young and dull grayish-green on maturity, walls ±3.5cm thick at base, branched from the base; nodes swollen with a whitish ring above, hairy below, branches hard, lower ones leafless or with a few leaflets, mostly spreading, sometimes thorn-like; lower internodes 10 -12cm long and the diameter of the cavity about 1/3rd of the diameter of the culm, upper internodes upto 45cm long, cavity larger than the lower internodes. **Culm-sheaths** are of two kinds, of the lower nodes shorter and broader, with densely appressed, dark hairs on outer surface, inner surface glabrous, shining, margins ciliate along one edge and on the other edge ciliate only at the top, rounded on the top; the culm-sheaths of the upper nodes 30 - 45cm long and 20 - 35cm broad at the base, more or less glabrous, truncate; imperfect blades of the culm-sheaths of lower nodes short, triangular, decurrent to a short fringed auricle; culm-sheaths of upper nodes 12-20cm long and 5 - 12cm broad, triangular, acute to acuminate, densely hairy on
Fig. 3. *Bambusa balcooa*
Leafy twig $\times 2$
Fig. 4. *Bambusa balcooa*
Flowering twig x 2
Bambusa balcooa

3. Culm-sheath
4. Flowering twig
adaxial surface, striate above, rounded at base, and then decurrent on the sheath
in a narrow band bearing a few long ciliate hairs; ligule 4 - 9mm high, denticulate,
membranous; auricle very short or sometimes absent, ciliate. **Leaves** oblong-
lanceolate, 15 - 38cm long, 2.5 - 5cm broad, rounded or sub-cordate at the base
into a short petiole-like base, apex with a twisted, scabrous, setaceous point, glabrous
above, pale and puberulous beneath, margins scabrous-ciliate, main vein prominent,
shining beneath, secondary veins 7 - 12, intermediate 6 - 7, many pellucid glands
which often give the appearance of prominent transverse veinlets on the lower
surface; leaf-sheaths striate, appressed-white-hairy, truncate above with a narrow
callus, sometimes furnished with a very few stiff, wavy, deciduous bristles; ligule
membranous, broadly triangular. **Inflorescence** a large compound panicle, bearing
spicate branches with bracteate heads of spikelets; rachis pubescent or scurfy,
striate, swollen above. **Spikelets** ovoid, lanceolate, flattened, 0.5 - 1.2cm long, 4-
6cm broad, with 0 - 2 empty glumes, then 4 - 6 hermaphrodite flowers, then a
terminal imperfect flower on a short flattened rachilla; **empty glumes** ovate-acute,
many-nerved; **flowering glumes** larger than the empty glumes, ovate-acute, many-
nerved, ciliate on the edges; **palea** as long as flowering glumes, ovate-acute, 2-
keeled, long ciliate on the keels, indistinctly veined; **lodicules** 3, ovate or obovate,
3 - to 5-nerved, fimbriate on the edges. **Stamens** hardly exserted; anthers glabrous,
connective ending in a short, dark, sometimes hairy point. **Ovary** broadly ovoid,
acuminate, hairy, with a hairy style, branching into three long plumose stigmas.
(Fig.3 & 4; Photo. 3 & 4).

**Chromosome number** : n = 35, 2n = 70, aneuploid (Sobita Devi & Sharma
1993).

**Exsiccata** : Kamrup, Baihata Charali, Alipub, July 30, 1996, C. Barooah 2506;
Lakhimpur, Barpathar No.1, January 16, 1997, C. Barooah 2517; Bhubri, Bilasipara,

Assam, Kamrup, October 1889, Pani Ram Das 22662(DD).

**Distribution** : (a) BANGLADESH, INDIA and INDONESIA; introduced in
Australia (Tewari, 1992); (b) Eastern U.P., Bihar, West Bengal, Assam, Nagaland,
Arunachal Pradesh, Meghalaya, Tripura, Manipur; (c) Widely cultivated all over
Assam and nowhere found in wild state.
Note: This species can be easily identified by its tall and stout culms and lower nodes swollen and rooting. 1- to 2-year old culms shining green and gradually become greyish due to occurrence of some crustaceous lichens. During active growth season (May-August) the new culms of this species are distinguishable by their erect, unarmed culms in having yellow culm-sheaths. On maturity culm-sheaths fall off and branching starts from base upwards.

During the present investigation two distinct types have been observed. One with comparatively stout culms having comparatively thin branches and the other with comparatively smaller culms having stout branches. In other words one can be said to be a gigantic type and the other as diminutive type, but both has all the essential characters similar. Both the types are quite common throughout Assam. Further detail comparative study is required for deciding their taxonomic status as varieties.

Blatter (1931a) mentioned that this species flowered in 1849 in Puruea district, West Bengal, in 1876 in Goalpara, Assam, in 1881 in Gorakhpur, Uttar Pradesh and in 1889 in Kamrup district, Assam. He also remarked that Roxburgh had the opportunity to see the flowering of *Bambusa balcooa* only once at the beginning of nineteenth century (Blatter 1931b). Gregarious flowering was reported from Eastern U.P. in 1986 (Rawat 1987). In Bangladesh it flowered during 1977-1985 and gregariously twice in 1983-1984 and 1984-1985 (Banik 1987). Flowering cycle is 35 – 45 years (Seethalakshmi & Kumar 1998).

During the present investigation the author could locate a large clump of this species in flowering at Khorahat village under Bilasipara Sub-Division of Dhubri district in March 1998 (Barooah 1999). It was also observed that after flowering the culm died off along with the rootstocks.

Use: Gamble (1896) states — "It is probably the best and strongest species for building purposes and is greatly esteemed in Calcutta, used for scaffolding and is very durable if well seasoned by immersion in water". Bor (1940) mentioned that this bamboo has great repute as a durable and strong bamboo in Brahmaputra valley of Assam. In Tripura it is used for making agarbati sticks (Chakraborty 1988). Jacona (1983) mentioned it as a possible source for bamboo wood chip industry.
During the present investigation it is observed that in Assam this bamboo is much sought in construction works especially in house building in rural areas as posts, rafters, roof-frame, foundation framing, scaffoldings, etc., for making agricultural implements like cart-yokes, plough-yokes, shaft of bullock cart, harrow, handle of axe, hoe, knife, etc. Immature culms are much preferred for lashing.

In Assam, particularly the communities inhabiting the Brahmaputra valley, used the tender shoots for preparing an edible preparation called *Kharicha*. The new shoots are cleaned by removing the sheaths and crushed in a pedal and kept for a month in a glass or China-clay container for fermentation during which the crushed shoots develop a mild acid in taste and an aroma. Both the residue and the sap are used in curries. The residue are also eaten as chutney. Pickles are also made by drying the residue. Sometimes the residue are sundried and preserved for use all the year round. In Assam preparation of pickles from shoots is a cottage industry and several organisations in the state export it not only to other parts of the country but even abroad. The tender shoots are commonly sold in markets.

Leaves are used as fodder for cattle. The leaves are usually fed to cattle after delivery, which is said to hasten the fall of placenta.


*Thaikawa* (Ass.).

Evergreen, large, handsome, caespitose. **Culms** 15 - 20m in height, 7 - 12cm in diameter, dull-green, strong, nearly solid; nodes with white ring of hairs and waxy powder, not much swollen; internodes 25 - 42cm long. **Culm-sheaths** 8 - 15cm long, 10 - 21cm broad at base, green when young, turning pale yellow along the margins, covered with appressed golden hairs, sometimes on the sides, rather
Fig. 5. *Bambusa burmanica*
Leafy twig x 2
Bambusa burmanica

5. Culm-sheath
6. Culms in a clump
broader than long, rounded at the top; imperfect blades short, broad, cuspidate, cordately rounded at base, apex acuminate; ligule 2mm, almost entire; auricles large, rounded, unequal, fringed with 2-4 mm long ciliae. Leaves of young plants oblong-lanceolate, 25 - 30cm x 2.5 - 5cm, white-hairy on both surfaces; petiole-like base upto 5mm long; leaf-sheaths striate, very pubescent; auricles large, rounded, fringed. Leaves of older plants linear-lanceolate, 18 - 25cm x 2.5 - 3.5cm, adaxial surface glabrous, abaxial surface whitish and pubescent, rounded or unequally attenuate at base, edges scabrous, ending in a subulate, setaceous, twisted, scabrous point; main vein prominent, secondary veins 7 - 8, intermediate 5 - 8, pellucid glands many; petiole-like base upto 2.5mm long; leaf-sheaths glabrous, reddish-brown, keeled, ciliate on the edges, truncate at top; ligule short, minutely dentate; auricles with deciduous ciliae, small, deciduous. Flowers not seen. (Fig. 5; Photo. 5 & 6).

Chromosome number: 2n = 70, aneuploid (Sobita Devi & Sharma 1993).


Distribution: (a) INDIA, MALAYSIA and MYANMAR; (b) Assam; cultivated in different parts of India, Dehra Dun (Forest Research Institute), Calcutta (Indian Botanic Garden), Manipur and in the Field Research Station of State Forest Research Institute at Chessa (Arunachal Pradesh); (c) Occurring wild in N.C. Hills and cultivated in Bongaigaon and Dhubri districts (Natural occurrence of this species was reported for the first time only from Assam in India by Biswas 1993).

Note: The identity of this species was confirmed after critical examination, scrutiny of literature and consultation of herbaria of Forest Research Institute, Dehra Dun (DD), Botanical Survey of India, Eastern Circle, Shillong (ASSAM), Central National Herbarium, Howrah (CAL), S.F.S. College, Burnihat and Tropical Rain and Moist Deciduous Forest Research Institute, Jorhat, Assam.

Appressed golden hairs on the outer surface of the culm-sheaths, large, rounded auricles with ciliae and the culms having nodes with a ring of silky-white hairs are the main key characters on the basis of which the identity of this species has been confirmed.
This species flowered in 1890 in Katha district of Upper Myanmar (Gamble 1896). There is no report of its flowering since then. In August, 1986, flowering of this handsome bamboo occurred in North Cachar Hills district of Assam (Biswas 1993). In the present investigation no flowering material has been found.

**Use:** Culms of this species are used for roofing, thatching, construction and basket making (Biswas 1993).


Tall, evergreen, caespitose, **Culms** usually 10 - 20m high, 5 - 12cm in diameter, green when young, slightly, dark-green on maturity, almost unbranched below, nodes slightly thickened, internodes 40 - 65cm long; young shoots without white powdery excretions below the culm-sheaths. **Culms sheaths** 12 - 15cm long, 25 - 27cm broad, outer surface covered with chocolate-brown, sharp, apicular hairs, top rounded; imperfect blades orange-yellow, broadly triangular, cordate, cuspidate, spreading at right angle to the axis; ligule short, almost entire; auricles wavy, with thick, rigid ciliae on the margins and short, dense hairs outside on the body. **Leaves** 12 - 34cm x 2 - 4.2cm, linear-lanceolate, or lanceolate, glabrous above, glaucescent and puberulous beneath, apex scabrous, acuminate, base obliquely rounded; petiole-like base upto 4 mm long; leaf-sheaths striate, hairy when young, glabrous on maturity; ligule very small, minutely dentate; auricles rounded, fringed with short white hairs. **Flowers** not seen. ( Fig. 6; Photo. 7).


**Distribution:** (a) INDIA; (b) Assam; (c) Cachar and scattered in the Brahmaputra valley. Endemic to Assam (Tewari 1992; Shukla 1996).
Fig. 6. *Bambusa cacharensis*
Leafy twig x 2
Bambusa cacharensis
7. Culm-sheath

Bambusa multiplex
8. Culms in a clump
**Note:** This species is very similar to *Bambusa tulda* and *B. pallida*. Culms are like *B. tulda* but without white powdery excretion below the culm-sheaths in young stage. Culm-sheaths are covered on the back with chocolate-brown coloured, sharp, apicular hairs; blades orange-yellow in colour, spreading at right angles to the axis (erect in *B. tulda* and *B. pallida*); auricles wavy with thick, rigid ciliae on the margins and short, dense hairy on the outside (hairs absent in auricles of *B. tulda* and *B. pallida*).

**Use:** Used for making household goods (Shukla 1996). The local people use this bamboo for house building also.


Shrubby, evergreen, caespitose. **Culms** usually 6 -15m high, 4 - 8cm in diameter, glabrous, dark-green, often unbranched below; nodes slightly thickened, lower ones rooting; internodes 20 - 45cm, with a ring of white hairs below, walls thin; branches many from the nodes of midculm, slender, horizontal. **Culm-sheaths** 10 - 16cm x 8 - 15cm, deciduous, glabrous, rounded at top; imperfect blades triangular, cordate, cuspidate, erect, hairy within; ligule narrow, entire; auricle 2, small, unequal, margins ciliate. **Leaves** 10 - 26cm x 2 - 4cm, linear-lanceolate, or lanceolate, usually unequally rounded at base, acuminate above in a subulate twisted point, glabrous above, often glaucescent beneath, scabrous on the edges; petiole-like base up to 3 mm long; leaf-sheaths striate, pubescent when young, glabrous on maturity; ligule narrow, inconspicuous; auricles rounded, fringed with thin whitish bristles. **Flowers** not seen. (Fig. 7).

**Exsiccata:** Karbi-Anglong near Hamren, June 29, 1997, C. Barooah 2822.

**Distribution:** (a) INDIA, MYANMAR; (b) Assam, Meghalaya; (c) Karbi-Anglong and North Cachar Hills.

**Note:** This species is nearly indentical to *Bambusa tulda* but differs in having glabrous culm-sheaths, smaller auricles and shrubby habit.
Fig. 7. *Bambusa jaintiana*
Leafy twig x 2
In the absence of flowering material, the identity of this species have been established on the basis of its vegetative characters and by consulting the isotype (G. K. Deka 31765) deposited in the Herbarium of Botanical Survey of India, Eastern Circle, Shillong (ASSAM).

It has been observed in flower and reported by Kanjilal in 1915 from N.C. Hills of Assam (Tewari 1992; Seethalakshmi & Kumar 1998). In the present investigation no flowering material has been found.


*Borosi-dang banh, Jupuri banh* (Ass.); Chinese bamboo (Eng.).

Thickly growing, caespitose, evergreen, shrub. *Culms* usually 3 - 6m high, 1.5 - 2.5cm in diameter, straight, peripheral ones suberect, glabrous, green when young, yellowish on maturity, hard, branched above; nodes rather prominently thickened; internodes usually 20 - 40cm long. *Culm-sheaths* 10 - 15cm × 5 - 10cm, green when young, yellowish on maturity, stiff, glabrous, striate, slightly attenuate and rounded at the top; imperfect blades 5 - 10cm long, 2 - 3.5cm broad at base, triangular, linear, acuminate, decurrent at the base on either sides along the rounded
Fig. 8. *Bambusa multiplex*
Leafy twig x 1
Fig. 9. *Bambusa multiplex*
Flowering twig × 2
Bambusa multiplex

9. Culm-sheath
10. Flowering twig
part of the sheath, somewhat black, appressed-hairy or glabrous above, hairy beneath, deciduously ciliate on the edges; ligule up to 1.5mm high, narrow, entire; auricles very small, bristly. **Leaves** distichous, 5 - 11cm long, 8 - 15mm broad, linear-lanceolate, narrowed in a rounded or slightly tapering, petiole-like base very short, above ending in a subulate, twisted point, smooth above, whitish or glabrous and minutely pubescent beneath, main vein faint, pale beneath, secondary veins 3 - 6, intermediate 7 - 8, no transverse veinlets, but very faint pellucid glands; leaf-sheaths smooth, striate, ending in a prominent callus and auricled at the mouth, the auricles fringed with a few long, stiff bristles; ligule short. **Inflorescence** a leafy panicle formed by whole culms. **Spikelets** 1.2 - 3.7cm long, 0.5mm broad, glabrous, straw-coloured, bearing 5 or more flowers, separated by glabrous, flattened, 0.2 - 0.5mm long rachillae, the terminal flower only imperfect; **empty glumes** none or very rarely one; **flowering glumes** 1.3 - 1.6cm long glabrous, many-nerved, ovate-acute; **palea** shorter than flowering glume, 2-keeled, minutely ciliate only at the tip, many-nerved; **lodicules** 3, unequal, 0.2 - 0.5mm long, entire, linear, somewhat concave or thickened below, usually 2-nerved. **Stamens** exserted, pendulous; anthers blunt or slightly apiculate, yellow. **Ovary** obovate, rough, pubescent above; style very short, almost immediately dividing into 3 long, feathery stigmas. **Caryopsis** elliptic, furrowed, roughly hairy above, ending in a short beak. (Fig. 8 & 9; Photo. 8, 9 & 10).

**Chromosome number**: 2n = 72 (Uchikawa 1935; Darlington & Wylie 1955; Zhang Guang - Zhu 1987). n = 35; 2n = 72, aneuploid (Sobita Devi & Sharma 1993).


**Distribution**: (a) Indigenous to CHINA and JAPAN, cultivated in INDONESIA, INDIA, PHILIPPINES and SRI LANKA; (b) Cultivated in many parts of India; (c) Frequently cultivated as hedge in Assam.

**Note**: The nomenclature of this bamboo has been a subject of controversy for quite a long time. Merrill (1935) adopted the name *Bambusa multiplex* based on
earliest valid name *Arundo multiplex* Lour. and treated *B. multiplex*, *B. glaucescens* and *B. nana* as a single taxon. Holttum (1956b) on the other hand treated *B. glaucescens*, *B. nana* and *B. glauca* to be the same and distinct from *B. multiplex*. He, however, was silent about the taxonomic status of these two. Anatomical, Chemical and Physical and mechanical properties also support this view (Seethalakshmi & Kumar 1998). Following Merrill (1935) many botanists considered *B. multiplex*, *B. nana* and *B. glaucescens* to be the same but rejected the earliest name *multiplex* on the ground that its identity is not clear due to the insufficient original description by Loureiro (1790). Soderstrom (1985), however, followed Merrill (1935) in adopting the earliest epithet *B. multiplex* and also opinioned out that its identity is very clear. In the present work the earliest valid name *B. multiplex* has been adopted following Merrill (1935) and Sodestrom (1985). It is also observed that the binary *B. glaucescens* has been attributed by workers to "Sieb ex Munro", but Munro (1869) mentioned the above combination only as a synonym of *B. nana* Roxb. The combination *B. glaucescens* was first validly published by Merrill (1912).

Some taxonomists considered that there are two distinct taxonomic units of the species, viz. one is of small size, usually 1.5 - 2m high, with small, pale, glaucous leaves and referred to *B. glaucescens* and *B. nana* and is a native to China or Japan and the other is larger and usually grows upto a height of 5m or more is referred to *B. multiplex* and is a native to Cochinchina. Although Dajun & Shao-Jin (1987) treat the smaller plant as a variety *B. multiplex* var. *nana* (Roxb.) Keng. f., in the present work it is considered not proper to treat the above morphovariants as distinct from each other before further investigation considering all aspects is conducted.

This species can be easily identified without flowers by its shrubby habit, yellowish old culms and the imperfect blades of the culm-sheaths having broad, rounded and decurrent base.

It has been reported to have flowered in Germany in 1808 and 1839; in Bangladesh in 1851 and 1879; in Sri Lanka in 1863; in India at Calcutta in 1890; in Singapore in 1892 (Gamble 1896; Holttum 1956c). During 1977 - 1985 it flowered sporadically from 1977 - 78 in Bangladesh (Banik 1987). During the present study one whole
clump was in flower at Kathgaon near Mariani of Jorhat district and this is probably
the first record of its flowering in Assam.

Use: Grown as hedge in many parts of Assam, especially in Tea Gardens in upper
Assam. The culms are used as fishing rods and as handles of ceiling brush. Young
shoots are edible and used for making pickles (Tewari 1992).

