ESTABLISHMENT OF A BAMBOOSETUM

T. Surendran
K.C. Chacko
N. Gopalakrishnan Nair
E. Muhammad

KERALA FOREST RESEARCH INSTITUTE
PEECHI, THRISSUR

October 1991 Pages: 22

CONTENTS

ABSTRACT

Bamboo is a valuable renewable natural resource. It has both household and industrial uses. Of about 1000 bamboo species recorded all over the world, India is endowed with more than 100 species. In order to obtain first-hand knowledge about different species of bamboos, a project was undertaken for collection and establishment of different species of bamboos. So far 20 species of bamboos have been established in the bamboosetum located at Nilambur in Kerala, India. The propagules used were offsets, culm or branch cuttings and seedlings. Hormone treatments were given in cases where induction of rooting was necessary in culm and branch cuttings. Observations on culm production and growth were recorded. A list of species with accession number and a plot chart are also provided. Botanical names, vernacular names, distribution and important uses of each species are appended.

INTRODUCTION

Bamboo constitutes one of the most important renewable biomass resources. From time immemorial, due to their various characteristic properties and easy availability, they have been used for making various articles of day-to-day use. As a raw material for handicrafts, paper and pulp industries, bamboo has always been in great demand. In the household sector, bamboo is used for making baskets, mats, flutes, agricultural implements, spears, bows and arrows and walking sticks. Bamboo shoots are delicious and edible species are cultivated in Japan, the Philippines and China for domestic consumption and export. Bamboos are ideal species for afforestation, soil conservation and social forestry. Being closely associated with the life of people in several ways, they occupy a place of pride. The Vietnamese epitomize the closeness of bamboo in their proverb by saying "The bamboo is my brother". In China, bamboo is one of the four noble plants, along with orchids, plum tree and chrysanthemum. It is a subject of fascinating study to the artists, poets and scientists (Suri and Chauhan, 1984).

India is endowed with a large number of bamboo species and perhaps world's largest resources of bamboos, exist in this country. Out of the total of nearly 1000 known species (excluding the herbaceous bambusoid species) about 100 have already been described or recorded from India and there are probably many more which are not yet known to science (Lessard and Chouinard, 1980). Several species have also been introduced from other countries and presently the total number of taxa, both wild and cultivated in India is ca 136. Out of

these, more than 50% occur in eastern India, viz., Arunachal Pradesh, Aesam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal, Other areas rich in bamboos are Andamans Bastar region of Madhya Pradesh and the Western Ghats while quite a few species are found in other parts of lndia both in hills upto 1000 m altitude as well as in the plains (Varmah and Bahadur, 1980). The important genera of bamboos occurring in India are *Arundinaria, Bambusa Dendrocalamus, Gigantochloa, Indocalamus, Melocanna, Neohouzeaua, Ochlandra, Oxytenanthera, Phyllostachys, Pseudostachyum, Schizostachyum, Semiarundinaria, Sinobambusa, Teinostachyum* and *Thamnocalamus.* Besides these, 3 exotic genera, viz. *Guadua*, *Pseudochloa* and *Thrysostachys* are found in cultivation. However, Varmah and Bahadur (1980) consider, that the above list is tentative as they expect some general synonymous with others, while there may be a few more which have yet to be described.

This project was undertaken with an objective of having a live collection of as many species of bamboos as possible in one locality. Even though, this calls for continuous attention and knowledge about the requirements of each individual species, the task enables detailed study of bamboos.

MATERIALS AND METHODS

Propagation materials of various species of bamboos used to establish the live collection included offsets, rooted culm cuttings and branch cuttings, seeds and seedlings. The propagules according to their avilability were collected from different localities (Table 1) and were planted in the bamboosetum.

The area: An area of about 0.75 ha was demarcated in the Nilambur Subcentre campus of KFRI (11°17'N, 74°4'E). The soil is well drained and has a pH 6.7. The area receives annual precipitation of about 2500 to 3000 mm and is located 150 m above msl.