*Bambusa nutans* Wall. ex Munro in Trans. Linn. Soc. 26 (1) : 92, 1868;
India, 7:387, 1896; Camus, Les Bambusees : 116, t. 78 B, 1913; Bor, Fl. Assam
5:28, 1940; Varnah & Bahadur in Ind. For. Rec. (n.s.) Bot. 6 (1): 2, 1980; Bennet
& Gaur, Thirty Seven Bamboos : 29, 1990; Tewari, Monograph : 44, t. 16, 1992,
Shukla, Grasses of North-Eastern India: 183, 1996; Seethalakshmi & Kumar,

*Jatia mokal* (Ass.); *Makla* (Beng.); *Seringjai* (Khasi); *Wa-malang* (Kuki).

Moderate-sized, evergreen, caespitose with creeping rootstock. **Culms** 10 - 15m
tall, 5 - 10cm in diameter, loosely clumped, much-branched above, usually
unbranched or thinly branched below, striate, green, smooth, not shining, white-
ringed below the nodes; nodes slightly raised, often hairy, lower ones bearing
rootlets; internodes usually 25 - 45cm long, thick-walled. **Culm-sheaths** variable,
usually 10 - 23cm long and upto 30cm wide at base, covered on the back with
appressed, scattered, black hairs, the base bearing a ring of soft, deciduous hairs;
roundedly truncate at top; imperfect blades of the lower nodes 15 - 23cm long and
very broad, that of middle nodes shorter, acute, margins recurved, clothed within
with appressed black hairs, rounded at the base and again decurrent on the top of
the sheath, auricles large, wavy, one usually erect, the other decurrent, both densely
furnished with long, curved bristles; ligule 2 - 2.5mm, smooth, dentate. **Leaves** 15
- 25cm x 2 - 3.5cm, linear-lanceolate, acuminate at apex, rounded and usually
oblique or attenuate at the base, ending above in a twisted, scabrous point, green
on both surfaces when young, upper surface dull-green on maturity, glabrous except
the scabrid hairs on the midrib and marginal veins, lower surface glaucous, glabrous
or slightly hairy, scabrous on the edges, main vein rather narrow, prominent, pale
Fig. 10. *Bambusa nutans*
Leafy flowering twig x 2
Bambusa nutans
11. Culm-sheath
12. Flowering twig
beneath, secondary veins 7 - 10, intermediate 8 - 9, pellucid glands frequent; petiole-like base 3 - 5mm long; leaf-sheaths striate, hairy when young, ending in a smooth callus and produced in a falcate auricle with a few bristles; ligule elongated, obtuse, hairy. **Inflorescence** a stiff panicle bearing spicate branches with clusters of stiff, erect spikelets in bracteate heads, rachis smooth, **Spikelets** many, sterile or bearing gemmiparous glumes, few fertile, 1.4 - 2.5cm long, glabrous, acute; **empty glumes** 2 - 3, glabrous, mucronate, gemmiparous; fertile flowers 3 - 5; **flowering glumes** ovate, acute, mucronate, many-nerved, minutely hairy within; **palea** flattened, shorter than flowering glume, ovate, 2-keeled, with the long, white ciliae on the edges of the keels, overlapping; rachillae clavate, hairy and ciliate at the top, uppermost 2 - 3 flowers usually imperfect; **lodicules** 3, broad, obtuse, long fimbriate, fleshy at first, many-nerved, one narrower than the other two. **Stamens** 6, anthers long apiculate or slightly penicillate at apex. **Ovary** sub-ovate, stalked, glabrous below, pubescent above; style short, pubescent; stigma 2-3, shortly plumose, twisted, nearly glabrous. **Caryopsis** oblong, obtuse, hairy on the top. (Fig. 10; Photo. 11 & 12).

**Chromosome number**: n = 35, 2n = 70, aneuploid (Sobita Devi & Sharma 1993).


Sibsagar, Assam, June 1890, Gopal Bennerji, Coll. No. Nil; Cachar, Assam, September 2, 1912, Forest Economist 3903; Rangazumi, Assam, August 7, 1942, N.L. Bor 16118; Golaghat, Assam, May 4, 1944, N.L. Bor 18164(DD).

**Distribution**: (a) INDIA; (b) Naturally occurring in Sub-Himalayan tracts from Yamuna eastwards to Arunachal Pradesh, Assam, Bengal, Sikkim, 600-1500 msl., cultivated in Dehra Dun, N.W. India and Orissa; (c) Commonly cultivated in Assam.

**Note**: Chatterji & Raizada (1963) pointed out that there has been a persistent
complication in taxonomy of bamboos and this is very unsatisfactory for *Bambusa tulda* Roxb., *B. nutans* Wall. ex Munro, *B. teres* Ham. and *B. longispiculata* Gamble. Parker (1929) suspected *B. nutans* to be same as *B. tulda* while *B. longispiculata* as merely a form of *B. tulda* with large flowers and spikelets. Majumdar (1989) even considered *B. nutans*, *B. teres* and *B. longispiculata* to be same as *B. tulda* and included these as synonyms of *B. tulda*.

In the absence of flowers it is, however, very difficult to distinguish *B. nutans* from *B. tulda* and *B. teres*. Munro (1868) remarked that *B. nutans* may possibly be a mountain form of *B. tulda* of much smaller plant with a slender and nearly solid stem. Although the best distinction is that of the culms, which in *B. nutans* arise singly from a creeping rootstock, while in *B. tulda* they form a central tuft, yet this is not a constant character. However, the spikelets of *B. nutans* are much stiffer and shorter and the bristles of the leaf-sheaths are usually spreading, while in *B. tulda* are generally erect and regular (Gamble 1896). *B. nutans* differ from *B. teres* by the anthers being apiculate in the former and penicillate in the latter (Gamble *l.c.*). The present investigator although distinguished the three species viz. *B. nutans*, *B. tulda* and *B. teres* on the basis of their flowers yet *B. nutans* can be identified by its creeping rootstock, moderate sized culms with a ring of white hairs below each node and the culm-sheaths covered on the back with appressed, scattered, black hairs.

During the scrutiny of herbarium specimens in the Herbarium of Forest Research Institute (DD), the species has the record of flowering in 1893, 1894, 1896, 1915, 1922, 1923, 1925, 1927, 1931, 1932, 1935, 1942, 1944, 1958, 1963, 1966, 1975, 1979-80. The flowering was both gregarious and sporadic types throughout the lower Himalayas. Though there are many flowering records for different years from 1893 onwards, the authentic gregarious flowering reports after the one in 1840 are for the years 1894-96, 1966 and 1979-80 (Bennet & Gaur 1990b, Tewari 1992). Gamble (1896) remarked that it seems to flower only at long intervals, for Dehra Dun there is no record since 1840, but in 1894 one whole clump flowered. Bahadur (1980), on analysing the flowering records, concludes that apart from sporadic flowering this bamboo seems to flower gregariously after 35 years and at least two separate flowering cycles are involved. The flowering cycle in the first
case roughly corresponds to the years: 1896, 1931 and 1966 and in the second case to the years: 1840, 1875, 1910, 1944 and 1979-80. Anantachotc (1987) reports that it flowers every year in Thailand.

The present investigator has recorded its sporadic flowering in one clump at Dakshin Kulabali village near Boginadi of Lakhimpur district and another one clump at Kekowabari Tiniali near Kalabari of Sonitpur district in April, 1997 (Barooah 1999).

**Use:** It is a graceful bamboo worth growing as ornamental (Gamble 1896). One of the six species commonly used in paper industry in India (Krishnamachari et al 1972). The culm is strong and straight and is used locally for construction, house building, basket making, etc. In Assam the tender culms are much preferred for lashing.


*Bijuli* (Ass.); *Bakhal, Surwal* (Beng.); *Sesktien, Skhen, Tneng, Usken* (Khasi); *Loto* (Kar.); *Watoi* (Naga).

Graceful evergreen or semideciduous, caespitose, thickly growing. **Culms** 13 - 20m high, 5 - 8cm in diameter, smooth, olive-green, the young shoots covered with white powder; nodes not very prominent, lower nodes rooting and not much branching; internodes 45 - 70cm long, walls thin. **Culm-sheaths** 18-30 cm long, 20 - 25cm broad, slightly attenuate upwards and very straightly truncate at top, only when young somewhat roundedly truncate, glabrous or covered on the back with appressed white hairs when young and with black hairs on maturity; imperfect blades long, usually longer than the sheath, wavy along the middle, often upto 35cm long, triangular-acuminate from a broad base which covers nearly the whole top of the sheath, appressed black hairy within, glabrous or sparsely hairy on the
Fig. 11. *Bambusa pallida*
Leafy twig × 2
Bambusa pallida

13. Culm-sheath
14. Culms in a clump
back, slightly rounded at the lower edges; auricles small, rounded, furnished with bristles; ligule very narrow. **Leaves** 10 - 22cm x 1 - 2.5cm, linear-lanceolate, rounded or sub-cuneate at the base, furnished above with a subulate, twisted, scabrous point, glabrous above, except for the scabrous marginal veins, whitish and hirsute beneath, margins scabrous, main veins conspicuous, shining, secondary veins 4 - 6, rarely more, intermediate 7 - 9; petiole-like base very short, 2mm long; leaf-sheaths glabrous, striate, ending in a prominent, smooth callus; auricles rounded, erect, fringed with a few stiff, long, white bristles; ligule very short. **Flowers** not seen. (Fig. 11; Photo. 13 & 14).


Kamrup, Assam, October 1886, Pani Ram Das 22663; Palashbari, Kamrup, Assam, May 15, 1944, N.L. Bor 18179; Assam Forest, May 1957, R. N. Chatterji, Call. No. Nill (DD).

**Distribution**: (a) BHUTAN, INDIA, MYANMAR between 700 - 1250 msl.; (b) Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, West Bengal (Northern part) up to 1200msl. Cultivated in Indian Botanic Garden, Calcutta and in the Bambusetum of Forest Research Institute, Dehra Dun; (c) Cultivated in the plains of Assam, wild in Desoi Valley R. F. of Sivasagar district

**Note**: Blatter (1930) remarked that the flowering specimens were collected from Bangladesh in 1850 and from Kamrup in Assam in 1890. The present author could not collect any flowering material during his field work. Probably the physiological cycle of this species is a larger one than the other species.

After scrutiny of the specimens of the Forest Research Institute Herbarium (Dehra Dun) the author confirmed the identity of this species. In the field it is very easy to identify by its white powdery young culms and culm-sheaths which are appressed black hairy on either sides of the outer surface with two small, fringed auricles and the long triangular-acuminate, sparsely hairy, wavy, deciduous, broad based imperfect blades covering the whole top of the sheath.

**Use**: Mainly used for house building, basket, and mat making (Gamble 1896).
Tripura this bamboo is used for making toys, wall plates, screens, wall hangers, etc. (Chakraborty 1988). In Assam it is used for home building, making of baskets, hand fans, mats, etc.


*Jama betwa, Betwa* (Ass.); *Betua, Jaibaroowa, Jama* (Beng.).

Large evergreen, densely tufted, sometimes leaf-shedding in dry season. Culms in dense clumps, 16 - 25m high, 8 - 15cm in diameter, gray to greyish-green, white-scurfy when young; nodes thickened, lower ones fibrous-rooted; internodes 40 - 60cm long; unbranched below, much branched above and curving outwards. Culm-sheaths thick, 20 - 25cm long, 30 - 35cm broad, persistent, broader based and narrowed into a rounded top, covered on the back with densely and closely appressed brown to dark-brown deciduous hairs; imperfect blades 6 - 10cm long, reflexed, deciduous, triangular, base cordate, apex acuminate, abaxial surface brown pubescence and adaxial surface brown pubesence, margins ciliate; ligule narrow, irregularly dentate, ciliate; auricles two, one upwards, the other down, falcate, continuous with sheath, fringed with deciduous, stiff bristles. Leaves 7 - 29cm long, 1 - 3cm broad, linear-lanceolate, base unequally rounded or attenuate, ending above in a short, subulate, scabrous point, at first hairy on both surfaces, especially below, afterwards nearly glabrous, somewhat scabrous above and on the margins and main vein, secondary veins 4 - 6 on either sides faint, intermediate 7, petiole-like base 2 - 3mm long; leaf-sheaths keeled, compressed, striate, hairy, ending in a callus, a minute auricle furnished with a few long deciduous bristles; ligule very thin and short. Flowers not seen. (Fig. 12; Photo. 15).
Chromosome number: 2n = 72 (Darlington & Wylie 1955); 2n = 64, aneuploid (Dabita Devi & Sharma 1993).


Distribution: (a) BANGLADESH, INDIA, INDONESIA, MYANMAR, THAILAND; (b) Arunachal Pradesh, Assam, Madhya Pradesh, Manipur, Meghalaya, Tripura, West Bengal; introduced in Karnataka, Kerala and Tamilnadu; (c) Cultivated in Cachar and N.C. Hills.

Note: Culms straight, uniform, gray to greyish-green, white scurfy. After the culms reach their full growth culm-sheaths begin to fall from the top, middle few sheaths open gradually and attached erectly to the culms for few days, a few lower culm-sheaths persistent and decay afterwards. Branches arising from upper nodes slightly pendent covering the upper half of the whole clump. Leaves pale green, smaller. On the basis of these characters this bamboo can be easily identified.

Reports of gregarious as well as sporadic flowering and death after seeding are on records for this species. The earliest report of its flowering available from Myanmar was from Pegu and Yoma (Camus 1913). The gregarious flowering in the year 1914 from Prome, Myanmar was reported to be after about 55 years (Blatter 1930). Sporadic and gregarious flowering occurred during 1929-30 in the Pynimananan Division, Myanmar (Bodekar 1930). In Bangladesh it flowered during 1977-1985 and gregariously from 1981 to 1982 (Banik 1987). Gaur (1987) pointed out that its flowering cycle is 35-60 years.

Use: In Manipur this bamboo is popular for house building for its outstanding mechanical properties and durability (Singh 1986). It is also used for paper and pulp (Bhargava 1946) and for making agarbati sticks (Chakraborty 1988). It can be used for making fibreboards (Narayanamurti & Bist 1963) and considered best for walls, roof and floor of home in lower Myanmar (Gamble 1868). This is one of the ten species used for building construction (Widjaja & Risyad 1987). Its shoots are considered best in the world (Vivekanandan 1987). Kennard and Freyre (1957), after studying selected 27 bamboos belonging to 10 genera for the edibility of the shoots, evaluated this species as the best and also mentioned that this as one of the two bamboos to produce shoots with a distinctly sweet taste in the raw state. It is
Fig. 12. *Bambusa polymorpha*

Leafy twig $\times 2$
Bambusa polymorpha
15. Culms in a clump

Bambusa pseudopallida
16. Culm-sheath
used locally in Cachar and N. C. Hills districts for house building, basket making, household articles, etc.


*Bijuli banh* (Ass.); *Deo banh* (Kach.).

Caespitose, thickly clumped, evergreen, shrub. **Culms** 7 - 13m high, 2 - 5cm in diameter, smooth, olive-green, covered with white powder; nodes slightly prominent; internodes 25 - 45cm long, wall thin. **Culm-sheaths** 10 - 20cm x 6 - 13cm, slightly attenuate upwards, truncate at top, glabrous, sometimes powdery on the back; imperfect blades longer than the culm-sheaths, 15 - 25cm long, oblong-acuminate from a broad base which covers nearly the whole top of the sheath, abaxial surface appressed black hairy, adaxial surface glabrous; ligule very short; auricles pointed, one projecting upward and the other downward, with bristles. **Leaves** 10 - 31cm x 2 - 4.5cm, linear-lanceolate, rounded or sub-cuneate at the base, glabrous above, whitish and hirsute beneath, margins scabrous; petiole-like base 2 - 3.5mm long; leaf-sheaths hairy when young, glabrous on maturity, striate, ending in a smooth prominent callus; auricles rounded, erect, with scattered long bristles; ligule very short, minutely dentate. **Flowers** not seen. (Fig. 13; photo. 16).


**Distribution:** (a) INDIA; (b) Assam, Meghalaya and other northeastern states; (c) Cultivated throughout Assam.

**Note:** The flowering of this species has been reported for the first time from Assam in 1965 by Kanjilal (Tewari 1992; Seethalakshmi & Kumar 1998). Since then there is no record of flowering. The present author could not find flowering specimen during his field work.

This species is very much like _B. pallida_ but it can be identified on the basis of its
Fig. 13. *Bambusa pseudopallida*
Leafy twig × 2
morphological features, especially by its shrubby habit and by the culm-sheaths having longer imperfect blades and pointed auricles, one projecting upwards and the other downwards.

Use: Occasionally used for house building, erecting fence and for basket making.


*Bhaluki makal* (Ass.).

Large, thickly caespitose, moderately thorny, evergreen. **Culms** upto 20 m high, 8 cm in diameter, dark green, smooth; nodes formed by a ring consisting of the bases of fallen sheaths, slightly prominent; internodes 40 - 50cm long, walls 8 - 10mm thick; branches long, lower ones often leafless bearing small, straight spines. **Culm-sheaths** 20 - 30cm long, 20 - 25cm broad at base, nearly glabrous, hardly attenuate upwards, somewhat rounded at top; imperfect blades 10 - 15cm long, triangular, cuspidate, appressed hairy beneath, rounded at the base; auricles broad, wavy, fringed with few deciduous bristles; ligule narrow, 2mm high, white-hairy outside. **Leaves** 20 - 35cm long, 3 - 4cm broad, oblong-lanceolate, unequally rounded at base, narrowly attenuate into a short 2 - 2.5mm petiole-like base, above long acuminate, with a twisted, scabrous, setaceous point, glabrous above except the scabrous points on marginal veins, shortly pubescent beneath, scabrous on the edges, main vein conspicuous, shining, secondary veins 10 - 16, intermediate 5 - 7, pellucid glands many, giving the appearance of strongly marked transverse veinlets beneath; leaf-sheaths glabrous or slightly hairy, ending in a broad, shining callus, mouth truncate; ligule short. **Inflorescence** large compound panicle with spicate branches bearing heads of sterile and fertile spikelets with chaffy bracts; rachis fistular, striate. **Spikelets** 5 - 6cm long with 1 - 2 empty or gemmiparous glumes,
Fig. 14. *Bambusa teres*
Leafy twig × 2
Fig. 15. *Bambusa teres*

Flowering twig × 2
Bambusa teres
17. Culm-sheath
18. Culms in a clump
Bambusa teres

19. Flowering clump
20. Flowering twig
5-6 fertile flowers and 1-2 terminal imperfect flowers; rachilla obcuneate, striate, minutely ciliate at top; **empty glumes** ovate-acute, mucronate; **flowering glume** ovate-lanceolate with a broad base, acute, glabrous, sometimes with a soft sub-foliaceous point, many-nerved; **palea** ovate, 2-keeled, scabrous, toothed on the keels, 5-6 nerved between them, tip glabrous or penicillate; **lodicules** almost obovate, long, fimbriate, many-nerved. **Stamens** 6, anthers narrow, penicillate at the apex. **Ovary** ovate, acute, hairy above, style short, stigmas 3, long, hairy. **Caryopsis** not seen. (Fig. 14 & 15; Photo. 17, 18,19 & 20).


**Distribution:** (a) BANGLADESH, INDIA, SINGAPORE, (b) Arunachal Pradesh, Assam, Meghalaya, Nagaland, Tripura, West Bengal; (c) Cultivated throughout Assam.

**Note:** This species was collected only once in flowering stage in 1809 by Hamilton from Gongachora in North Bengal (Blatter 1929). During the course of field work the present investigator observed sporadic flowering in three lower Assam districts (Bongaigaon, Barpeta and Kamrup) during March 1998 (Barooah 1999). The collection of flowering material during the present investigation is quite significant.

**Use:** Used for making *agarbati* sticks, mats, baskets, food-grain containers, etc. in Tripura (Chakraborty 1988). In Assam it is mostly used for lashing and for making a type of special basket called *Tom* or *Topa* for preserving paddy seeds for cultivation. In rural Assam the long and straight culms with the main branches cut about 15cm off the base are used as ladder and are locally known as *Jakhala*.

Evergreen or deciduous, caespitose, tall, gregarious forming a central tuft. **Culms** 10 - 23m high, 5 - 10cm in diameter, glabrous, green when young, greyish-green on maturity, almost unbranched below; nodes not swollen, lower ones fibrous rooted; internodes 40 - 70cm long, white-scurfy when very young, with white ring below the internodes, walls thin, 7 - 12mm; branches many from nearly all the nodes, lower branches slender, horizontal and with few leaves. **Culm-sheaths** 15 - 25cm long, 15 - 27cm broad, deciduous, inner surface smooth, shining, often whitish powdered, outer surface covered with appressed black hairs, attenuate upwards, rounded or truncate at top; imperfect blades broadly triangular, reniform or cordate, cuspidate, erect, hairy within; ligule continuous with the sheath top, narrow, entire; auricles 2, unequal, large, wavy, one continuous with the blade and the other rounded, upward, long-fringed. **Leaves** linear-oblong or linear-lanceolate, 15 - 31cm long, 2 - 4cm broad, equally rounded at the base, acuminate above in a subulate twisted point, glabrous above, except for the scabrous veins near the margin on one side, glaucous and puberulous beneath, scabrous on the edges, main vein rather narrow, secondary veins 6 - 10, intermediate 7- 8, pellucid glands faint, scanty; petiole-like base, short, 2.5mm long; leaf-sheaths striate, glabrous; ligule very small; auricles rounded, fringed with white hairs. **Inflorescence** a large radical leafless panicle, sometimes a short leafy peniculate or spicate branch; branches spicate, bearing interrupted clusters of 1 - 5, usually fertile long spikelets supported by shining chaffy bracts; rachis smooth striate. **Spikelets** 2.5 - 7.5cm long, 5mm broad, sessile, glabrous, cylindrical, acute at first, afterwards divided into many flowers separated by conspicuous rachillae, bearing first 1 - 2 short bracts, then 2- 4, usually gemmiparous empty glumes, then 4 - 6 fertile flowers, and finally 1 or 2 imperfect, male, terminal flowers; **empty glumes** acute, many-nerved; **flowering glumes** many-nerved, glabrous, striate, 1.5 - 3cm long, 7.5mm broad, ovate acute or acuminate, mucronate, sometimes minutely ciliate on the edges;
Fig. 16. *Bambusa tulda*
Leafy twig \( \times 2 \)
Fig. 17. *Bambusa tulda*
Flowering twig x 2
Bambusa tulda

21. Culm-sheath
22. Culms in a clump
Bambusa tulda

23. Flowering clump
24. Flowering twig
palea rather shorter, boat-shaped, 2-keeled, with long white ciliae on the keels and penicillate at the tip, 5 - 7 nerves in the hollow between the keels; rachilae clavate, flattened, striate, glabrous except on the ciliate tip and occasionally the faintly ciliate edges, articulate below the glumes, so that the spikelet readily breaks up; lodicules 3, 2.5mm long, 2 cuneate, oblong, obliquely truncate, thickened and fleshy below, especially on one side, hyaline and about 5-nerved above, the upper part long-white, fimbriate; the third not thickened, hyaline, acute long-fimbriate. Stamens long exserted, anthers 7.5mm, purple, glabrous, blunt at the tip or emarginate. Ovary obovate-oblong, white, hairy above, surmounted by a short hairy style divided into 3 long plumose, wavy stigmas. Caryopsis 8mm long, oblong, hirsute at the apex, furrowed. (Fig. 16 & 17; Photo. 21, 22, 23 & 24)


Distribution: (a) BANGLADESH, INDONESIA, INDIA, MYANMAR, PHILIPPINES, SINGAPORE, THAILAND; (b) Assam, Bihar, Meghalaya, Mizoram, Nagaland, Tripura, cultivated in Arunachal Pradesh, Karnataka, North Bengal and Uttar Pradesh; (c) Widely cultivated all over Assam. Although Rajkhowa (1964) mentioned that it forms extensive gregarious belts in low hills of Central Assam Zone yet the present investigator could not find it in wild state.

Note: It has been reported to flower gregariously over considerable area but partly overcut culms very often produce flowers. Flowering collections were made from Bengal in 1867-68, 1872, 1884, 1919 and 1930; from Assam in 1886, 1889, 1910
and 1930; from Myanmar in 1892, 1908, 1911 and 1914 and from Chittagong (Bangladesh) in 1876, 1886 and 1929-30 (Gamble 1896). It flowered gregariously at Dehra Dun in 1986 (Rawat 1987) and in 1976-77, 1978-79, 1982-83 and 1983-84 in Bangladesh (Banik 1987). The present author recorded its sporadic flowering in two different localities, one in Dhemaji and the other in Lakhimpur district in April 1997 (Barooah 1999). The earlier records (Blatter 1930) exhibit its gregarious flowering as the usual and therefore, the sporadic flowering recorded during the present study seems to be significant.

The species can be identified without flowers by its very long, straight culms of almost uniform diameter up to half of its length and then the diameter gradually decreases up to its full length. There is a ring of silky-white hairs up to 1.5 cm long just above each of the lower nodes. Upper internodes of the culms of above 5 years old turn yellowish. During shooting a part of a culm may sometimes break down and develop the remaining (lower) part like the normal ones. This kind of culms are considered devoid of durability and called as Nada bank.

Use: This species extensively used throughout northeast India for covering the houses, scaffolding, etc. (Bennet & Gaur 1990b; Tewari 1992). Tender shoots are commonly used for making excellent pickles (Roxburgh 1832). It is used for pulp and paper production (Bhargava 1964) and is suitable for manufacture of wrapping, writing and printing paper (Bhola 1976). In Tripura it is used for making toys, mats, screens, wall plates, wall hangers, hats, baskets, etc. (Chakraborty 1988) and in Arunachal Pradesh a flute, called locally as Eloo, is made for use during Dree festival (Pal 1984).

In Assam it is one of the most important and widely used bamboo for house building, fence and for making agricultural implements, bird traps, fishing traps, baskets, mats, cooking utensils, brooms, furniture, household contravencies, etc. Tender shoots are eaten in similar way like Bambusa balcooa.


_Tanсти бэнх, Телай бэнх_ (Ass.); _Бакал_ (Beng., Mani.).

Moderate-sized, evergreen, caespitose, loosely-clumped. **Culms** erect or sub-erect, 8 - 20m high, 5 - 15cm in diameter, bright green or striped green and yellow, matured yellowish, polished, shining, branching usually from midculm to top; nodes prominent, lower ones often with a narrow ring of brown roots; internodes up to 45cm long, walls 7 - 15mm thick. **Clum-sheaths** 15 - 25cm long, 20 - 35cm broad, often beautifully streaked when young with green and yellow, rounded at top and concavely truncate, striate, outer surface densely covered with thick appressed brown-black hairs, edges ciliate; auricles 2, subequal, falcate, conspicuous, continuous with the blade, ±1.5 cm high, with pale, wavy, 6 - 8mm long, stiff bristles; ligule 5 - 7.5mm broad, dentate, sometimes long-fimbriate; imperfect blades triangular, acute, 5 - 15cm long, up to 12cm broad at base, greenish-yellow, appressed hairy within, margins bristly, revolute, rounded at the base and decurrent on the sheath. **Leaves** narrowly or broadly lanceolate, 15 - 32cm long, 2 - 4cm broad, rounded or attenuate at the base, ending above in a long, twisted, scabrous point, pale green, glabrous on both surfaces, sparsely hairy beneath when young, scabrous on the margin and on the adjacent nerves, main vein narrow, pale, secondary veins 6 - 8, intermediate 8 - 9, frequent pellucid glands giving the appearance beneath of transverse veinlets; petiole-like base ± 5 mm long; leaf-sheaths striate, laxly hairy, ending in a smooth ciliate callus; auricles smooth, rounded, with a few deciduous bristles; ligule short, shortly ciliate. **Flowers** not seen.

**Chromosome number**: 2n = 72, hexaploid (Seethalakshmi & Kumar 1998).
Fig. 18. *Bambusa vulgaris* var. *vulgaris*
Leafy twig × 2
Bambusa vulgaris var. vulgaris

25. Culm-sheath
26. Culms in a clump
KEY TO VARIETIES/FORMA

Culms and culm-sheaths uniformly green .......... var. vulgaris.
Culms and culm-sheaths striped with yellow ..... var. vittata
Culms green and internodes pitcher shaped ........ f. waminii

var. vulgaris

(Fig. 18; Photo. 25 & 26).

Exsiccatea: Kamrup, State Zoo, Guwahati, August 11, 1997, C. Barooah 2560;

Distribution: (a) Although not certain about its origin yet cultivated in
BANGLADESH, CHINA, INDONESIA, INDIA, MALAYA, NEW GUINEA, SRI
LANKA; (b) Cultivated mainly in Northeast India and also many parts of the country;
(c) Cultivated throughout Assam.

Note: This variety of the species is much alike to Bambusa balcooa but different
in having its bright, shining, yellowish-green culms, thinner walls and culm-sheaths
with densely appressed brown-black hairs.

It flowered in 1851, 1863, 1879, 1890 and 1892 in Chittagong (Bangladesh), Sri
Lanka, Indian Botanic Garden (Calcutta) and Singapore Garden respectively (Blatter
1930). According to Banik (1987) it is reported to have flowered sporadically in
Bangladesh in 1980-81 and 1983-84. Flowering cycle is 80 - 88 years
(Seethalakshmi & Kumar 1998). The author could not find any flowering material
during the present investigation.

Use: This bamboo is used for paper, scaffolding, construction, poles, etc. in many
parts of India. In Manipur it is commonly used for fencing and the longevity of the
culm is comparable to that of the best timber (Singh 1986). Rings prepared from
the split culms are put into ear perforations by the Tunkul-Naga tribe of Manipur
(Mehra et al 1975). The culms are extensively used for construction purposes,
also used for scaffolding and manufacture of handicrafts of curios. It is cultivated
most commonly in Sri Lanka (Vivekanandan 1980, 1987), while in Malaysia it is
only occasionally for its edible young shoots (Nor & Wong 1987). Laboratory studies and pilot trials of pulp made from this species grown in Africa indicate its potential value especially for mixing with hardwood pulps on account of their tearing strength which equals or exceeds that of softwood pulps (Doat 1967).


*Halodhia banh* (Ass.); *Basini banh*, *Bansini banh* (Beng.); Golden bamboo, Yellow bamboo (Eng.).

Graceful, caespitose, loosely clumped, evergreen. **Culms** 8 - 15m high, 5 - 12cm in diameter, glabrous, yellow with light-green stripes, shining; nodes slightly swollen, lower ones rooting; internodes 10 - 35cm long, walls thick. **Culm-sheaths** 10 - 18 cm long, 15 - 25 cm broad at base, greenish yellow when young, rounded at top and concavely truncate, striate, outer surface densely covered with thick, appressed, black-brown hairs, edges ciliate; auricles 2, rounded, falcate, subequal, conspicuous, continuous with the blade, ±1.5 cm high, with pale-yellowish, wavy, 6 - 8 mm long, stiff bristles; ligule 5 - 8 mm broad, dentate; imperfect blades triangular, acute, 5 - 15 cm long, upto 10 cm broad at base, greenish yellow, appressed hairy within, margins revolute, base rounded and decurrent on the sheath. **Leaves** 15 - 32 cm long, 2 - 3.8 cm broad, linear-oblong or oblong-lanceolate, base obtuse and oblique, pale green, yellowish green along the veins, glabrous beneath, ending above in a long twisted scabrous point, margin scabrous, main vein narrow, secondary veins 5-7, intermediate 6-8; petiole-like base short, upto 5 mm long; leaf-sheaths smooth, glabrous, yellowish on maturity; auricles small, rounded; ligule short, truncate
Fig. 19. *Bambusa vulgaris* var. *vittata*
Leafy twig × 2
Bambusa vulgaris var. vittata

27. Culm-sheath
28. Culms in a clump
shortly ciliate. **Flowers** not seen. (Fig. 19; Photo. 27 & 28).


**Distribution:** (a) CHINA, INDIA, JAPAN, PHILIPPINES under cultivation; (b) Commonly cultivated all over India as an ornamental up to 1000 msl.; (c) Cultivated throughout Assam as an ornamental.

**Note:** J.D. Hooker in Curtis’s Botanical Magazine (vol. 30, 1874) has illustrated and described this plant as having 3- to 5- flowered spikelets and 2 stigmas. Gamble (1896) described it as having 6- to 10- flowered spikelets and 3 short, plumose stigmas, while Holttum (1958) described it as having 5- to 10-flowered spikelets and 3 short stigmas. It appears that in some of the earlier publications the descriptions of this variety and that of the typical *Bambusa vulgaris* have been mixed up.

On the basis of the height and colour of the culms, hairs of the culm-sheaths and appearance of the young shoots Lindley (1836), Munro (1968) and Hooker (l.c.) treated this variety as a species (*B. striata*) distinct from *B. vulgaris*. This is followed subsequently by many workers including Tewari (1992), Bennet & Gaur (1990b) and Seethalakshmi & Kumar 1998. Camus (1913), Blatter (1929), Holttum (1958) and many other authors treated this taxon as a variety *B. vulgaris* var. *striata* and included *B. vulgaris* var. *vittata* as its synonym following Gamble (1896), who for the first time used this varietal name. In varietal rank the name var. *vittata* Riviere (1878) has priority over the name var. *striata* and therefore the present author treated it as *B. vulgaris* var. *vittata*.

During the present investigation, it has been observed that plants grown in Assam have culms larger in size, shape and even length (more than 7m). Similarly the culm-sheaths and leaves are also larger in size and shape than in the descriptions provided by earlier workers.

**Use:** In India it is mainly used for ornamental planting. Culms are used as poles and for construction (Bennet & Gaur 1990b). In Indonesia it is one of the ten species of bamboos used for building construction (Widjaja & Risyad 1987). It can also be used for pulping (Semana *et al* 1967).

*Kolochi bank* (Ass.): Buddha's Belly bamboo, Pitcher bamboo (Eng.).

Medium sized, bushy, evergreen, loosely clumped, caespitose, graceful. **Culms** usually 4 - 8m high, bright green, glabrous, shining, upper 1/3rd length branching; internodes pitcher shaped, 5 - 15cm long, lower ones shorter, uniformly much swollen, upper ones longer, swollen at the basal part, gradually narrower upwards, matured pale yellowish, nodes constricted, lower a few rooting; branches, stout, strong, suberect, not much longer, branch-nodes constricted, branch-internodes swollen at the basal part. **Culm-sheaths** 10 - 20cm long, 15 - 30cm broad at base, rounded and truncate at top, beautifully streaked when young, outer surface very densely covered with thick, appressed, dark-brown hairs, margin ciliate; imperfect blades triangular, green when young, acute, 5 - 25cm long, upto 11cm broad at base, densely hairy within, glabrous or sparsely hairy beneath, lower edges ciliate; auricles 2, rounded, ciliate, subequal; ligule 3 - 5mm high, dentate or sometimes entire. **Leaves** linear-lanceolate, 10 - 30cm long, 1.4 - 3.5cm broad, rounded or attenuate at the base, ending above in a long, twisted, scabrous point, glabrous on both surfaces, scabrous on the margins, main vein narrow, pale, secondary veins 6 - 8, intermediate 8 - 9; petiole-like base short, upto 5mm long; leaf-sheaths laxly hairy, ending in a smooth callus; auricles falcate with a few deciduous, short bristles; ligule elongated, obtuse, hairy. **Flowers** not seen. (Fig. 20; Photo. 29 & 30).


**Distribution** : (a) Cultivated Worldwide; (b) Cultivated all over India; (c) Cultivated throughout Assam as ornamental.
Fig. 20. *Bambusa vulgaris* f. *waminii*
Leafy twig x 2
Bambusa vulgaris f. waminii

29. Culm-sheath
30. Culms in a clump
Note: Following Camus (1913) many workers have treated this taxon as a separate species from Bambusa vulgaris. Brandis (1906) described it under the Burmese name Wamin and Camus (l.c.) described it under the genus Bambusa with a question mark. Although the publication of Camus (l.c.) fulfils the requirement for valid publication of the name Bambusa wamin yet McClure (1966) considered this name as invalid. The present author followed the view of T.H. Wen (1985) in treating this taxon as a cultivated variety of B. vulgaris.

So far flowering is not known for this taxon. In the present investigation also no flowering material could be collected. However, in the absence of flower this bamboo can be easily identified by its bright green, glabrous and very short culms with pitcher-shaped internodes and culm-sheaths having densely appressed, dark-brown hairs.

Use: Grown only as ornamental plant.

**Bambusa sp. 1.**

*Saru Bijuli* (Ass.).

Evergreen or deciduous, tufted or loosely clumped shrub. **Culms** erect, 5 - 12m high, 1.5 - 3cm in diameter, not very straight, white powdery when young, glabrous, green on maturity, new culms branch from the lower nodes upwards, often few lower nodes without branches, branches not very long; nodes prominently thickened; internodes 15 - 40 cm long, walls 3 - 4mm thick. **Culm-sheaths** 8 - 16cm long, 5 - 12cm broad at base, glossy green when young, outer surface glabrous or white powdery, often shining, attenuate, rounded at the top; imperfect blades 6 - 15cm long, 5 - 8cm broad, ovate, acuminate, bases rounded, glabrous on the outer surface, appressed pale hairy within, margins smooth; ligule upto 1 mm high, narrow, entire; auricles 2, rounded, ±1cm high, unequal with wavy, ±8 mm long bristles, one upwardly conspicuous, narrow, the other downwardly broad, decurrent on the sheath. **Leaves** 10 - 31cm X 2.5 - 4cm, oblong-lanceolate, unequally rounded at the base, scabrid on the margin, ending above in a twisted, subulate, scabrous point, glabrous above, whitish or glaucous beneath, main vein conspicuous, scabrous, secondary veins 8 - 10, intermediate 6 - 7, pellucid glands between,
Fig. 21. *Bambusa* sp. 1
Leafy twig × 2
Bambusa sp. 1.
31. Culm-sheath
32. Culms in a clump
which give the appearance of transverse veinlets when dry; leaf-sheaths sparsely pubescent when young, glabrous, striate, polished on maturity; auricles 2, long, rounded with long upto 1.5cm, pale white bristles; ligule short, minutely dentate. **Flowers** not seen. (Fig. 21; Photo. 31 & 32).


**Distribution**: Commonly cultivated in lower Assam.

**Note**: During the consultation of herbarium specimens of the Herbarium of Forest Research Institute, Dehra Dun, two specimens (without flower) collected by Pani Ram Das from Assam have been found to be identical with the specimens collected by the present author. Of the two specimens, the one bearing Acc. No. 22663 was collected in Oct. 1889 from Kamrup, Assam and has been placed under the name *Bambusa pallida* and the other specimen bearing the Acc. No. 22667 was collected in June 1890 from Kamrup, Assam has been placed under the name *B. tulda*. It is observed that the specimens collected by the present author differ from *B. pallida* and *B. tulda* in having the culms of 5-12 m long, 1.5-3 cm in diameter and smaller, glabrous culm-sheaths. The habit of this bamboo is also different from *B. tulda* and *B. pallida*. On the basis of the facts mentioned above it is considered appropriate to keep the option open for confirmation of its identity and described the specimens collected by the present author under *Bambusa* as *Bambusa* sp.1.