Design: Initially a chessboard design of planting was envisaged in the area, so that each species will occupy one block of 16 plants, planted in 4 rows of 4 plants each. *Bambusa bambos, B. vulgaris, Dendrocalamus longispathus* and *D. strictus* were planted in this design. All other species were planted in a linear design, owing to the limited number of propagules obtained. A spacing of 7 x 7 m was provided between plants. Also a 1 m pathway across the area was provided (Fig. 1).

Propagation:

a. Offsets: Offset consists of a portion of an old culm with its roots and a portion of rhizome,cut off above a node at about 30 to 60 cm above the ground. Such offsets are collected and planted in the season of rest (March-May), so that in the season of active growth, which usually begins with the onset of rain, they will be capable of taking root easily. Offsets collected from distant places were

covered with wet sawdust, packed in gunny bags and transported to the area. Usually these were potted and kept in shaded nursery conditions for about a month before planting out in the field, to ensure survival.

b. Culm cuttings: Culms extracted from clumps of different species of bamboos, were brought to the area and were made into two noded culm cuttings. These were subjected to hormone treatments (Surendran and Seethalakshmi, 1985) for induction of rooting and were planted in the nursery beds. After sufficiently rooting, the propagules were planted in the bamboosetum.

c.Branch cuttings: Side branches of bamboos were also made into two noded cuttings before giving hormone treatments by 'dip method'. After treatments, cuttings were planted in the nursery beds, till they formed good propagules. When sufficient rooting and sprouting were obtained, they were uprooted and planted in the bamboosetum.

d. Seeds: Seeds were first sown in the nursery to obtain seedlings. Seedlings were pricked out and planted in poythene bags, and were kept under nursery conditions in order to allow them to attain a plantable size (about 30 cm height), before planting them out in the area.

e. Seedlings: Propagules obtained as seedlings were initially planted in polythene bags and were kept under nursery conditions. When they attained plantable size, they were planted out in the area.

Numbering: Each plant in the bamboosetum is given a serial number denoted as accession number (Table 4). The number is treated as

permanent number and it is given irrespective of species and position of planting in the area (see Table 4 and Fig..

Growth observations: Observations on some of the phenological characters like, total number of culms produced up to 1990, number of new culms produced, height and girth of culms were recorded.

RESULTS AND DISCUSSION

Live collection of 20 different species of bamboos was established in the bamboosetum. The location of collection, nature of propagules used, hormone treatments given, if any, during the propagation time and the year of planting in the bamboosetum are given in Table 1. There are a total of 7 species belonging to the genus *Bambusa* and 6 species belong to the genus *Dendrocalamus.* The genus *Melocanna* is represented by only a single species, while *Ochlandra, Uxytenanthera* and *Thyrsostachys* by two species each. The list of various species along with their accession numbers is furnished in the Table 4.

The collection of propagules of various bamboo species were made from Kerala, Karnataka and Assam in India and Thailand. Seeds/seedlings were obtained in the case of six species while all other species were propagated and established either through culm/branch cuttings or through offsets. The hormones used to induce rooting in culm cuttings were indole butyric acid (IBA) and naphthalene acetic acid(NAA) both at a concentration of 100 ppm.

The important phenological parameters recorded are presented in the Table 2. *Bambusa vulgaris* represented maximum number of plants (19), followed by *Dendrocalamus strictus.* The number of culms, height

and girth of the culms and production of new culms etc. largely depended upon the number of years completed in the bambooseturn, by a plant and general growth of the clump. The production of new shoots occurs, generally after the onset of monsoon, i.e. during late May to early June.

Most bamboos flower only once in their life time and die soon after seeding. The flowering interval varies, between 7 and 120 years, from species to species. This phenomenon poses problems in bamboo identification. Bahadur (1979) tried to identify bamboos based on morphological characters of culm sheaths and juvenile shoots. Culm sheaths are close fitting covers provided at every node of the bamboo culm (stem) and perform the function of protecting and supporting the stiffening of the internodes of young culms during the period of their active elongation growth. Culm sheaths have the blade,the ligule and the auricles as their principal appendages. The size and shape of these vary from species to species. The variation in the morphological characters of culmsheaths and juvenile shoots are very well used for distinguishing different bamboo species. A brief account of these characters are given in Table 3.

The main objective of the project was to establish as many bamboo species as possible. The requirement of each species varies and this demands great care and scientific management practices. Since the project is envisaged as a continuous one, more species will have to be collected and established. This will enable detailed study of each species.

Table 1 Botanical names, Place of collection, propagules used, horwne treatments given and year of planting of different species of bamboos in the bamboosetum

Species	Place of collection	Propagules used	Hormone treatment	Year of planting
Barbusa balcooa	Peechi	Rooted culm cuttings	IBA* 100 ppm	1983
Bambusa *bambos*	Nilambur	Rooted culm cuttings	IBA 100 ppm	1983
Barbusa glaucescens	Calicut	Offsets		1988
Bambusa polymorpha	Nedumpoil	Rooted culm cuttings	IBA 100 ppm	1982
Bambusa tulda	Assam	Offsets		1985
Bambusa ventricosa	Calicut	Rooted culm cuttings	NAA *100 ppm	1987
Bambusa vulgaris	Nilambur	Rooted culm cuttings	NAA 100 ppm	1983
Dendrocalamus brandisii	Wakkoot	Rooted culm cuttings Offsets		1985
Dendrocalamus giganteus	Trivandrum	Offsets		1985
Dendrocalamus hamiltonii	Assam	Offsets		1985
Dendrocalamus longispathus	Manantody Nilambur	Rooted culm cuttings Seedlings	NAA 100 ppm	1983,1984
Dendrocalamus membranaceus	Kodanad	Rooted culm cuttings	IBA100 ppm	1984
Dendrocalamus strictus	Nilambur	Rooted culm cuttings	NAA100 ppm	1982,1983
Melocanna bambusoides	Karnataka	Offsets		1988
Ochlandra scriptoria	Vazhachal	Rooted culm cuttings	IBA 100 ppm	1984
Ochlandra travancorica	Vazhachal, Wancheeri	Rooted culm cuttings, Seedlings	NAA 100 ppm	1984
Oxytenanthera monostigma	Nilambur	Seedlings		1985
Oxytenanthera stocksii	Kasaragod	Offsets		1987
Thyrsostachys oliveri	Ezhakkode	Offsets		1984
Thyrsostachys siamensis	Thailand	Seedlings		1988

*IBA = Indole butyric acid; + NAA = Naphthalene acetic acid

Table 2. Phenological characterr of various species of bamboos in tbe bamboosetum

Species	Total no. of clumps	Mean no.of culms	Mean maximum height of clums(m)	Mean Maximum girth of clums(m)	Wean no. of new clums as on 17-11-90
Bambusa balcooa	4	7.0	5.9	11.9	1
Bambusa bambos	5	7.0	8.7	15.3	-
Bambusa glaucescens	1	39.0	2.5	2.0	-
Bambusa polymorpha	3	50.0	8.0	14.3	6
Bambusa tulda	1	2.0	4.1	9.0	-
Bambusa ventricosa	2	4.5	2.4	6.7	1
Bambusa vulgaris	19	15.9	8.4	16.6	18
Dendrocalamus brandisii	1	6.0	7.2	14.7	-
Dendrocalamus giganteus	1	4.0	11.6	23.0	-
Dendrocalamus hamiltonii	1	2.0	0.5	-	-
Dendrocalamus longispathus	12	35.4	10.0	13.9	15
Dendrocalams membranaceus	1	-	-	-	-
Dendrocalamus strictus	18	14.4	1.3	10.2	2
Melocanna bambusoides	1	2.0	0.8	-	1
Ochlandra scrip toria	4	52.5	3.4	4.7	7
Ochlandra travancorica	2	18.8	3.9	7.1	-
Oxytenanthera monostigma	1	4.0	1.1	-	-
Oxytenanthera stocksii	1	1.0	2.5	1.3	-
Thyrsostachys oliveri	3	14.0	2.7	4.3	2
Thyrsostachys siamensis	1	-	-	-	

Table 3. Species, characteristics of the culm sheaths, and characters of young shoots of some bamboos in the bamboosetum.