**Use**: Culms are used as handles of shieling brush, for erecting fence and for handicrafts.

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*Bambusa* sp. 2.

*Garuchokuwa banh* (Ass.).

Evergreen or deciduous, loosely clumped, caespitose, moderate sized. **Culms** 10 - 15m high, 5 -10cm in diameter, glabrous, green when young, greyish on maturity, mostly lower 2nd to 4th internode abruptly banded horizontally and roundedly
Fig. 22. *Bambusa* sp. 2
Leafy twig × 2
Bambusa sp. 2.

33. Culm-sheath
34. Culms in a clump
growing erect forming two almost rightangular bends, unbranched below, not much branching above; nodes thickened, lower few with long, many rootlets, sometimes two nodes develop together without having internodes in between near the ground, dormant branch-buds conspicuous, often swollen; internodes 15 - 45cm long, lower a few very short and streaked with pale yellow, 1 - 1.5cm high, white ring below, walls thin; branches short. **Culm-sheaths** 10 - 12cm long, 15 - 25cm broad at base, deciduous, inner surface smooth, glabrous, shining, outer surface covered with appressed black hairs, attenuate upwards, obliquely rounded or truncate at top, margins ciliate; imperfect blades broadly triangular, reniform or cordate, cuspidate, erect, hairy within; ligule narrow, entire, ±2 mm high; auricles 2, unequal, rounded, fringed, larger one wavy, decurrent on the sheath. **Leaves** 10 - 25cm x 3 - 2.5cm, lanceolate or linear-lanceolate, glaucесent and puberulous beneath, base obliquely rounded, apex acuminate; petiole-like base 5mm long; leaf-sheath striate, sparsely puberulous when young, glabrous on maturity; auricles rounded, fringed with long, deciduous, hairs. **Flowers** not seen. (Fig. 22; Photo. 33 & 34).


**Distribution** : Sporadically cultivated all over Assam, nowhere found in wild state. Cultivated in Assam Bio-Resource Centre at Madan Kamdev Archaeological site near Baihata Chariali in Kamrup district.

**Note** : The culm-sheaths are almost similar to that of *Bambusa tulda* but somewhat shorter. Culms of this bamboo are rather different in having a few lower internodes which are comparatively shorter, pale yellow striped and abruptly banded horizontally and then growing erect forming two almost rightangular bends. The specimens of this plant could not be matched either with the existing herbarium specimens in the Herbarium of Forest Research Institute, Dehra Dun (DD), Kanjilal Herbarium, Shillong (ASSAM) and Central National Herbarium, Calcutta (CAL) or with descriptions of species in earlier works.

Although flowering materials could not be collected, this plant has been included
under the genus *Bambusa* on the basis of the culm-sheath's characters as *Bambusa* sp. 2, for pending confirmation of its identity.

**Use:** This bamboo is seldom used because of its undurable culms. Therefore, it is less known even among the common people.

**Bambusa** sp. 3.

*Bijuli banh* (Ass.).

Tall, overgreen or deciduous, caespitose, thickly growing. **Culms** 15 - 20m high, 8 - 10cm in diameter, young shoots and young culms white powdery, dull green or green on maturity, branching from the base upwards, much branching above; nodes slightly swollen, lower few rooting; internodes upto 50cm long, walls 8 - 15mm thick. **Culm-sheaths** 12 - 22cm long, 15 - 25cm broad at base, deciduous, attenuate, truncate at top, glabrous shining, powdery on both surfaces, edges smooth; imperfect blades broadly triangular, cordate, cuspidate, erect, base rounded, hairy within; ligule continuous with the sheath top, 2mm high, entire; auricles 2, rounded, unequal, smaller one upward, fringed with bristles. **Leaves** 15 - 30cm x 2 - 3.5cm, linear-lanceolate, base rounded or obliquely rounded, ending above in a scabrous, twisted, acuminate point, glabrous, green above, glaucescent beneath, main vein narrow scabrid; petiole-like base 4mm long; leaf-sheaths sparsely puberulous, powdery when young, glabrous on maturity; auricles rounded with deciduous, long bristles; ligule very small, minutely dentate. **Flowers** not seen. (Fig. 23; Photo. 35 & 36).

**Exsiccatia:** Lakhimpur, Boropathar No.1, August 18, 1996, C. Barooah 2508.

**Distribution:** Common in Lakhimpur district of Assam; sporadically cultivated in many parts of Upper Assam.

**Note:** This plant is similar to *Bambusa tulda* and *B. pallida* but differs in its densely tufted clumps in having 15-30 cm exposed rhizomes which produce slender culms, much spreading above covering an area of about 8-12 m radius. Young culms and culm-sheaths are white powdery like *B. pallida* but culm-sheaths of older culms are larger and glabrous. Matured culms rooting upto few nodes unlike *B. pallida.*
Bambusa sp. 3.

35. Culm-sheath
36. Culms in a clump
Use: Used for house building, basket making and for erecting fence.

*Bambusa* sp. 4.

*Bon bijuli* (Ass.).

Small, shrubby, caespitose, loosely tufted. **Culms** 5 - 8m high, 2 - 3.5cm in diameter, green, glabrous, yellowish-green on maturity, branching above; nodes slightly thickened; internodes 15 - 30cm long, walls thin. **Culm-sheaths** 8 - 5cm long, 5 - 10cm broad at base, deciduous, outer surface glabrous, slightly attenuate upwards, rounded at top; imperfect blades 10 - 18cm long, 3.5 - 5cm broad at base, erect, wavy along, oblong-acuminate from the base, base abruptly rounded, glabrous on the outer surface, hairy within, margins smooth, sometimes ciliate; ligule 1mm high, entire; auricles 2, small, upto 1cm high, rounded, fringed. **Leaves** 10 - 26cm x 1.5 - 2.5cm, green, glabrous above, greyish or glaucescent beneath, one edge scabrous, base equally rounded, ending above in a twisted, scabrous point, main vein conspicuous, scabrous; ligule very small, minutely dentate; auricles rounded, fringed, 1.5cm long pale bristles. **Flowers** not seen. (Fig. 24; Photo. 37 & 38).

**Exsiccata**: Lakhimpur, Ranga R. F., August 18, 1996, C. Barooah 2512.

**Distribution**: Found wild in Ranga R. F. of Lakhimpur district.

**Note**: This plant, growing in natural habitat, is rather different because of its shrubby habit with small, slender culms and especially the culm-sheaths which are glabrous with sparsely hairy and long, wavy imperfect blades. During consultation of herbarium specimens of bamboos housed in F. R. I. Herbarium (Dehra Dun), Central National Herbarium (Calcutta) and Kanjilal Herbarium (Shillong), this plant could not be matched with. Though the flowers could not be collected it has been placed under the genus *Bambusa* as *Bambusa* sp. 4 after critical study of the morphological characters and kept open for confirmation of its identity.

This bamboo is occurring in Ranga Reserved Forest of Lakhimpur district which have been introduced in the Bambusetum of Assam Bio-Resource Centre at Madan Kamdev near Baihata Chariali of Kamrup district.
Fig. 24. *Bambusa* sp. 4
Leafy twig x 2
Bambusa sp. 4.

37. Culm-sheath

38. Culms in a clump
**Dendrocalamus** Nees


**Type**: *Dendrocalamus strictus* (Roxb.) Nees

Arborescent, evergreen or deciduous, sometimes of very large size, often unarmed. **Culms** usually erect from a densely ramified rootstock. **Culm-sheaths** deciduous, often very large, variably auricled, usually elongated; imperfect blade narrowly triangular. **Leaves** shortly petiolate, variable in size, sometimes very broad, with no transverse veinlets, but frequently with pellucid glands instead. **Inflorescence** a large compound panicle. **Spikelets** usually in rounded congested heads in long spikes, ovate or obtuse, flowers few, rarely more than six, usually hermaphrodite; **empty glumes** 2-3, many-nerved, ovate, acute or mucronate; **flowering glumes** similar to empty glumes; **palea** ovate, acute or truncate or emarginate or cleft, those of flower flowers 2-keeled, ciliate, those of uppermost flower usually rounded on the back and not ciliate; **lodicules** none or very scarce. **Stamens** 6, filaments free; anthers mucronate or with tufted hairs. **Ovary** ovoid or sub-globular, often depressed, hairy above; style long, usually hairy, base persistent; stigma usually simple. **Caryopsis** small, the seed surrounded by a crustaceous or hardened pericarp, the position of the embryo not usually visible on the surface.

**Distribution**: 24 species, Asia and Africa (Bahadur 1979); 30 species, all from southeast Asia, mainland and islands (Farrelly 1984); 25 species, southern and eastern Asia inclusive of New Guinea and the Pacific Islands (Ohrnberger & Goerrings 1985); 35 species in India, Sri Lanka to China and Philippines (Clayton & Renvoise 1986); 20 species, northeastern India, Myanmar, Thailand, Malay Peninsula, Indo-China (Biswas 1988).

8 species and 2 varieties in India and 7 species in northeastern India (Bahadur 1979); 11 species and 4 varieties in India and 6 species in northeastern India
According to a report only 5 species of *Dendrocalamus* are occurring in Assam (Anonymous 1991), while according to Varmah & Bahadur (1980) and Biswas (1988) 6 species are occurring in Assam.

In the present investigation 6 species have been recorded to occur in Assam.

**KEY TO SPECIES**

1a Culms giant, with white cursts; culm-sheaths glabrous  .............  *D. giganteus*

1b Culms not giant, without white cursts; culm-sheaths hairy on outside:

   2a Culms sub-arborescent, not straight, with strong branches, solid or with small cavity; culm-sheaths covered sparsely with golden brown hairs on outside; imperfect blades persistent, continuous on the sheath  .............  *D. strictus*

   2b Culms arborescent, straight, cavity large, culm-sheaths covered with brown-black or black hairs on outside; imperfect blades not continuous on the sheath:

      3a Ligule of the culm-sheaths entire; culm-sheaths with scanty patches of black, stiff, deciduous, appressed hairs on outside  .............  *D. hamiltonii*

      3b Ligule of the culm-sheaths serrate, fimbriate or fringed:

         4a Upper margin of the culm-sheaths membranous, fimbriate; ligule fringed; nodes marked by a projecting, softly hairy ring  .............  *D. patellaris*

         4b Upper margin of the culm-sheaths not membranous:
5a Culm-sheaths very long, upto 60cm, often as long as internodes, papery, densely clothed with patches of dark brown hairs on outside; imperfect blades recurved; ligule much serrate or long fimbriate

\[ D. \text{longispatus} \]

5b Culms-sheaths upto 50cm long, shorter than internodes, densely covered with black or brown hairs on outside; ligule sharply serrate

\[ D. \text{hookeri} \]


**Kako banh, Wara (Ass.); Maroobob (Mani.); Giant bamboo (Eng.).**

Giant, evergreen, sometimes deciduous, caespitose, thickly growing with slender branches. **Culms** very large, 20-30m tall, 15-30 cm in diameter, greyish-green, covered with white waxy crust when young, usually naked below, branched above; nodes hairy below, marked with root scars; internodes 30-40cm long, cavity very large, walls 1-1.5 cm thick. **Culm-sheaths** large, 30-50 cm long, 30-45 cm broad, early deciduous, hard, glabrous, shining within, dull yellow, without or thinly covered with golden stiff hairs, rounded at the top, often much depressed; imperfect blades 13-38 cm long and upto 9 cm broad at base, usually recurved, the edges waved and often involute, base decurrent into glabrous, stiff, brown, wavy auricles which do not reach the edge of the sheath, narrowed upwards into a sharp point; ligule stiff, dark, 8-13 mm high, serrate on the edge. **Leaves** variable in size, in young culms upto 50 cm long and 10 cm broad, unequal-sided, slightly smaller on maturity, oblong, glabrous above, hairy beneath when young, edges scabrous,
Fig. 25. *Dendrocalamus giganteus*
Leafy twig × 2
**Dendrocalamus giganteus**

39. Culm-sheath
40. Culms in a clump
base obliquely rounded, suddenly acuminate, point twisted, sharp; main vein prominent, secondary veins 12-16 pairs, furnished with pellucid dots; petiole-like base thick, 5 mm long; leaf-sheaths striate, glabrous, ending in a callus which is sometimes shining and conspicuous, mouth produced upwards to meet the ligule; ligule broad, 2-3 mm high, fimbriate or serrulate, sometimes cleft in the middle; auricles small, glabrous. Inflorescence a huge panicle with long, slender, curved branchlets, bearing lax heads of few spikelets, sometimes the whole clump only flower-bearing, sometimes with leafy branchlets; heads upto 2.5 cm in diameter, rachis-joints 1.2-2.5 cm or more, slender, hairy below, white-scurfy above, often curved, furrowed on one side. Spikelets 1.2-1.5 cm long, 5-8 mm broad, minutely pubescent, somewhat flattened, ovate, acute, spiny, many-flowered; empty-glumes 1-2, ovate, mucronate, striate; flowers 3-6, all fertile except the last, which consists of an involute, elongate, mucronate glume; flowering glumes thin, papery, striate, many-nerved, mucronate, minutely hairy; palea of lower flowers blunt, of upper ones acute, bifid at the apex, those of lower flowers 2-keeled, ciliate on the keels, 2- to 3 -veined between them, that of the last fertile flower not usually keeled, glabrous. Stamens with long filaments, anthers 7.5-10 mm long, acuminate at the tip. Ovary ovoid, hairy, style long, hairy ending in a feathery purple stigma. Caryopsis oblong, 7-8 mm long, obtuse, hairy above. (Fig. 25, 26; Photo. 39, 40 & 41).

Chromosome number: 2n = 72 (Zhang Guang - Zhu 1987); 2n = 72, hexaploid (Sobita Devi & Sharma 1993).


Distribution: (a) Native of MALAYA and MAYANMAR, cultivated in INDIA; (b) Frequently cultivated in N. E. States; (c) Commonly cultivated in upper Assam, occasionally in lower Assam.

Note: Gamble (1896) reported its flowering in Indian Botanical Garden, Calcutta in 1861 and 1888. In FRI Campus, Dehra Dun, it flowered in 1979 (Bahadur
*Dendrocalamus giganteus*
41. Flowering twig

*Dendrocalamus hamiltonii*
42. Flowering twig
1979). In Kurseong Division (West Bengal) it was introduced during 1880-1888 and in 1974 all the culms flowered (Lahiri 1974). According to Gupta (1982) one clump of this species was observed in flower in 1981 along Tuli-Wokha road in Nagaland. Flowering cycle is 40 years (Seethalakshmi & Kumar 1998). During field work the present author observed one clump in flowering at Ketetong village near Margherita of Tinsukia district in February, 1997 and another one at Mathurapur 101 Grant near Sola R.F. of Sivasagar district in March, 1997 (Barooah 1999). So far gregarious flowering of this species has not been reported.

This species can be easily identified without flowers for its giant culms with white waxy crust and large culm-sheaths.

Use: In northeastern India the culms are widely used for house building, mast of boats, flowers vases, various decorative items and as containers. In Siang district of Arunachal Pradesh Abors and Mishmi tribes use this bamboo mainly as water containers (Rao & Joseph 1965). In Manipur several palatable vegetable products are prepared from the tender shoots (Singh 1986; Borthakur 1996). It is a better raw material for paper making than D. strictus (Guha et al 1975). In Sri Lanka it is widely used for scaffolding, manufacture of curios and handicrafts (Vivekanandan 1980). During the present investigation it is observed that culms are used for house building, fence, as containers, etc. Tender shoots, although occasionally in some areas in upper Assam, are also eaten like Bambusa balcooa.


*Kekowa bankh, Paharia Kako* (Ass.); *Kaipho* (Kar.); *Tamo* (Nep.).

Large, evergreen or deciduous, caespitose, densely clumped, sometimes growing tall and erect, but more often sending out its stems at an angle or curved downwards.
Fig. 27. Leafy twig x 2

Dendrocalamus hamiltonii
Fig. 28. *Dendrocalamus hamiltonii*
Flowering twig x 2
Dendrocalamus hamiltonii

43. Culm-sheath
44. Culms in a clump
Culms large, 12-20m and even upto 25m tall, usually naked below, more often armed or branching from the lower nodes, much branched above, 10-15 cm in diameter, greyish when young with dense appressed pubescence, dull-green on maturity; nodes prominently thickened, lower some nodes with 1-3 cm long downwardly curved rootlets; internodes 30-50 cm long, of the lower ones walls 1.5cm thick and of the upper ones 0.5-0.8 cm thick. Culm-sheaths long and stiff, variable in size, those of lower part of larger culms 35-45cm long, upto 20cm broad at base, glabrous, shining within, rough and glabrous or with scanty patches of brown-black, stiff, deciduous, appressed hairs on the outer surface, truncate at the top and furnished on either side with a small glabrous, triangular point; imperfect blades upto 30cm long, 5-10cm broad, ovate-lanceolate, sometimes oblong-lanceolate, sides incurved, glabrous on the outer surface, closely covered with black, sharp hairs at the base of the inner surface; ligule 5mm high, smooth, entire. Leaves variable, those of older culms small, those of new culms 36cm long and 8cm broad, sides unequal, rounded at the base, broadly lanceolate above, cuspidate, ending in an acuminate scabrous, twisted point, dorsal surface smooth, ventral surface rough, finely serrate in the margins, main vein narrow, raised, secondary veins 6-17 pairs, fairly prominent, intermediates 5-7, having pellucid dots between which form cross bars resembling transverse veinlets when dry; petiole-like base thick 4-5mm long; leaf-sheaths sparsely puberulous when young, glabrous above on maturity, furnished below with white appressed stiff hairs on outer surface, glabrous, shining inside, somewhat keeled below the shining callus; ligule broad, usually elongate, obliquely truncate or jaggad. Inflorescence a large, much-branched panicle with many whorls of branchlets, bearing half-verticillate, semiglobular heads of purple flowers, supported by rounded scarios bracts; rachis-joints 2.5 cm long or less, thick, fistular, scabrous and white-pruinose, especially below the swollen nodes, furrowed on one side; heads variable, 1.7-4cm in diameter. Spikelets purple, ovoid, depressed, ±10mm long, glabrous; empty glumes usually 2, short, rounded, nerved; flowers 2-4, usually all fertile; flowering glumes broad, orbicular, some-what recurved, ciliate on the edges; palea of lower flowers oblong as flowering glumes, 2-keeled, ciliate on the keels and bifid at the acute apex, 2-nerved on the back, that of last flower not keeled, hairy at the acute apex, 2-nerved on the back, that of last flower not keeled, hairy at the acute apex.
apex only, many-nerved. **Stamens** long, exserted, pendulous; anthers purple, the connective produced into a long, black, hairy, twisted point. **Ovary** sub-orbicular, hairy; style long, hairy; stigma trifid, plumose, **Caryopsis** broadly ovoid, rounded at the base, beaked with the undulated style, hairy or glabrous above, glabrous below; embryo visible. (Fig.27 & 28 ; Photo.42, 43 & 44).

**Cromosome number**: $2n = 72$ (Zhang Guang-Zhu 1987); $2n = 70$, aneuploid (Sobita Devi & Sharma 1993).


Mikir Hills, Assam, April 25, 1890, Gopal Benerjee 22654; Jagiroad, Assam, August 3, 1944, N. L. Bor 18376 (DD).

**Distribution**: (a) BHUTAN, INDIA, MYANMAR, NEPAL, THAILAND; (b) West, Central and Eastern India in the lower hills from Simla eastwards extending to Upper Myanmar upto 900msl; (c) Wild in the lower hills of Assam, often forming extensive patches and also occasionally cultivated in the plains.

**Note**: During flowering of this species it is very easy to identify by its large, very thin-walled, much-branched panicle with many whorls of branchlets bearing half-verticillate, globular or semiglobular heads (upto 4.5 cm in diameter) of purple flowers. However, it can be identified in absence of flower by its tufted larger culms in having swollen nodes which bear a ring of silky-white hairs and especially the culm-sheaths which bear a small patch of black appressed hairs on either sides of the outer surface with persistent, long-acute, rounded based imperfect blades.

This species usually flowers sporadically every year, sometimes gregariously and the flowering cycle is reported to be 30 - 40 years (Tewari 1992; Seethalakshmi & Kumar 1998). Gamble (1896) mentioned its gregarious flowering from Sikkim and Dehra Dun during 1894. It flowered again gregariously at Dehra Dun in 1992. In northeastern India records of gregarious flowering are very limited. The species
flowered gregariously in Assam in 1905, 1912 (Cachar district), 1956 and during 1981-82 and in Khasi Hills during 1967-69 over about 15 km. stratch along the Nongpoh-Guwahati road (Gupta 1972; Seethalakshmi & Kumar 1998). In the present investigation gregarious flowering of this species have been observed in Dhemaji, Lakhimpur, Sonitpur and adjoining districts of Arunachal Pradesh during May-September 1996; in Tinsukia, Dibrugarh, Jorhat, Nagaon and Marigaon districts in Feburary 1997; in Dhubri in March 1998 and in Kamrup in March-May 1999 (Barooah 1999).

Use: This bamboo is one of the most commonly used species in Assam as it occurs gregariously in many parts of Assam. It is used in house building, construction, making of baskets, mats, as containers for water, milk and other edible items. Tender shoots are eaten like B. balcooa. The Karbi people prepare a kind of fermented palatable etable called 'Han-up-apau' and a drink called 'Han-up-alang' (Jain & Borthakur 1980). The Tribals of Arunachal Pradesh use tender shoots for preparation of Hiyup, a sour pickle (Seethalakshmi & Kumar 1998). The leaves are used as fodder for cattle.


**Seiat, Sejsai, Sijong, Ukotang, Ussey** (Ass.); **Ooei** (Mani.); **Tili bans** (Nep.).

Large, evergreen, caespitose, thickly clumped. **Culms** large, 15-20m high, 10-15cm in diameter, usually naked below, dark-green, internodes 40-50cm long, lower ones somewhat rough hairy, walls 1.5-2.5cm thick; nodes slightly thickened, much-branched above, branches long, curving. **Culm-sheaths** large, 20-30cm long,
Fig. 29. *Dendrocalamus hookeri*
Leafy twig × 2
upto 40cm broad at base, narrower in younger culms or on the upper nodes, densely covered with black or brown hairs on outside, glabrous inside, narrower above to 5-8cm where the imperfect blade is inserted and furnished with small, rounded, auricles on either sides covered with long stiff ciliae, edges ciliate; ligule 5-8mm high, glabrous, sharply serrate; imperfect blades 8-18cm long, rounded at base, triangular-cuspidate above or elongate-cuspidate, hairy above, glabrous below. **Leaves** large, 20-30cm × 4-8cm, oblong-lanceolate, base rounded, oblique, tip long, twisted, hispid, acuminate, smooth above, rough below, with scattered hairs near the base, edges scabrous, main vein very prominent, yellow, shining, secondary veins 8-16 pairs, conspicuous, intermediate usually 7-8, with pellucid dots between, bars-like transverse veinlets apparent when dry; petiole-like base 5-6mm long, thick; leaf-sheaths striate, hairy below, glabrous and brown, shining above, truncate or somewhat produced at the mouth, which is sometimes furnished with a few stiff, long bristles, callus large; ligule conspicuous, truncate or produced, glabrous. **Flowers** not seen. (Fig. 29).

**Chromosome number**: 2n = 36 (Seethalakshmi & Kumar 1998).


**Distribution**: (a) INDIA, MYANMAR, NEPAL; (b) Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim (Biswas 1988), West Bengal (north), Manipur (Singh 1986), cultivated in Shillong (Gupta 1968), introduced in Nainital before 1881 (Gamble 1896), planted in Garhwal, cultivated in Indian Botanic Garden, Calcutta; (c) Subansiri R.F. (Dhemaji), Dullong R.F. (Lakhimpur), Kakojan (Jorhat).

**Note**: Among all other species belonging to the genus *Dendrocalamus*, this species has some distinctive characters by which it can be identified without its flowering parts. In the field, the culm characters, e.g. large and tufted and culm-sheath characters, e.g. densely hairy with black or brown hairs on the outer surface, narrower above to 5-8 cm where triangular-cuspidate or elongate-cuspidate imperfect blade is inserted, have been found by the present investigator as useful for identification of the species in the absence of flowers.
It flowered in Khasi Hills in 1850 and in Nainital in 1881 (Gamble 1896); in Shillong in 1967 (Gupta 1968); in East Kashi Hills in 1982 (Seethalakshmi & Kumar 1998); in Lushai Hills during 1924-28 (Parry 1931). In the present investigation no flowering material has been found.

Use: Culms of this species are used for construction, basket and water-buckets (Gamble 1896) and also used for house building and for paper pulp (Lin 1972).


*Khang* (Beng.); *Unal* (Mani.).

Large, handsome, caespitose. **Culms** 10-18m high, 6-10cm in diameter, branched and leafy above, unbranched and naked below, glaucous-green when young, greyish-green when old, covered with more or less persistent sheaths; nodes little swollen, lower ones often rooting; internodes 25-60cm long, covered by papery remnants of sheaths and dark-brown pubescence, walls upto 1.5cm thick. **Culm-sheaths** 35-50cm long, 10-20cm broad, sometimes longer than the internodes, fragile, papery, sides parallel till near the top where they are gradually approximate and embrace a depressed sinus on which the recurved imperfect blade is inserted, inner surface glabrous, outer surface clothed densely with patches of stiff dark-brown hairs; auricles usually absent, sometimes very small, rounded naked on one side; ligule broad, much serrate or often long-fimbriate; imperfect blades 25-45cm long, 2.5-4cm broad at the broadest point a little above the insertion, lanceolate-acuminate, recurved, densely hairy on the back and near the base.
Fig. 30. *Dendrocalamus longispathus*
Leafy twig × 2
beneath. Leaves 10-32cm x 2.5-4cm, oblong-lanceolate to linear-lanceolate, acuminate, narrowed at the base, glabrous above, rough and glauescent or sometimes almost white beneath, edge scabrous, main vein thick, prominent, yellow, shining beneath, secondary veins 8-10 pairs, not prominent, intermediate 6-7; petiole-like base very short; leaf-sheaths ligulate, smooth, glabrous, margins ciliate, sometimes covered with brown pubescence; auricle absent or a rounded, naked on one side; ligule narrow, usually fringed. Flowers not seen. (Fig. 30).

**Chromosome number**: 2n = 72 (Zhang Guang - Zhu 1987); 2n = 48, aneuploid (Sobita Devi & Sharma 1993).


**Distribution**: (a) BANGLADESH, INDIA, MYANMAR, THAILAND; (b) Assam, Meghalaya, Mizoram, Tripura, West Bengal, introduced in Orissa and Weastern Peninsula; (c) Cachar, Dholai block, Hovaithung, Kamrup.

**Note**: In the present investigation no flowering material could be collected. However, the species can be identified on the basis of its culms which are unbranched and naked below in having upto 60cm long internodes and the culm-sheaths which are often as long as the internodes, more or less persistent, fragile, papery, densely clothed with patches of dark-brown hairs and with recurved imperfect blades.

This species flowered gregariously in 1876 and during 1977-79, and sporadically in 1876, 1880, 1885 and 1930 in Bangladesh (Blatter 1930; Anonymous 1930, Banik 1987a). Blatter (1930) reported that in Myanmar it flowered gregariously in 1887, 1912, and 1913 and sporadically in 1862, 1871, 1875 and 1891. Blatter (1931a) pointed out that this species comes under the class of irregular flowering- gregarious and often sporadically.

**Use**: Culms are not highly esteemed as building material, but used when better kinds are not available (Watt 1908). Used for house building, furniture and paper pulp (McClure 1953). In Tripura used for making of baskets and food-grain containers (Chakraborty 1988). It is one of the quick growing species (Kulkarni & Seth 1968) and suitable for ornamental planting. Tender shoots are occasionally eaten.

**Futung** (Kar.).

Evergreen, caespitose. **Culms** 7-10m high, 2.5-4cm in diameter, rather soft, dull green, striate; branching above; nodes marked by a projecting, softly hairy ring, often 7.5mm deep and 5mm thick; internodes 30-45cm long, whitish below the nodes, walls thin, fistular. **Culm - sheaths** long, persistent, 25-30cm long, upto 8cm broad at base, prominently striate, sparsely covered with appressed brown stiff hairs outside, glabrous within, attenuate in the upper third only to a truncate top, 18-25mm broad at top, upper margin furnished with 2.5-5cm long, 7-10mm broad, membranous, fimbriate, pale fringe; ligule conspicuous, fringed; imperfect blades 15cm long, upto 3cm broad, lanceolate, usually recurved, glabrous outside, hairy within; **Leaves** soft, variable, 20-40cm long, 2.5-10cm broad, obliquely rounded at the base, ending above in a twisted, scabrous point; smooth above, slightly rough below, minutely scabrous on the edges, main vein thick, prominent, secondary veins 8-10 pairs, intermediate 7; petiole-like base 5mm long; ligule very long and broad, deeply long-fimbriately fringed; leaf-sheaths striate, keeled at back, truncate or produced at top into a narrow callus, fringed or ciliate on the edges. **Flowers** not seen. (Fig.31).


**Distribution**: (a) INDIA; (b) Arunachal Pradesh, Assam, Nagaland, Sikkim, Uttar Pradesh (Kumaon), W. Bengal (North) between 1200-1500msl.; (c) Cachar, Karbi-Anglong and N.C. Hills districts.

**Note**: The flowering of this species was reported only once by Sri Gopal Benerjee in 1890 from Rangma Parbat of Naga Hills (Blatter 1930). During the field work by the present investigator no flowering material has been found.
Fig. 31. *Dendrocalamus patellaris*
Leafy twig × 2
In absence of the flower identity of this bamboo has been established by its medium sized, soft culms in having nodes marked by a projecting, softly hairy ring and the persistent, prominently striate culm-sheaths of which the upper margin furnished with membranous, fimbriate, pale fringe.

Use: In Sikkim it is used for making huts, flutes, straw, knife edge and arrow head (Holstrom 1993). The local people use this bamboo for making containers, mats and other household items.


*Sal banh* (Ass.); *Karail* (Beng.); Male bamboo (Eng.).

Deciduous, caespitose, densely-clumped, sub-arborescent. **Clums** variable in size, 8-16m high, 2.5-8cm in diameter, strong, solid or with a small cavity, glaucous-green when young, dull-green or yellowish on maturity, spreading above; branches drooping; nodes swollen and in open situation bearing leafy, often deflexed, branches even from the base, basal nodes often rooting; internodes short, 30-45cm long, walls thick; **Culm-sheaths** variable, lower ones shorter, 10-30cm long, 5-10cm broad, covered on the outer surface with golden-brown stiff hairs, sometimes glabrous in dry localities, striate, rounded at the top, ciliate at the edges; auricles 2, small; ligule 2-3mm high toothed; imperfect blades triangular, subulate, hairy on both surfaces, especially appressed hairy within. **Leaves** linear-lanceolate, upto 25cm long, 3cm broad in moist humid area, rather small in dry localities, rounded suddenly at the base, gradually narrowed upwards into a sharply acuminate, twisted point, rough and hairy above, softly hairy beneath, scabrous.
Fig. 32. *Dendrocalamus strictus*
Leafy twig x 2
Dendrocalamus strictus

45. Culm-sheath
46. Culms in a clump
on the edges, main vein prominent secondary veins 3-6 pairs, intermediate 6-8, no transverse veins, pellucid dots frequent between the veinlets; petiole-like base 4mm long; leaf-sheaths striate, hairy, ending in a prominent callus and short auricle with a few wavy, deciduous ciliae; ligule narrow, serrate. **Flowers** not seen. (Fig. 32; Photo. 45 & 46).

**Chromosome number:** \(2n = 70, 72\) (Zhang Guang - Zhu 1987); \(2n = 70, 72\) and 56, hexapolid (Sobita Devi & Sharma 1993).


**Distribution:** (a) CHINA, INDIA, INDONESIA, JAVA, MALAYA, MYANMAR, NEPAL, SINGAPORE, THAILAND; (b) Widely distributed in semidry and dry zone along plains and hilly tracts of the Eastern and Western Ghats and of Central and South India up to 1000 msl and commonly cultivated throughout India in the plains and foot hills; (c) Occasionally cultivated in Assam.

**Note:** In absence of the flowering material this species can be identified by the vegetative characters too. Tufted sub-arborescent, strong, solid or semisolid culms and striate culm-sheaths with persistent imperfect blades decurrent on the sheaths are the key characters which are quite distinct from the other species.

Blatter (1930) recorded the flowering years of this species from various parts of India and adjoining regions for the period 1865-1914. Apart from the gregarious flowering after long intervals, sporadic flowering have been reported in almost every year from different parts of India. According to Troup (1921) flowering cycle for the Garhwal outer Himalayan tract is 20-60 years. Gregarious flowering was reported from different parts of the country during the last few decades; Kalagarh forest division of Uttar Pradesh in 1950-56 (Mathur 1964) and in 1968 (Shah 1968), Kalahandi and Rayagada division of Orissa in 1967 (Singh 1967); Porahat forest division of Bihar during 1921-22 and in 1968 (Sinha 1968); Mandla division of Madhya Pradesh during 1961-63; various localities in Maharashtra during 1940-1942, 1948-1949, 1957-1958, 1961-1962, 1978-1980 (Desai & Subramaniam 1980). Sporadic flowering spreading over 12-13 years (1946-
1958) was reported from North Kanara (Singh 1969). In Kalahandi forest division of Orissa this species flowered sporadically in 1968, some culms become green in 1969 after flowering and to produce new flushes of which's-broom type of leaves (Mohapatra 1969). One to three-year seedlings are also reported to flower (Pathak 1899; Ahmed 1969; Uppin 1978). Sporadic flowering for 2 - 3 years usually precede gregarious flowering. Gregarious flowering cycle varies from 25 - 45 years and is related to injury, nutrition, climatic conditions and soil factors (Seethalakshmi & Kumar 1993).

**Use:** This is one of the most important bamboos in India (Kodas 1982). It is found suitable for reclamation of ravine lands (Shrivastava & Qureshi 1966). In India it is extensively used for paper pulping and also for constructional purposes. It is also used for agricultural implements, musical instruments, furniture, etc. Tender shoots are commonly used as food items. Decoction of leaves and nodes and silicious matter is used in traditional medicine in India (Seethalakshmi & Kumar 1998).

**Dinochloa Buse**


**Type:** *Dinochloa tjankorreh* Buse, now *D. scandens* (Bl. ex Nees) O. Kuntze.

Lofty climbing. **Culms** zig-zag, climbing, moderately thick, usually covered by the persistent culm-sheaths. **Culm-sheaths** thick, loosely-clasping, wrinkled at the base, where a broad, leathery ring remains after the sheath falls; imperfect blades long. **Leaves** large, rather soft in texture, with transverse veinlets. **Inflorescence** a large compound panicle of thin spicate clusters of spikelets. **Spikelets** very minute, numerous, in sub-globose sessile heads or short branchlets,
1- or 2-flowered; rachilla short, not articulate, not produced; empty glumes 1-4, broad, very obtuse, muticous, gradually larger upwards; flowering glumes similar; palea convolute, equal to, or larger than the flowering glume, not keeled; lodicules none. Stamens 6, free, short. Ovary ovate, glabrous; style short. Caryopsis ovoid, acuminate.

**Distribution**: 4 species distributed in South-East Asia (Farrelly 1984); 20 species in Malay Peninsula, Borneo, the Philippines, Indonesia, Bangladesh, India, Thailand and China (Ohnberger & Goerrings 1985); 25 species distributed from Myanmar to Philippines but mainly in Malesia (Clayton & Renvoize 1986); 20 species in Myanmar, northeastern India, Thailand, Malay Peninsula and Philippines (Biswas 1988; Seethalakshmi & Kumar 1998).

3 species in India and 2 in northeastern India (Bahadur 1979; Varmah & Bahadur 1980); 2 species in India and one in northeastern India (Biswas 1988; Anonymous 1991); 4 species in India and one in northeastern India (Majumdar 1989); 6 species in India and 4 in northeastern India (Tewari 1992; Seethalakshmi & Kumar 1998); 4 species in India and 3 in northeastern India (Shukla 1996).

The number of species of *Dinochloa* occurring in Assam is 2 (Varmah & Bahadur 1980; Biswas 1988); One (Majumdar 1989; Anonymous 1991); 4 (Tewari 1992; Seethalakshmi & Kumar 1998) and 3 (Shukla 1989). In the present investigation only one species has been recorded to occur in Assam.

Fig. 33. *Dinochloa macclellandii*
Leafy twig × 2
Lofty, scandent or climbing, evergreen. **Culms** upto 30m long, shorter and straggling if growing unsupported, 2.5-5cm in diameter, slightly zig-zag, covered by persistent, loose sheaths, grey-green, walls 5-7.5mm thick; nodes swollen; internodes 15-20cm long, often angled especially when young, scabrous, with appressed brown pungent hairs. **Culm-sheaths** cylindrical, the base often dark, leathery, persistent, 15-23cm long, 17-22cm broad at base, 5-7cm wide at top, covered with densely appressed golden brown pubescence, ending above in a narrow 2.5mm broad, dark, glabrous margin, edging the whole of the truncate top outside the base of the imperfect blade; imperfect blades lanceolate, acuminate, rounded at the base and decurrent on the sheath, 15-30cm x 2.5-6cm, recurved or spreading, glabrous outside, densely brown hairy within; ligule 2.5-5mm broad, entire or very faintly serrate. **Leaves** large, 15-47cm x 2.5-10cm, broadly oblong-lanceolate, acuminate, unequally rounded at base, tip acuminate, setaceous, scabrous, twisted, retrorsely scabrous on one or both edges, glabrous on both sides, main vein prominent, secondary veins 10-18 pairs, intermediate 7, transverse veinlets many, conspicuous, oblique; peliole-like base upto 1.2cm long; leaf-sheaths striate, transversely veined, produced at the mouth into a rounded naked auricle, keeled at back, appressed-hairy when young, glabrous on maturity; ligule often broad, entire or serrate. **Flowers** not seen. (Fig. 33)


**Distribution**: (a) BANGLADESH, CAMBODIA, INDIA, LAOS, MYANMAR, THAILAND and VIETNAM; (b) Arunachal Pradesh, Assam and West Bengal, cultivated in Indian Botanic Garden, Calcutta and Forest Research Institute, Dehra Dun; (c) Cachar, Dhemaji, Lakhimpur and N.C. Hills districts.

**Note**: Although Ohmberger & Goerrings (1985) remarked that culms are usually solid in the genus *Dinochloa*, yet the specimens collected by the present author are having hollow culms. Interestingly all the earlier descriptions of the species
were silent about this character, i.e. whether the culms are solid or hollow but in figures (Gamble 1896; Bennet & Gaur 1990b; Tewari 1992) the culms are shown with hollow internodes. Further, there is a persistent controversy regarding the merger of the genus *Melocalamus* with *Dinochloa* and the above character of culms (solid versus hollow) can probably be useful for its solution. From the collections of the present author it can be inferred that *Dinochloa* have hollow culms while the *Melocalamus* have solid culms. However, further observation is required in this regard.