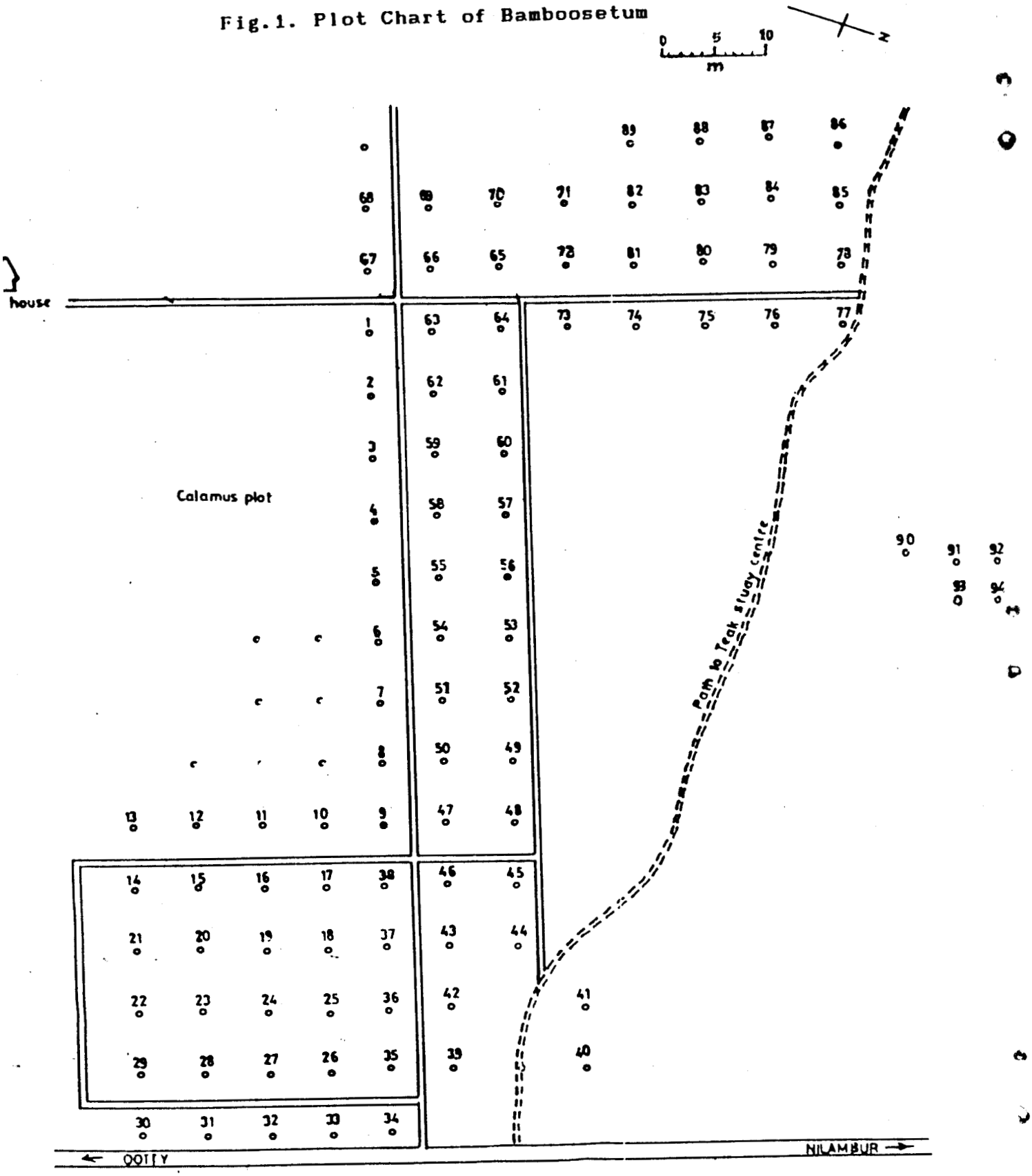
Species	Characteristics of culm sheaths	Diagnostic characters of young shoots
Bambusa balcooa	Lower ones short and broad, densely appressed hairy on the upper surface, ciliate on the edges; upper ones almost glabrous, striate, ciliate on the edges.	Dull greyish green; apex pointed.
Bambusa bambos	Elongated, glabrous; thick, Small apex narrow, culm erect, blade broadly triangular; branches thorny.	Metalic purplish green; growing apex blunt.
Bambusa glaucescens (Syn.B. *multiplex, B. nana)*	Conical, broad based; blade smaller than sheath.	Auricles inconspicuous; blade broad at the base, suddenly tapering upward: slender.
Bambusa polymorpha	Very large, glabrous; much broader than longer; auricles present, falcate.	Auricles biserrate; lover blade brown; other blades green, cup shaped.
Bambusa tulda	Fairly large, felted; asymmetric or oblique; auricles, at least one of them stituated laterally; culm nodes with a white calcarious band on one side.	Yellow stripes on green surface; calcareous band on one side of culm node
Bambusa ventricosa	Green, rounded at the top and striate.	Dark brown, apex green; auricles distinct : internodes pitcher shaped.
Bambusa vulgaris	Fairly large; felted; symmetric, broad; covering a major part of the internode, yellow or green; rounded at the top, blade triangular.	Dark brown, apex green; auricles distinct ;internodes cylindric; pure green and pure yellow culms with all interrediary shades, yellow with green stripes most common.
Dendrocalamus brandisii	Thick coriaceous, minutely white pubescent on the back, rounded depressed at the top.	Ash-gray to greenish-gray nodes slightly swollen
Dendrocalamus giganteus	Very large, glabrous; not conical, ligule serrate; blade broadly triangular.	Column very big, glaucous-green, glabrous; auricles absent.
Dendrocalamus hamiltonii	Very large, glabrous; conical, broad; auricles absent.	Tomentum perfectly black; auricles present; blade iff and pointed.

Species	Characteristics of culm sheaths	Diagnostic characters of young shoots
Dendrocalamus longispathus	Elongated, glabrous: papyraceous, very long.	Glaucous-green, covered with more or less persistent sheaths.
Dendrocalamus membranaceus	Domeshaped felted;, blade narrow, elongated, tapering.	Sheath light brown, mottled; blade linear.
Dendrocalamus strictus	Domeshaped, felted; blade triangular, pointad.	Brown with very thick, dark brown hairs, apex short: auricles absent; culms glaucous.
Helocanna bambusoides (Syn. *M.* baccifera)	Fairly large, felted: symmetric, narrow; auricles prominent, blade arising from a concave depression	Ligule horse-shoe shaped: blades flagellate; stems single Inon-clump forming).
Ochlandra scriptoria (Syn. **O**.rheedii)	Purplish green, hairy when young, siooth striate when old, ciliate on the edges, rounded and truncate at the top and bearing **2** small falcate, long ciliate auricles.	Erect, long and smooth with persistent sheath.
Ochlandra travancorica	Long, thin, longitudinally wringled and striate, vhen young covered with many golden or black bulbous based hairs, glabrous when old, ciliate on the margins.	Gray green, rough: apex pointed.
Oxytenanthera monostigma	Thin papery at the edges, striate sparsely covered with white appressed stiff hairs.	Densely covered with soft, pale yel low, velvetty tomentum.
Oxytenanthera stocksii	Yide at the base, gradually tapering upwards concavely truncate at top: densely appressed brown hairy on the back, ciliate on the margins.	Grey-green, glabrous or covered with close soft pubescence.
Thyrsostachys oliveri	Fairly large, felted: symmetric, narrow; auricles abscent, blade arising from a flat top,	Yellow lines on the sheaths: blades linear; lower culm nodes often bearded.
Thyrsostachys siamensis	Soft, thin covered with fine white appressed pubescence on the back attenuate upwards to a wavy truncate top, produced at the margins into short triangular auricles.	Straight, high, usually covered with the persistent sheaths: internodes with a white ring below the nodes.