Information on earlier flowering of this species is not available. During the present investigation too flowers have not been found. Identity of this bamboo can easily be confirmed by its climbing habit with hollow culms which produce long pendent leafy branchlets and by the culm-sheaths which are cylindrical, leathery and persistent having lanceolate, acuminate, recurved imperfect blades.

**Use:** Leaves are lopped to feed cattle.

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**Gigantochloa Kurz ex Munro**


**Lactotype:** *Gigantochloa atter* (Hasskarl) Kurz ex Munro.

Large, arborescent or scandent. Culms usually tall, not branched at the base. Culm-sheaths generally stiff, hairy above, glabrous below, auricled. Leaves rather large, long, usually attenuate at the base. Inflorescence a large compound panicle with long, spicate branches bearing heads of spikelets. Spikelets usually few, often of two kinds, fertile and sterile, oblong or linear, fertile flowers several; empty glumes 2-3; flowering glumes similar to empty glumes; paleae of all flowers 2-keeled, keels ciliate, lodicules 3 or less, often none. Stamens 6, filaments, joined into a tube which at first is thick and short and afterwards elongate, membranous. Ovary
hairy, style elongate, stigmas 1-3, hairy. **Caryopsis** usually oblong or narrow, linear, generally furrowed, pericarp membranaceous.

**Distribution**: 20 species, from Southeast Asia, mainland and islands, Myanmar, Indo-China to Malay Peninsula and Philippines, introduced in Java (Farrelly 1984); 16 species, southern and eastern Asia inclusive of New Guinea and the Pacific Islands (Ohmberger and Goerrings 1985); 20 species in the world and 15 species from Assam to Malaya (Clayton & Revoize 1986); 20 species, N.E. India, Malay Peninsula, Philippines, Sabah, Thailand, Java (Biswas 1988); 16 species in the world, Thailand, Singapore, Philippines and Malaysia (Seethalakshmi & Kumar 1998).

2 species in India and both are occurring only in northeastern India (Bahadur 1979; Biswas 1988); 5 species in India, of which two are naturally occurring in northeastern India and the other three are cultivated (Varmah & Bahadur 1980, Anonymous 1991); 4 species, all are occurring in northeastern India (Majumdar 1989); 7 species in India, of which 4 are occurring in northeastern India and the other three are cultivated (Tewari 1992); 4 species in India and three in northeastern India (Shukla 1996); 7 species in India, out of which 3 species are occurring naturally and 4 species are introduced (Seethalakshmi & Kumar 1998).

2 species are occurring in Assam (Bahadur 1979; Varmah & Bahadur 1980; Biswas 1988), while according to Majumdar (1989) and Tewari (1992) 4 species are occurring in Assam.

In the present investigation three species have been recorded.

**KEY TO SPECIES**

1a Nodes oblique; internodes upto 2.5m in diameter; culm-sheaths appressed hairy on outside; imperfect blades oblong lanceolate ............... *G. albociliata*

1b Nodes transverse; internodes 5-10cm in diameter:

2a Culms upto 16m high and 10cm in diameter; culm-sheaths densely hairy, upto 20cm long; imperfect blades triangular; auricles fringed ............... *G. macrostachya*

2b Culms upto 8m high and 5cm in diameter; culm-sheaths sparsely hairy on outside, upto 10cm long; imperfect blades ovate-lanceolate; auricles naked. ............... *G. rostrata*

**Kalisuneti** (Ass.).

Evergreen or semievergreen, caespitose, densely clumped. **Culms** 6-9m high, 1.5-2.5cm in diameter, greyish-green with white stripes, hispid above; nodes oblique, raised in a ring formed by the base of the sheath; internodes 15-38cm long, walls moderately thick, 5-8mm in thickness. **Culm-sheaths** 10-20 cm long, upto 15 cm broad, covered with dense, tawny appressed hairs when young, smooth on maturity, truncate, folded and coriaceous at the base, ending at the truncate mouth in a narrow naked band; imperfect blades as long as or little larger than the sheath, lanceolate, acuminate, broad and rounded at the base and decurrent; auricles small; ligule very long, 1.5-2.5cm, truncate, toothed. **Leaves** 15-29cm x 2-3.5cm, linear-lanceolate, base rounded, ending above in a setaceous point, glabrous above except scabrous points near the margins, glaucescent beneath, scabrous on one or both edges; main vein prominent, secondary veins 6-8, intermediate usually 4-5, transverse veinlets absent, but frequent pellucid glands having that appearance on the lower surface; petiole-like base 2.5mm long; leaf-sheaths smooth, striate, ending in a smooth callus and truncate edge; ligule rather long, faintly ciliate. **Flowers** not seen. (Fig. 34)

**Exsiccata** : Goalpara, Rangjuli, June 14, 1997, C. Barooah 2811.

**Distribution** : (a) Native to INDO-CHINA, MYANMAR, introduced in INDIA, THAILAND; (b) Introduced in Arunachal Pradesh, Assam, Meghalaya, Tripura and elsewhere in the country, widely cultivated in West Bengal; (c) Occasionally cultivated in Assam.
Fig. 34. *Gigantochloa albociliata*
Leafy twig × 2
Note: Munro (1868) and Gamble (1896) described this taxon under *Oxytenanthera* which is exclusively confined to Africa. Holttum (1956b) concluded that species from Asia described under these two genera are either species of *Dendrocalamus* or species of *Gigantochloa*. The characters mentioned by Munro (1868) agree with our specimen and are typical of *Gigantochloa*. Accordingly the species is treated here under *Gigantochloa*.

This species flowered in Myanmar during 1857, 1871, 1880, 1891-92, 1900-1901, 1911-14, 1916-17 and in Europe during 1909 (Blatter 1930); in Assam it flowered during 1956-60 and in 1987 (Gupta 1987). Gupta (1987) also mentioned that it flowers sporadically almost every year and the intensity is never more than 0.001% of total clumps and the seeds produced from such sporadic flowering are not fertile. A flowering cycle of about 30 years has been reported from India (Seethalakshmi & Kumar 1998).

In the present investigation no flowering material could be collected. Identity of this bamboo has been confirmed mainly on the basis of the characters of the culms which are up to 9m high and 2.5cm in diameter, greyish-green with white stripes, presence of oblique nodes and the culm-sheaths which are up to 20cm long and 15cm broad, covered with dense, tawny appressed hairs when young, ending above at the truncate mouth in a narrow naked band.

Use: Although this bamboo is considered as a troublesome weed in teak plantation in Myanmar (Gamble 1896) yet in Thailand it is considered as a commercial species and the tender shoots are commonly used for edible purposes (Anantachote 1987; Visuphaka 1987).

Fig. 35. *Gigantochloa macrostachya*
Leafy twig x 2

*Gigantochloa macrostachya*
Oxytenanthera macrostachya (Kurz) Brandis, Indian Trees: 719, 1906.

Tekserah (Garo).

Large, evergreen, caespitose. **Culms** 10-16m high, 6-10cm in diameter, glaucous when young, especially below the nodes, dark green on maturity, sometimes striped, fistulose, walls 5-8mm thick; nodes scarcely swollen, hairy; internodes 45-75cm long, lower ones shorter. **Culm-sheaths** rather short, 12-20cm long, upto 35cm broad at base, not much narrowed upwards to the truncate top, densely covered with appressed, blackish, deciduous hairs, less ciliate at the edges; imperfect blades as long as or shorter than the sheath, reniform, acute, appressed hairy beneath, less so above, rounded at the base and then again produced into 1.2-2.5cm broad, wavy, long-fringed band, ending in auricles, sometimes decurrent; ligule narrow, entire or faintly toothed. **Leaves** thin, lanceolate, 16-40cm x 1.2-5cm, attenuate or rounded at the base, ending above into a setaceous, scabrous point, smooth and glabrous above except the scabrous points on the marginal nerves, whitish and minutely and softly puberulous beneath, margins scabrous, main vein rather narrow, secondary veins 5-13, intermediate 7; petiole-like base 4-5mm long, wrinkled; leaf-sheaths hairy when young, glabrescent on maturity, often keeled, ending in a rounded callus; auricles 1 or 2, much longer and more ciliate when young, small, glabrous, rounded, fringed with very deciduous and long ciliae on maturity; ligule short. **Flowers** not seen. (Fig. 35).

**Chromosome number**: 2n = 72 (Zhang Guang - Zhu 1987).


**Distribution**: (a) BANGLADESH, INDIA, MYANMAR, THAILAND; (b) Arunachal Pradesh, Assam, Meghalaya, Mizoram; (c) Kulsi, Rani, Taraibari Reserved Forests of Kamrup Division.

**Note**: Though the distribution of this species has been shown as Assam in most of the earlier literature yet the present investigator found that it is confined to Assam in areas bordering Garo Hills.

Flowering of this species was reported in 1862, 1880, 1869, 1893 from Burma, in 1879 from Chittagong (Bangladesh) and from Garo Hills in 1889 (Gamble 1896).
In the absence of flower the identity of this species has been confirmed by its striped fistulose clumps with swollen, hairy nodes and the culm-sheaths which are covered densely with appressed, black, deciduous hairs having wavy long-fringed auricles.

This species resemble to those of *Bambusa tulda* in its leaves and to those of *Bambusa tulda* and *B. teres* in its culm-sheaths.

**Use**: This species is used for making mats, baskets and for construction (Seethalakshmi & Kumar 1998).


**Pani banh** (Ass.).

Moderate sized, evergreen, caespitose, densely clumped. **Culms** dark-green, 5-8m high, 2.5-5cm in diameter, thick-walled, slightly drooping; nodes prominent; internodes 20-30cm long, scabrous, rough above, glabrous below, lower ones with yellowish stripes. **Culm-sheaths** upto 10cm long and 6cm broad at base, deciduous, striate, edges ciliate, with appressed, stiff, dark-brown hairs on the back, slightly narrowed upwards, truncate at the top; auricles low, rounded, naked, glabrous; ligule 1-1.5mm high, faintly toothed; imperfect blades upto 8cm long, leaf-like, ovate-lanceolate, decurrent on the sheath, spreading or reflexed. **Leaves** 15-27cm x 2-3cm, lanceolate, unequally rounded at the base, ending above in a subulate, twisted point, rough above, pale and smooth and at first pubescent beneath, margin scabrous, main vein prominent, secondary veins 9-12, conspicuous, transverse veinlets none, pellucid glands which appear beneath like transverse veinlets;
Fig. 36. *Gigantochloa rostrata*

Leafy twig x 2
petiole-like base 4mm long; leaf-sheaths stiff, hairy when young, smooth and glabrous on maturity, edges ciliate; auricles small, naked, rounded; ligule narrow. **Flowers** not seen. (Fig. 36).

**Exsiccat**a : Goalpara, Guabari, June 14, 1997, C.Barooah 2812.

**Distribution** : (a) BALI, BANGLADESH, INDIA, INDONESIA, SUMBAWA, SUMATRA, THAILAND; (b) Andaman & Nicobar Islands, Assam, Bihar, Madhya Pradesh, Maharashtra, Meghalaya, Karnataka, Orissa, cultivated in different parts of India; (c) Goalpara, Chattachera, cultivated sporadically in other parts of Assam.

**Note** : Regarding the confusion on the identity of this species Widjaja (1987) remarks, "Munro (1868) confounded more than three species under *Oxytenanthera nigrociliata*. Only the Javanese specimens cited by him represent *Gigantochloa nigrociliata*. The other two are *Bambusa andamanica* and either *Gigantochloa rostrata* or *G. macrostachya* sensu Gamble p.p. None of the specimens which I have studied from India is referable to *G. nigrociliata* and most of them resemble Wallich No. 5033. The spikelet of this species in some cases resemble the specimen Wallich No. 5033 collected from Chappadong Amherst, identified by Munro (1868) as *Oxytenanthera nigrociliata*. Several Indian specimens in Dehra Dun, which were indentified as *Gigantochloa macrostachya* sensu Gamble (1896) are found referable to *G. rostrata*.

This species flowered gregariously in Bastar in March 1960 (Tewari 1992) and in Bangladesh in 1978 (Banik 1987). A flowering cycle of 30-35 years has been reported (Seethalakshmi & Kumar 1998).

Flowering of this species was not found during the field visit and identified mainly on the basis of its medium sized culms in 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.

**Use** : Culms are used for house building, basket making and in paper mills (Bennet & Gaur 1990b). Seeds are used as food by the local people (Seethalakshmi & Kumar 1998).
Melocalamus Benth.


Type: Melocalamus compactiflorus (Kurz) Benth.

Moderate sized, arborescent, unarmed. Culms from a thick rootstock, semi-scandent. Culm-sheaths cylindrical, hard, auricled. Inflorescence a large compound panicle, the spikelets in round congested heads in long spikes. Spikelets very small, 2-flowered, rachilla continuous between the flowers and produced beyond them, flowers hermaphrodite, only one fertile; empty glumes 2, broad, blunt, muticous, many-nerved; flowering glumes similar to empty glumes; palea as long as flowering glume, very broad, 2-keeled, membranaceous; lodicules 3, large. Stamens 6, filaments free, anthers blunt. Ovary glabrous, style short, stigmas 2 or 3, plumose. Caryopsis very large, globose, depressed, pericarp tough, seeds large, free, fleshy.

Distribution: The genus Melocalamus was considered as monotypic till 1983 when the second species M. elevatissimus Hsueh & Yi was described from Tibet (Yi 1983). Majumdar (1983) added the third species M. indicus R. Majumdar from Cachar, Manipur and other adjoining areas of northeastern India and in 1989 he added the fourth species M. gracilis R. Majumdar from Borail Range of N.C. Hills, Assam. The genus is restricted in southeastern Tibet and Yunan Province of China, eastern parts of India and Bangladesh, upper and lower part of Myanmar, northern part of Thailand and Vietnam (Farrelly 1984; Ohrnberger & Goerrings 1985; Biswas 1988).

Of the four species of Melocalamus, three species including the type are known to occur in India and all are confined to northeastern India including West Bengal (Bahadur 1979; Biswas 1988; Majumdar 1989; Anonymous 1991).
Except one, viz. *D. elevatissimus*, the other three species, viz. *M. compactiflorus*, *M. gracilis* and *M. indicus* have been reported to occur in Assam (Bahadur 1979; Biswas 1988; Majumdar 1989).

In the present investigation two species including the type have been recorded to occur in Assam.

**KEY TO SPECIES**

1a Culms solid; nodes without woody ring; culm-sheaths persistent, covered with white, appressed hairs on outside

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*M. compactiflorus*

1b Culms sub-solid; nodes with woody ring; culm-sheaths deciduous, covered with scanty patches of deciduous hairs on outside

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*M. indicus*


*Beti banh* (Ass.); *Daral* (Beng.).

Climbing, evergreen, tufted, arborescent. **Culms** solid, greyish-green, rough, scandent, spreading and arching over tall trees, 10-33 m long, 1.2-3 cm in diameter; nodes swollen, whitish; internodes 30-62 cm long. **Culm-sheaths** 15 cm long, 8 cm broad at base, persistent, hard, brittle, cylindrical, smooth or covered with
Fig. 37. *Melocalamus compactiflorus*
Leafy twig × 2
Melocalamus compactiflorus
47. Culm-sheath
Melocanna baccifera
48. Culm-sheath
white appressed hairs, truncate at the mouth, dilated at the base; imperfect blades more or less equal to the length of the sheath, recurved, long-acuminate, rounded at the base and then spreading out into auricle, hispidly hairy towards the base; auricles narrow, dark, reflexed, crescent shaped, fringed with stiff bristles; ligule narrow, entire. **Flowers** not seen. (Fig. 37; Photo. 47).

**Chromosome number**: $2n = 72, n= 36$, hexaploid (Lalithakumari 1983).


Cachar, Assam, April 4, 1921, DD, Acc. No. 25614.

**Distribution**: (a) BANGLADESH, CHINA, INDIA, MYAN MAR; (b) Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland upto 1850 msl., cultivated in F. R. I. Dehra Dun, U. P.; (c) Cachar, Dhemaji, Lakhimpur.

**Note**: The genus *Melocalamus* is based on the type species *M. compactiflorus*, which was originally described from Myanmar as *Pseudostachyum compactiflorum* by Kurz (1873). Although Bentham (1881) proposed its transfer to a new genus *Melocalamus*, yet he did not provide the generic description. However, the transfer was validly effected in 1883 (Bentham & Hooker 1883).

McClure (1936) merged the genus *Melocalamus* with *Dinochloa*. Bennet (1989) advocated the view of the McClure (*l.c.*) citing reasons and in most of the recent works on Indian bamboos (Varmah & Bahadur 1980; Bennet & Gaur 1990; Tewari 1992; Shukla 1996, etc.) the view of McClure (*l.c.*) has been followed. Majumdar (1989) on the other hand, although recognised both the genus viz. *Melocalamus* and *Dinochloa*, yet he has reduced *Melocalamus compactiflorus* (Kurz) Benth., the type species of the genus *Melocalamus*, to a synonym of *Melocalamus mastersii* (Munro) R.Majumdar by transferring the species *Bambusa mastersii* Munro to *Melocalamus*, which is contradictory to Art. 7 of ICBN.

Holttum (1958) did not agree with McClure (1936) in merging *Melocalamus compactiflorus* with *Dinochloa*. Bahadur & Naithani (1983) after examining the flowering materials including the type material of *Melocalamus compactiflorus* pointed out the characters, viz. two perfect florets and the rachilla extends with a
rudiment at its tip, as typical for the genus *Melocalamus*. In *Dinochloa* on the other hand has single floret and rachilla without any rudiment (Bahadur & Naithani 1983). Moreover, the fruits of *Melocalamus* are relatively larger and fleshy with a thick pericarp than those of *Dinochloa* (Bahadur & Naithani 1983; Ohrnberger & Goerrings 1986). In the present account the view of Holttum (1958) has been followed.

*Melocalamus compactiflorus* was first collected in flowering state from Martaban and Karen Hills of Myanmar by Kurz in 1871. During 1878 it flowered in Thayetmy and during 1894 in Ruby Mines district of Myanmar (Gamble 1896). Blackwell (1902) reported its flowering from Sinlemkaba Hills, northeast of Bhamo in Myanmar adjoining Chinese border. Although there is no published report of the flowering of this species from Myanmar after that of Blackwell (1902), yet the herbarium sheets at DD indicate that it did flower in Myanmar in 1917 near Byingyi, in 1926 in Thangyin Division and in 1933 in Hlaing Yoma Hill Reserve (Bahadur & Naithani 1983).

In India the first authentic report of the flowering of this bamboo appears to be from Dehra Dun in December 1980 (Bahadur & Naithani 1983). However, an anonymous collection deposited in the F.R.I. herbarium (DD) indicate that it had flowered in 1921 (Bahadur & Naithani 1983). Report of the flowering of this species from Manipur by Malik in 1974 considered to be erroneous due to misidentification (Bahadur & Naithani 1983).

In the present investigation also no flowering material has been collected. The species has been identified mainly by its climbing, solid, greish-green culms and cylindrical, hard, persistent culm-sheaths.

Use : Culms are used in basket making. Stripped internodes are twisted into strands and shoes/sandals are made by interlacing the strands in China and Myanmar (Blackwell 1902).