Table 4. List of live collection, their accession numbers and number of clumps of various species of bamboos in the bamboosetum.

Sl. No.	Name of species	Accession Number	Number of plants
1	*Bambusa balcooa*	4,34,68,74	4
2.	*Bambusa bambos*	10-13,55	5
3.	*Bambusa glaucescens* (Syn. *B. multiplex, B. nana)*	47	1
4.	*Bambusa polymorpha*	2,31,64,67	4
5.	*Bambusa tulda*	48	1
6.	*Bambusa ventricosa*	58,69	2
7.	*Bambusa vulgaris*	5,14-30,50,72	19
8.	*Dendrocalamus brandisii*	66	1
9.	*Dendrocalamus giganteus*	-	1
10.	*Dendrocalamus hamiltonii*	51	1
11.	*Dendrocalamus longispathus*	1,35-46	13
12.	*Dendrocalamus strictus*	53.75-89	16
13.	*Dendrocalamus mebranaceus*	4	1
14.	*Melocanna bambusoides* (Syn.*M. baccifera)*	9,33,59	3
15.	*Ochlandra scriptoria* (Syn.*O. rheedii)*	91-94	4
16.	*Ochlandra travancorica*	49,90	2
17.	*Oxytenanthera monostigma*	60,65	2
18.	*Oxytenanthera stocksii*	32	1
19.	*Thyrsostachys oliveri*	52,63,70	3
20.	*Thyrostachys siamensis*	-	1

Fig.1. Plot Chart of Bamboosetum



REFERENCES

Bahadur, K.N. 1979. Taxonomy of Bamboos. Indian Journal of Forestry 2(3):222-241.

Gamble, J.S. 1896, The Bambusae of British India, Vol. VII. Annals of the Royal Botanic Garden, Culcutta.

Hata Okamura and Yukio Tanaka, 1986. The Horticultural bamboo species in Japan. Published by Higashimode Kobe, Japan:6-7.

Lessard, G. and Chouinard, A. (Eds.) 1980, Bamboo research in Asia. Proceedings of a Workshop held in Singapore, 28-30 May, 1980 IDRC, Canada.

Surendran, T. and Seethalakshrni, K.K. 1985. Investigations on the possibility of vegetative propagation of bamboos and reeds by rooting stem cuttings. KFRI Research Report No. 31: 47p.

Suri, S.K. and Chauhan, R.S. 1984. Indian Timbers. Bamboo. Information Series 28. Forest Research Institute and Colleges, Dehra Dun.

Varmah, J.C. and Bahadur, K.N. 1980. Country Report and Status of research on bamboos in India. Indian Forest Records (Botany) 6(1), 1980: 28p.

APPENDIX - 1

Botanical names, vernacular nares, distribution, and uses of bamboos in the bamboosetum.

***Bambusa balcooa* Rox.**

Vernaluar names: Balku bans (Bengali); Baluka (Assamese)

Distribution: Assam, lower Bengal and Bihar extending to Gorakpore

Uses: It is probably the best and strongest species for building purposes, and is greatly esteemed in Calcutta but it is hardly chosen as an ornamental species. It is much used for scaffolding and is very durable if well seasoned by immersion in water.

***Bambusa bambos* (L.) Voss**

(Syn.*Bambusa arundinacea* (Retz.) Willd.)

Vernacular names: Bans, behor bans, kotua, katuabi (Bengali)

Illy (Malayalam), Kanta bans (Orissa), Kattang (Madhya Pradesh), Kotora (Assamese), Kyakatwa (Burmese), Magar bans, Nal ban (Punjab), Mugil (Tamil), Mulkas, Vedru (Telugu), Mundugay (Marathi)

Distribution: Throughout India, Burma and Sri Lanka, except in the Himalaya and Sub-Himalayan region and the valleys of Ganges and Indus. It is common in Orissa, the Circars Karnataka, Concan and the Western Ghats, ascending in the hill ranges upto 1000 m above msl.