Fig. 38. *Melocalamus indicus*

Leafy twig $\times 2$
Evergreen, scandent. **Culms** very long, sub-solid, arching over tall trees and then 'hanging downwards with tufts of green leaves at the tips of the branches, branches many in tufts, often supporting a solitary, large bud that develops into a branch as thick as the main culm; nodes with a woody ring formed by the persistent lower part of the cylindrical culm-sheaths; internodes white, scurfy. **Culm-sheaths** cylindrical crustaceous, deciduous. **Flowers** not seen. (Fig. 38).


**Distribution** : (a) INDIA; (b) Assam, Manipur; (c) Cachar and N. C. Hills districts of Assam, common in the tropical low-land and rain forest.

**Note** : Although no flowering materials have been collected by the present author, yet the type specimen (Majumdar 73083) deposited in CAL have flowers and that is the only record of its flowering.

The species is very similar to *Melocalamus gracilis* R. Majumdar described from N.C. Hills but differ in having auricles without cilia, cylindrical, sub-solid culms and blunt nodal buds. It differs from *M. compactiflorus* in having crustaceous, deciduous culm-sheaths.

**Use** : Culms are used for making baskets.

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**Melocanna Trinius**


**Type** : *Melocanna bambusoides* Trinius, now *M. baccifera* (Roxb.) Kurz.

Evergreen, erect, monopodial, moderate sized, unarmed. **Culms** erect, distant,
single from the ramifications of an underground rhizome; **Culm-sheaths** often persistent, brittle, short, with auricles; imperfect blades very long, linear. **Leaves** broad, smooth, no transverse veinlets. **Inflorescence** a large compound panicle of spicate, one-sided spikelets. **Spikelets** 2-3, fasciculate in bracts in the axils of the spikes, acuminated, with one fertile and one or more sterile flowers; **empty glumes** indefinite, acuminated, mucronated, striate; **flowering glumes** similar to empty glumes; **palea** also similar, convolute, not keeled; **lodicules** 2, narrow. **Spikelets** 5-7, filaments free or irregularly joined. **Ovary** glabrous, style elongate, stigmas 2-4, shortly hairy. **Caryopsis** very large, pear-shaped, long beaked, pericarp very thick.

**Distribution**: 3 species, India and Myanmar (Farrellly 1984; Ohrnberger & Goerrings 1985); 2 species, India, Bangladesh, Myanmar and Indo-Malaya (Biswas 1988; Shukla 1992; Seethalakshmi & Kumar 1998).

2 species in India and both are occurring in northeastern India (Bahadur 1979; Biswas 1988; Shukla 1996); only represented by the type species, which is occurring in northeastern India (Majumdar 1989); 2 species, one in northeastern India and the other is cultivated (Varmah & Bahadur 1980; Anonymous 1991; Tewari 1992; Seethalakshmi & Kumar 1998).

Two species including the type are known to occur in Assam (Biswas 1988; Shukla 1996).

In the present investigation two species including the type have been recorded to occur in Assam.

**KEY TO SPECIES**

1a Culms upto 5m high and 2.5cm in diameter; nodes without a ring; culm-sheaths glabrous, cylindrical; imperfect blades subulate-acuminated, erect

............... **M. arundina**

1b Culms upto 20m high and 7cm in diameter; nodes with a circular band of white bloom little below; culm-sheaths appressed hairy on outside, broader than long; imperfect blades broadly lanceolate, sickle-shaped, recurved

............... **M. baccifera**

Evergreen, erect, distant. **Culms** slender, 3-5 m high, upto 2.5 cm in diameter, dark green, very hollow; nodes hardly thickened; internodes 30 cm long. **Culm-sheaths** glabrous, shining, cylindric, very short, rounded and inflated at the sinuate mouth; imperfect blades linear, very long, subulate-acuminate, erect, decurrent into a narrow, naked, green stripe bordering the sinuses; ligule very short, entire. **Leaves** 10-20 cm x 2-2.5 cm, lanceolate to linear-lanceolate, obtuse at the base, one margin very rough, glaucescent and minutely roughish pubescent beneath, secondary veins 8-10 pairs, very faint; petiole-like base 2-3 mm long; leaf-sheaths glabrous; auricles minute, with long, deciduous fringe. **Flowers** not seen. (Fig. 39).


**Distribution**: (a) INDIA, MYANMAR; (b) It has a restricted distribution in Assam (Biswas 1988), cultivated in Botanic Garden, Calcutta; (c) Sonai, Jiri and Borail Reserved Forests of Cachar and N.C. Hills districts.

**Note**: **Melocanna humilis** was described from Myanmar for the first time by Kurz in 1877. Parkinson (1935) while proposing the name **M. arundina** for the species described by Kurz 1877 from Myanmar under the name **M. humilis** pointed out as follows: "The binomial **Melocanna humilis** had already been used by Roepert in Trinius Clav. Agrost (1822) p-105, and Merrill in his *Interpretation of Rumphius' Herbarium Amboinense* (1917) p-102 has shown that this is merely a new name for *Arundo fax* Lour. Kurz's plant can not reasonably be associated with either *Arundo fax* Lour. or **Melocanna humilis** Roep. and the latter combination is
Fig. 39. *Melocanna arundina*  
Leafy twig × 2
therefore not valid for the Burmese plant which requires a new specific name."

So far this species is known only by its vegetative parts and flowering material has not been collected. In the present investigation also no flowering material could be collected. Identification of this species has been confirmed by its distant culms upto 5m tall, 2.5 cm in diameter and glabrous, cylindrical culm-sheaths having subulate-acuminate, erect imperfect blades.

**Use:** Culms are used for construction and for erecting fence.


*Tarai, Muli* (Ass.); *Muli* (Beng.); *Wati* (Dim.); *Wat rai* (Garo); *Mouri* (Mani.); *Artem* (Kar.); *Turiah* (Naga); *U sili* (Khasi).

Evergreen, arborescent, with single distant culms arising from the ramifications of an underground rhizome. **Culms** 10-20m high, 3-7 cm in diameter, green when young, pale greenish-yellow when old, very straight, erect, mostly unbranched, shortly branched at the proximate end, branches short and slender; nodes not prominent, with a circular band of white bloom little below; internodes upto 50 cm long, walls thin, 2-4 mm, lower few ones covered by persistent culm-sheaths. **Culm-sheaths** 10-15 cm long, 12-25 cm broad at base, undulated above, yellowish-green when young, yellowish-brown on maturity, brittle, striate, truncate or concave at top, glabrous or sparsely with whitish appressed hairs on the back; ligule very
Fig. 40. Melocanna baccifera
Leafy twig × 2
Melocanna baccifera
49. New shoot
Schizostachyum dullooa
50. Culm-sheath
short with undulated or toothed margin; auricles small, subequal, membranous, fringed with silvery bristles; imperfect blades deciduous, 15-30 cm long, 2-3 cm broad at base, gradually tapering, linear-lanceolate, sickle-shaped, of lower sheaths subulate, the base decurrent along the top of the sheath. Leaves 15-38 cm x 2.5-5 cm, lanceolate to oblong-lanceolate, the apex acuminate, with long, scabrous, penicillate, hairs, base rounded, often oblique, glabrous above, glaucescent or sparsely pubescent beneath, margins finely ciliate, one margin scabrous, not only on the margin but on 2 or 3 adjoining veins; main vein prominent, secondary veins 8-12, intermediate 5-6, inconspicuous, no regular transverse veinlets, but regular pellucid glands with bars between veinlets; potiole-like base 5-12 mm long; leaf-sheaths thick, glabrous, smooth, margins ciliate; auricles pointed, with 1-1.5 cm long, 10-12 or more conspicuous, whitish, stiff, deciduous, bristles; ligule very short. Flowers not seen. (Fig. 40; Photo. 48 & 49).

Chromosome number : 2n = 72 (Zhang Guang - Zhu 1987).


N.C. Hills (2500 ft.), February 1890, Gaustov Mann, Coll. No. Nil; Cachar, June 18, 1912, Forest Economist 3725 (DD).

Distribution : (a) BANGLADESH, INDIA, MYANMAR, cultivated in other Asian countries; (b) Assam, Manipur, Meghalaya, Mizoram, Tripura, Sikkim, West Bengal; (c) Cultivated all over Assam, wild mostly in Cachar, Goalpara and N.C. Hills districts.

Note : Gregarious flowering of this species was reported from Manipur in 1952 and in Mizoram in 1960 (Shukla 1996). It was reported to have flowered sporadically in Cachar district of Assam and in Manipur in 1967 (Nath 1968). Earlier records of its flowering were known in 1863-66, 1892-93, 1900-02, 1910-12, 1933,1960 (Chatterjee 1960; Vaid 1972). Sharma (1992) reported flowering at FRI, Dehra Dun. Flowering and fruiting was also observed at Pune during 1993 (Seethalakshmi & Kumar 1998). Flowering cycle according to Gamble (1896) is
30 years, according to Kurz (1876) is 30-35 years and according to Troup (1921) is about 45 years. Culms and rhizomes die after flowering.

Flowering of this species was not seen during the present investigation. Without flowering materials it is very easy to identify by its moderate sized, unarmed, erect, distant culms and especially the culm-sheaths in having wavy and hard sheath proper having linear-lanceolate, sickle-shaped imperfect blade.

Use: It is one of the principal species used for house building, weaving of baskets and other articles and paper pulp (Chakraborty 1988; Bennet & Gaur 1990b; Shukla 1996). Fruits are edible (Holland 1919). *Tabashir* can be isolated from culms and branches (Singh 1986). Prefabricated walls, called *Tarja* or *Chatai*, made from splitted culms are used for roofing and walls of huts and temporary barricade, etc..

**Oxytenanthera Munro**


**Type:** *Oxytenanthera abyssinica* (A. Richard) Munro.

Arborescent or climbing, usually of medium or small sized, unarmed, often gregarious. **Culms** from a thick rhizome, usually creeping, underground and stoloniferous; **Culm-sheaths** various, usually rather narrow; imperfect blades narrow. **Leaves** variable, generally small; petiole-like base short. **Inflorescence** a large panicle with spicate heads of few or many spikelets. **Spikelets** narrow, elongate, conical, bearing 1,2 or 3 flowers, the uppermost usually fertile; **empty glumes** 1-3; **flowering glumes** ovate, elongate, mucronate; *palea* of lower flowers 2-keeled, of uppermost flower convolute, only little or not at all keeled; **lodicules**
none. **Stamens** monadelphous, exserted, tube thickened at first, afterwards membranous, elongate, anthers narrow, acute or spicate. **Ovary** ovoid, style fine, stigma 1-3, usually more or less plumose. **Caryopsis** elongate, terminated by a beak formed by the persistent style base, grooved, embryo conspicuous.

**Distribution:** 5 species distributed in Africa and Asia, from Angola to Java (Farrelly 1984); 16 species, Africa and Asia (Ohnberger & Goerlings 1985; Seethalakshmi & Kumar 1998); 20 species in the world, one in tropical Africa (Clayton & Renvoize 1986); 20 species, Africa, Malagassy, Indo-Malaya (Biswas 1988).

In India 5 species are occurring and of which only one is found in northeastern India (Bahadur 1979); 7 species in India and only one in northeast India (Varmah & Bahadur 1980); 2 species in India and both are occurring in northeastern India (Biswas 1988); 7 species in India and only one species in northeastern India (Anonymous 1991); 2 species in India and one in northeastern India (Tewari 1992; Seethalakshmi & Kumar 1998); 3-4 species in India and one in northeastern India (Shukla 1996).

In Assam only one species is known to occur (Biswas 1988; Tewari 1992; Shukla 1996; Seethalakshmi & Kumar 1998).

In the present investigation also only one species, viz. *O. parvifolia* has been recorded to occur in Assam.


*Hill jati* (N.C. Hills).
Fig. 41. *Oxytenanthera parvifolia*

Leafy twig × 2
Large-sized, evergreen, caespitose. **Culms** upto 20 m high and 8 cm in diameter, dark-green; nodes slightly prominent; internodes 20-45 cm long, walls upto 1.2 cm thick. **Culm-sheaths** 20-23 cm long, 20-25 cm broad at base, truncate, striate, rounded at the top, outer surface with appressed brown hairs, inner surface glabrous, shining; imperfect blades 5-8 cm long, upto 3 cm broad, ovate-acuminate, base rounded, decurrent on the top of the sheath in a narrow, naked, slightly auricled band, base rounded; ligule rather broad, dentate. **Leaves** 7-23 cm x 1.5-2 cm, linear-lanceolate, base rounded, apex with a short, subulate, twisted point, smooth above, but marginal veins scabrous, pale, slightly pubescent beneath, usually one margin scabrous; petiole-like base 2-3 mm long; leaf-sheaths hairy when young, glabrous on maturity, ending in a prominent callus and furnished with a few deciduous bristles at top; ligule long, acute, faintly dentate, pubescent. **Flowers** not seen. (Fig. 41).


**Distribution** : (a) INDIA, MYANMAR; (b) Assam, Mizoram; (c) Cachar, N.C. Hills districts.

**Note** : Blatter (1930) remarks that Brandis recorded its flowering in 1880 from Yonzalin in Myanmar. Shukla (1996) also mentioned that it had flowered during March- April, 1961 in N.C. Hills. During February 1987, gregarious flowering of this species was recorded from Haflong in N.C. Hills of Assam by Gupta (1987).

In the present investigation no flowering material has been found. Although flowers are not available, the identification of this taxon is based on the morphological features of the culms and culm-sheaths. Comparatively larger, dark-green, culms with slightly prominent nodes and appressed brown hairy, broad based, truncate culm-sheaths having broad, dentate ligule and small auricles are the main key characters for its field identification.

**Use** : Local Dimasa, Kuki and other hill tribes use this bamboo for construction of their huts and also for making baskets, mats, etc.
Phyllostachys Siebold et Zuccarini


Type: Phyllostachys bambusoides Siebold et Zuccarini

Shrubby or arborescent, caespitose. **Culms** smooth, flattened on one side in alternate nodes; nodes prominent; internodes rather short, branches 2- to 3-nate or fasciculate at the nodes. **Culm-sheaths** papery, striate, rounded above; imperfect blades narrow, subulate. **Leaves** articulate on sheaths, small or moderate sized, transverse veinlets numerous, tessellate; leaf-sheaths loose, smooth. **Inflorescence** a leafy terminal panicle, lax, covered with spathiform, imbricate, bracts which are sheath-like and bear sometimes a leafy imperfect blade. **Spikelets** 2-3, alternate, sessile, with 1-4 fertile flowers, terminal one imperfect, rachilla articulate between the flowers and produced beyond into a terminal imperfect flower; **empty glumes** 2-3, many-nerved, usually unequal, glabrous, often ending in a leafy imperfect blade; **flowering glumes** ovate-lanceolate, many-nerved, acuminate; **palea** scarcely shorter than flowering glumes, narrow, 2-keeled, many-nerved, often bimucronate, **lodicules** 3, usually unequal, lanceolate, acute, veined. **Stamens** 3, long, exserted, filaments filiform, anthers linear. **Ovary** stipitate, ovoid or globose, glabrous, style long, dividing above into 3 long feathery stigmas.

**Distribution**: 40 species in the world, mostly native to central and southern China, a few in area to immediate south (Farrelly 1984); 41 species, native to mainland China, Taiwan, Myanmar, naturalised and/or cultivated in Korea, Japan,
Vietnam, Laos, India, Philippines, Indonesia, New South Wales, Queensland, Europe, North Africa, America, and Mexico (Ohrnberger & Goerrings 1985; Seethalakshmi & Kumar 1998); 40-45 species from Himalaya to Japan (Clayton & Renvoize 1986); 40 species, India, China and Japan (Biswas 1988).

2 species in India and both are occurring in northeastern India (Bahadur 1979; Biswas 1988); 5 species in India and 2 in northeastern India (Varmah & Bahadur 1980; Tewari 1992; Seethalakshmi & Kumar 1998); 3 species in India and two in northeastern India (Majumdar 1989); 4 species in India and 2 in northeastern India (Anonymous 1991); 2-3 species in India and 2 species in northeastern India (Shukla 1996).

Only one species, viz. *Phyllostachys assamica* is known to occur in Assam (Bahadur 1979; Varmah & Bahadur 1980; Biswas 1988; Majumdar 1989; Anonymous 1991; Tewari 1992; Shukla 1996). Two species are naturally occurring in Assam (Seethalakshmi & Kumar 1998).

In the present investigation two species have been recorded to occur in Assam.

**KEY TO SPECIES**

1a Culms upto 12m high and 20cm in diameter, with waxy ring below the nodes; culm-sheaths bristly at the mouth; auricles inconspicuous or small; ligule narrow .............. *P. assamica*

1b Culms upto 6m high and 3cm in diameter; without waxy ring below the nodes; culm-sheaths without bristles at the mouth; auricles conspicuous, caducous, fimbriate, curved; ligule broad .............. *P. mannii*

Fig. 42. *Phyllostachys assamica*
Leafy twig x 2

Evergreen, caespitose, shrubby. **Culms** 10-12 m high, upto 20 cm in diameter, sometimes more, brilliant green, glabrous, with waxy ring below the nodes which appears on maturity; nodes glabrous; internodes short. **Culm-sheaths** 15-25 cm long, thin, contracted at the top into a short, truncate or rounded collar, covered with black hairs, which at first appressed, afterwards erect and caducous; imperfect blades thin, subulate, erect when young, recurved on maturity, striations dark-green in the centre, pink on the margins; auricles often absent or small; ligule narrow. **Leaves** broadly linear, 8-19 cm x 1.5-2.2cm, glaucous, tip long, acuminate, setaceous, margins scabrous, lower surface covered with stiff, white hairs; petiole-like base short, upto 4 mm; leaf-sheaths keeled, margins ciliate; auricles short, hairy. **Flowers** not seen. (Fig. 42).


**Distribution** : (a) INDIA; (b) Assam, Arunachal Pradesh; (c) Lakhimpur, Tinsukia and Sivasagar districts.

**Note** : This species was earlier confused with *Phyllostachys bambusoides* Sieb. *et* Zucc., which occur under cultivation in that area where the former species grows (Bahadur & Jain 1981). Chao & Renvoize (1988) proposed to merge this species with *Phyllostachys mannii* which is followed also by Naithani (1990a), but the present author keeps both the species separate on the basis of their distinct morphological characters.

**Use** : Commonly used for house building and making walking sticks.

Deo banh (Ass.).

Caespitose, shrub. Culms 5-6 m high, 2.5-3 cm in diameter; nodes prominent; internodes upto 20 cm long, green when young, green or yellowish on maturity, flattened on one side. Culm-sheaths 20-22 cm x 2.5-5 cm, papery, straw-coloured, rounded at the top and truncate, extended at the base of the imperfect blade into two conspicuous fimbriate, caducous, curved auricles; imperfect blades 5-7.5 cm long, recurved, narrow, subulate, decurrent on the sheath; ligule broad, long-pectinate. Leaves in pairs in branches, 10-19 cm x 1-2 cm, base rounded, tip shortly acuminate, smooth and glabrous on both surfaces except a few white hairs near the main vein beneath, edges spinulose-serrate, main vein prominent, shining, secondary veins 5 pairs, intermediate 7-8, transverse veinlets numerous and very finely tessellate; petiole-like base rather long, upto 8 mm; leaf-sheaths loose, glabrous, smooth, straw-coloured, ending in a narrow ciliate callus with a few deciduous bristles; ligule short. Flowers not seen. (Fig. 43).


Distribution : (a) CHINA (?), INDIA, MYANMAR, cultivated in U.K.; (b) Arunachal Pradesh, Assam, Meghalaya, Nagaland; (c) On the way to Sadiya in Tinsukia district.

Note : In the earlier works there is no record of its flowering. During the present investigation also the flowers of this taxon have not observed. Identity has been confirmed by its smaller culms upto 6m high and 3 cm in diameter with swollen nodes and long, papery culm-sheaths with recurved, narrow, subulate imperfect blades.

Use : Culms are used for walking sticks (Gamble 1896).
Fig. 43. *Phyllostachys mannii*
Leafy twig x 2
**Schizostachyum** Nees


**Type**: *Schizostachyum blumii* Nees

Arborescent or shrubby, usually erect, sometimes scendent. **Culms** slender, smooth, thin-walled, usually drooping at tip, branches many and of equal length at each node from the midculm upwards, young branches at each node burst almost simultaneously from the culm-sheath, young shoots usually covered with white hairs. **Culm-sheaths** shorter than internodes, cylindrical, outer surface usually hairy, auricles small; imperfect blades triangular or subulate. **Leaves** moderately broad to broad, smooth, petioled, transverse veinlets absent. **Inflorescence** interaurant. of untidy and sometimes lax tufts of few to many spikelets, spathe or on bare branches, rarely capitulum at branch tip. **Spikelets** 1- to several-flowered, usually with rudiment; **glumes** 0-4, persistent, **lemmas** acute to pungent; uppermost palea rounded or sulcate, convolute, exceeding lemma; **lodicules** 0-10. **Stamens** 4-6, usually free, sometimes united. **Ovary** appendage with free central strand, stigma 2-3. **Caryopsis** with thin, crustaceous pericarp separable from seed, oblong to ovoid.

**Distribution**: The genus *Schizostachyum* is represented by 43 species distributed from tropical and subtropical south China, throughout southeast Asia (mainland and islands including Hawaii) to Madagascar (Farrelly 1984); 71 species and 3 varieties, tropical and subtropical China, throughout southeast Asia, northeastern
Himalayas to Madagascar and Pacific Islands (Ohrnberger & Goerrings 1985); 60 species in Madagascar, India and Malesia extending to China and Hawaii (Clayton & Renvoize 1986); 47 species in Indo-China, Bangladesh, Myanmar, Thailand, Malesia and Sri Lanka (Biswas 1988); 45 species distributed in Laos, Malaysia, Philippines, Singapore, Thailand, Africa and India (Seethalakshmi & Kumar 1998).

According to Bahadur (1979), 11 species are known to occur in India and 7 species in northeastern India; 14 species in India and 9 species in northeastern India (Varmah & Bahadur 1980); 9 species in India and all are occurring in northeastern India (Biswas 1988); 16 species, 1 variety in India and 11 species and 1 variety in northeastern India (Majumdar 1989); 13 species, 1 variety in India and 9 species in northeastern India (Anonymous 1991); 16 species in India and 13 species in northeastern India (Tewari 1992); 12 species in India and all are occurring in northeastern India (Shukla 1996); 17 species in India and 12 species in Northeastern India (Seethalakshmi & Kumar 1998).

In Assam 7 species are known to occur (Biswas 1988; Shukla 1996).

In the present investigation only 4 species have been recorded to occur in Assam.

Note: Holttum (1956d) stated that the genera Pseudostachyum Munro, Teinostachyum Munro and Cephalostachyum Munro are very similar to Schizostachyum especially in ovary and fruit structure and a clear method of separating the genera could not be found. On the other hand the genus Neohouzeaua A.Camus is a genus of doubtful status; it is chiefly defined by its united filaments and is in many respects quite similar to Schizostachyum (Ohrnberger & Goerrings 1985). Holttum (1946) pointed out that united filaments developed in distinct evolutionary lines and can not serve by its own as a good character for generic delimitation. Holttum (1946d) also emphasised the close relationship of Teinostachyum and Schizostachyum and pointed out an inconsistent distinction between them. Considering the similarities of the genera, viz. Cephalostachyum, Teinostachyum, Pseudostachyum, Neohouzeaua and Schizostachyum and the difficulty to find combinations of characters to delimit them Holttum (1956d) united them provisionally under Schizostachyum. In the present investigation also the view of Holttum (1956d) has been followed due to absence of flowering and fruiting materials of all the species recorded.
KEY TO SPECIES

1a Culms up to 3 cm in diameter, erect, scandent or straggling, distant 
or loosely tufted:

2a Culms distant, erect or scandent, very thin-walled, unbranched 
below; culm-sheaths covered with appressed, black hairs on 
outside; imperfect blades deciduous, triangular, acuminate; 
ligule dentate .......................... S. polymorphum

2b Culms loosely tufted, straggling or sub-scandent, branched 
from the lower nodes; branches many, whorled; culm-sheaths 
covered with appressed, white hairs on outside; imperfect 
blades narrow, subulate, reflexed; ligule fringed .......................... S. griffithii

1b Culms up to 10 cm in diameter, arborescent, tufted:

3a Internodes long, up to 90 cm long; culm-sheaths straw-coloured, 
de ciduous, covered with white or golden, appressed hairs on 
outside; imperfect blades narrow, subulate, recurved, densely  
golden hairy within; auricles inconspicuous; ligule 
long-fimbriate .......................... S. dullooa

3b Internodes up to 45 cm long; culm-sheaths chestnut-brown, 
covered with black, stiff, deciduous hairs on outside; imperfect 
blades ovate, cordate or cuspidate, densely brown hairy within; 
auricles, large, wavy, fringed; ligule narrow, entire .......................... S. pergracile

**Schizostachyum dullooa** (Gamble) R. Majumdar in Karthikeyan *et al.*, Fl. 
Ind. Enum. Mono. 281, 1989; Tewari, Monograph : 132, t. 80, 1992; Seethalakshmi  
& Kumar, Bamboos of India : 240, t. 80, 1998. *Teinostachyum dullooa* Gamble in 
1896; Camus, Les Bambusees : 164, t. 92A, 1913. *Neohouzeaua dullooa* (Gamble)  
1923; Bor, Fl. Assam 5 : 21, 1940; Varmah & Bahadur in Ind. For. Rec. (n.s.) Bot.  

*Dullooa, Dolo banh* (Ass.); *Wadroo* (Garo).

Moderate sized to large, tufted, evergreen. **Culms** variable, 10-20 m high, 3-10 cm 
in diameter, dark-green with a few white hairs, whitish below the nodes, glossy 
when dry; nodes slightly prominent; internodes 40-90 cm, sometimes up to 1 m 
long, walls thin, 3-8 mm. **Culm-sheaths** variable, 12-30 cm long, 10-30 cm broad at
Schizostachyum dullooa

Leafy twig x 2
base, striate, young ones with whitish and older ones with golden, appressed hairs on outside, rounded at the top and then somewhat concavely truncate and loosely fringed with bristles; imperfect blades narrow, 7-15 cm long, 1-2.5 cm broad at base, subulate, recurved, base rounded, densely hairy within with golden brown hairs, edges convolute; ligule prominent, long-fimbriate. Leaves variable, 10-39 cm x 2-6 cm, oblong-lanceolate, acuminate, base equally rounded, subulately acuminate above, the point scabrous, twisted, dorsal surface rough, almost glabrous beneath, edges scabrous, main vein pale, not very prominent, secondary veins 6-10, intermediate ±7, no transverse veinlets, pellucid dots beneath which have the appearance of transverse veinlets; petiole-like base 5-10 mm long; leaf-sheaths striate, ciliate, on the edges, callus ciliate with a few long, deciduous bristles and glabrous on maturity; ligule broad, long-fimbriate. Flowers not seen. (Fig.44; Photo.50).

Chromosome number: 2n = 56, aneuploid (Sobita Devi & Sharma 1993).


Kamrup, October 1889, Pani Ram Das 22673; Rajkhowapatthar, Makum, Lakhimpur (now Tinsukia district), July 1890, Gaustav Mann & Kripa Nath De, Coll. No. Nil; Sibsagar (Sivasagar), Assam, July 9, 1921, D.C.F. 23995 & 23996; Nambor Forest, November 20, 1942, N.L. Bor 17271 (DD).

Distribution: (a) BANGLADESH, BHUTAN, INDIA, MYANMAR; (b) Assam, Manipur, Meghalaya, Nagaland, Sikkim, West Bengal (North); (c) One of the commonest species throughout Assam, sometimes cultivated; it is found in wild state in Reserved Forests of Dhubri, Dibrugarh, Jorhat, Sivasagar and Tinsukia districts.

Note: Flowering of this species was reported from Bhutan in 1880 and from Myanmar in 1889, 1892, 1892-93, 1894 (Blatter 1930). Flowering has also been reported from Singla in 1951, 1957 and 1968 (Gupta 1972, 1982). Sporadic flowering has been reported in 1961 and gregarious flowering in 1971 from Cachar district of Assam (Seethalakshmi & Kumar 1998).
During the present investigation flowering material could not be collected. In absence of flower this bamboo can be identified by its straight, thin walled culms and by the culm-sheaths in having appressed golden hairs on the outer surface, fringed at the top and narrow, subulate, recurved imperfect blade.

**Use:** Used for lath, matting and crafts (McClure 1953; Lin 1972). Used by the Garos for carrying water and for making umbrellas. In Jaintia Hills it is used for making baskets, mats, etc. (Tewari 1992).


**Beti banh** (Ass.).

Graceful, straggling or sub-erect or sub-scandent. **Culms** erect when young, afterwards drooping or straggling, 7.5-15m long, 1.5-2 cm in diameter, verticillately branched; nodes slightly prominent with a ring of white hairs; internodes 35-60 cm long, scabrous above, walls thin, upto 4mm. **Culm-sheaths** 8-15 cm long, 4-5 cm broad at base, glabrous and shining below and white appressed hairy above on the outer surface, edges ciliate and strongly convolute; imperfect blades 5-10 cm long, upto 1.5 cm broad at base, reflexed, narrow, subulate, base rounded, outer surface glabrous, inner surface densely hairy; auricles,very small rounded on either side, the auricles and base of the imperfect blade fringed with long, curved, reflexed bristles, the inside densely white-shaggy; ligule short, pubescent. **Leaves** 15-25 cm x 1.5-4 cm, oblong-lanceolate, glaucous, base equally rounded, cuspidate above with a scabrous, subulate point, edges scabrous, glabrous on both surfaces except for clusters of long hairs at the base of the main vein, main vein conspicuous, pale,
Fig. 45. *Schizostachyum griffithii*

Leafy twig × 1
Schizostachyum griffithii
51. Culm-sheath

Schizostachyum pergracile
52. Culm-sheath
secondary veins 8-10 pairs, intermediate usually 7, no transverse veinlets, occasionally pellucid glands present; peliole-like base thick, wrinkled, 5mm long; leaf-sheaths striate, keeled, ciliate on the edges, glabrous or appressed, pubescent, ending in a narrow callus; auricles long, falcate on either sides, fringed with 1 cm long and stiff ciliae; ligule short, fringed like auricles. Flowers not seen. (Fig. 45; Photo.51).


Distribution: (a) INDIA, MYANMAR, THAILAND; (b) Arunachal Pradesh, Assam, Meghalaya; (c) Sivasagar and Tinsukia districts.

Note: This species is known to flower in Travancore in 1883, 1884, 1887-1889 and in Assam in 1889 (Blatter 1930). It may sometimes be confused as one of the species of Dinochloa. But its straggling habit of the culms and white appressed hairy, strongly convolute culm-sheaths with fringed base of the imperfect blades including ligule and auricles are quite distinct from species of Dinochloa.

Use: Culms are used for making baskets and pipes (Gamble 1896).


Medang (Ass. & Singpho); Khao-lam (Tai Khamti); Latang (Naga).

Deciduous, sometimes evergreen, tufted, arborescent. Culms 10-30m high, 5-10 cm in diameter, erect, glaucous-green, somewhat whitish-puberulous below the
Fig. 46. *Schizostachyum pergracile*
Leafy flowering twig × 2
*Schizostachyum pergracile*

53. Culms in a clump
54. Leafy flowering twig
nodes, nodes not very prominent, internodes 30-45 cm long, walls 5-10mm thick. **Culm-sheaths** chestnut-brown, sometimes reddish-yellow, much shorter than internodes, broader than long, 10-15 cm long, 15-20 cm broad at base, covered on the outer surface with black, stiff, deciduous hairs, afterwards polished; imperfect blades up to 6 cm long, ovate, cordate, cuspidate, densely hairy within, decurrent into a wavy fringe bordering the top of the sheath and ending on either sides in a rounded auricle, both fringe and auricle edged with up to 13 mm long stiff, curved, white bristles; ligule very narrow, entire. **Leaves** 15-35 cm × 2-5 cm, linear-lanceolate, base rounded or cuneate, tip subulate, acuminate, scabrous, margins scabrous, glaucous beneath, rough on both the surfaces, main vein conspicuous, secondary veins 7-13 pairs, intermediate usually 5, transverse veinlets few, oblique; petiole-like base up to 10 mm long; leaf-sheaths glabrous, faintly striate, ending in a small ciliate callus, auricles with white cilia which are early caducous; ligule very narrow, entire. **Inflorescence** a large often leafy panicle with verticils of long, drooping, filiform spikes bearing distant broad heads of spikelets supported by small, chaffy, sheathing bracts, rachis very slender, wiry, slightly thickened above, 3-5 cm between the heads. **Spikelets** in bracteate heads or clusters, 1-2 cm long, without empty-glumes, but bearing 1-2 sterile florets, then a fertile flower and then a terminal sterile flower or filiform produced rachilla; **flowering glume** 1-2 cm long, ovate-lanceolate, many-nerved, densely pale-hairy, long-mucronate; palea as long as flowering glume, 2-keeled, the keels close together, ciliate, apex deeply bifid, mucronate; **lodicules** 2, narrow, 6 mm long, lanceolate, obtuse and ciliate at the tip, 3- to 5-nerved, concave at base, persistent. **Stamens** with narrow filaments, anthers purple, obtuse. **Ovary** smooth, base sub-globular, prolonged above into a 3-edged style, stigma 3, stout, recurved. **Caryopsis** 1.2 cm long, ovate-oblong, shining, ending in a straight 1.2 cm long beak, compressed and grooved on one side. (Fig.46; Photo. 52, 53 & 54).

**Chromosome number**: 2n = 72, 48, 54 and 60, hexaploid (Ghorai & Sharma 1980; Sobita Devi & Sharma 1993).

**Exsiccatia**: Lakhimpur, Borpathar Khamti Gaon, August 18, 1996, C. Barooah 2507; Morigaon, Silviculture Range, Amsoi, February 8, 1997, C. Barooah 2519; Tinsukia, Ketetong Village near Margherita, February 20, 1997, C. Barooah 2524;

Assam, May 8, 1912, Forest Economist 3630(DD).

**Distribution:** (a) BHUTAN, CHINA, INDIA, MYANMAR, THAILAND; (b) Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Madhya Pradesh, Manipur, Nagaland, Orissa; (c) Dhemaji, Dibrugarh, Lakhimpur, N.C. Hills, Sivasagar, Tinsukia districts.

**Note:** This species often flowers sporadically and occasionally flowers gregariously over extensive area (Troup 1921). In Assam it flowered in Dibrugarh in 1936 (Bor 1940). The present author recorded its sporadic flowering (Barooah 1999).

**Use:** Culms of this species are used for house building, mat and baket making and other purposes. The Nagas use it for basket making (Gamble 1896). The Tai Khamti and other Tai People of Upper Assam and Arunachal Pradesh use the internodes as cooking pots, especially the glutinous rice. It is also important source of pulp (Anonymous 1950).


*Bojal, Nal banh* (Ass.); *Wachall* (Garo); *Pheling* (Nep.).

Large shrub, semiarborescent, evergreen, rhizomes creeping and jointed. **Culms** 10-20m long, 2-3.5 cm in diameter, branching at the upper half, often supported by
Fig. 47. *Schizostachyum polymorphum*
Leafy flowering twig × 2
*Schizostachyum polymorphum*

55. Culm-sheath

56. Culms in natural habitat
Schizostachyum polymorphum

57. Leafy flowering twig
adjoining trees and so appearing scandent, culms growing with support longer, nodes not prominent, internodes upto 30 cm long, walls very thin, upto 3 mm, glaucous when young, green on maturity, whitish below the nodes, sometimes dark red shading into bright green, smooth below, somewhat scabrous above. **Culm-sheaths** shorter than the internodes, often loose, triangular-truncate in outline, outer surface covered with appressed black or dark-brown hairs; auricles very short with a tuft of stiff bristles; ligule very short, upto 1 mm, slightly dentate; imperfect blades, long-acuminate on young shoots, shorter and triangular on older ones; usually deciduous, base equal to the horizontally-cut truncate top of the sheath, striate and with transverse veinlets. **Leaves** 10-28cm x 2.5-5cm, oblong-lanceolate, base unequal, ending in a long, twisted, scabrous point, smooth on both surfaces, one edge scabrous, main vein pale, conspicuous, secondary veins 7-11, conspicuous, intermediates 5-6, transverse veinlets many, oblique; petiole-like base upto 12mm long; leaf-sheaths faintly white-pubescent when young, glabrous on maturity, striate, the mouth ending in a few stiff ciliae, ciliae upto 1.5 cm long, whitish, often deciduous; ligule very short. **Inflorescence** a large, leafy panicle, compound of branches fascicled at the nodes, the rachis curved, wiry, angled, spikelets solitary in the axils of narrow bracts. **Spikelets** 5 mm long with 1 fertile flower and a terminal produced rachilla bearing glumes or on incomplete flower; **empty glumes** 1, broad, mucronate, usually 6-to 7-nerved; **flowering glumes** similar to empty glumes, finely ciliate above; **palea** thin, much convolute, 2-keeled, ciliate on the keels; **lodicules** 3-5, usually 4, large, acute, rounded or truncate at the apex, ciliate, persistent in the fruit. **Stamens** 6, free, filaments short, anthers apiculate. **Ovary** narrow, linear-oblong, ending in a long, rigid style, stigma 2, short, hairy. **Caryopsis** globose-depressed, surmounted by the base of the style and supported by the persistent glumes, palea and lodicules; pericarp crustaceous. (Fig. 47; Photo. 55, 56 & 57).

**Chromosome number:** 2n = 48, tetraploid (Sobita Devi & Sharma 1993).


Charduar, Darrang, December 1889, Gaustav Mann, Coll. No. Nil; Makum Forest, Lakhimpur (now Tinsukia district), December 1889 Gaustav Mann, Coll. No. Nil; Sibsagar (Sivasagar), June 1890, Gopal Benerjee Coll. No. Nil; Holongapara, Sibsagar (now Gibbon W.L. Sanctuary, Jorhat), July 29, 1921, D.C.F. 23998; Jamuguri-Harupani Road, Sibsagar (Sivasagar), July 31, 1921, D.C.F. 2400; Chuchugim, Assam, September 9, 1942, N.L. Bor 16686; Numaligarh, Assam, October 8, 1945, N.L. Bor 73(DD).

Distribution: (a) BHUTAN, INDIA, MYANMAR, NEPAL; (b) Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, West Bengal (North) upto 900 msl.; (c) Almost throughout the state, sporadic in lower Assam.

Note: This species flowers frequently and sporadically. Sporadical flowering was reported from Sikkim during 1857 (Blatter 1930) and from Mizoram during 1978-79 (Mohan Ram & Gopal 1981). No report of its gregarious flowering is available. In the present investigation sporadic flowering have been recorded (Barooah 1999).

In the absence of flower, however, the plant can also be identified by its distant rhizomes which produce slender, sub-scandent, shortly branched above, very thin walled culms and especially by the culm-sheaths in having sparsely appressed black hairs on outer surface, and long-acuminate, triangular, deciduous imperfect blades.

Use: Culms are used largely for basket making and preferred most for lath, matting, withes for tying frames of houses and small crafts.