Uses: This is probably the best known and most cultivated of all the Indian bamboos, largely employed for various uses. The densely

interlacing thorny branchlets make impenetrable hedges and good fencing material.

***Bambusa glaucescens*(Wil ld.) Sieb. ex Munro**

(*Bambusa multiplex; Bambusa nana*)

Vernacular names: Pa-lau-pinan-wa (Burmese); Bamboo tjeenah aloos Bamboo hower tjeenah ; Bulu perindu (Malay)

Distribution: A native of China and Japan, cultivated in India, Malaya and Sri Lanka in various places, Royal Botanic Gardens at Calcutta, Paredeniya, in Chittagong, Madras, Rangoon, Singapore and elsewhere.

Uses: It makes excellent stiff, closely growing hedges and is hardy.

***Bambusa polymorpha* Munro.**

Vernacular names: Kyathaungawe (Burmese);Betua and Jama betua (Bengali)

Distribution: Eastern Bengal and Burma Pegu Yomah and Martaban,

Uses: Best used for the walls, floor and roofs of houses in Lower Burma. It is also cultivated.

Bambusa ***tulda* Roxb.**

Vernacular names: This species is locally known as Miditenga (Sylhet), Wati (Garo), Wamung wagi nalbans (Assamese), Deoban (Assam-Burmese), Bijuli, Jate jao, Ghora (Kamrup), Jowa (Bengali), Peka (Hindi).

Uses: This is used for building, scaffolding, for making mats and baskets; young shoots are pickled and eaten.

***Bambusa ventricosa* Kurz. (Syn. *Bambusa wamin* Camus)**

Vernacular names: Budhabelli; Wamin (Burmese)

Distribution: China and Japan; Vietnam, Formosa and,Kanton, Worldwide; frequently cultivated for ornamental purposes.

Uses: Ornamental purposes, a short one with internodes particularly swollen is used as a miniature plant. The type with the deformed culm is well used for handicrafts (Hata Okamura and Yukio Tanaka, 1986).

***Bambusa vulgaris* Schrad Var. striata**

Vernacular names: Basini or Bansini (Benga1i);Bariala (Chittagong);Una (Sri Lanka);Hower sehah, Kooda (Malay)

Distribution: Cultivated in warmer parts of India, Burma, Malaya and Sri Lanka. Its original country is uncertain, it is found in Java, Moluccas, Mauritius, Bourbon, Madagascar, A1geria, West 1ndies, Mexico, Central and South America and it is cultivated in most tropical gardens.

Uses: Used for building purposes. The species is very ornamental and is cultivated in most of the tropical gardens.

Dendrocalamus brandisii Kurz.

Vernacular names: Kyellowa (Burmese); Waya, Wapya, Wakay (Karen)

Distribution: Tropical forest of the eastern slopes of the Pegu Yoma and of the Martaban hills upto 1250 m extending northwards to the Ruby Nines district, chiefly on calcarious rocks.

Uses: Used for building purposes

Dendrocalamus giganteus Munro

Vernacular names: Wabo (Burma) Worra (Assam)

Distribution: Malay peninsula in Penang and northwards to Tenasserim , cultivated in Burma and in Gardens of Calcutta, Madras, Paredeniya in SriLanka and elsewhere.

Uses: This species is probably the giant of the bamboo tribe, and is at once recognised by the size of its characteristic sheath. Multifarious uses.

Dendrocalamus hamiltonii Nees

Vernacular names: Wabo myetsangye (Burmese),Chye (in Dehra Dun North west Himalaya) Tama (Nepalese), Pao (Lepha) Kokwa and Pecha (Bengali), Fonay (Mikir)Wanoke

Distribution: North-East Himalaya Darjeeling Hills Terai, Assam Valley, Khasia Hills, Sylhet, extended eastwards to upper Burma and westwards to the Sutlej, though doubtfully indigenous beyond Nepal.

Uses: Largely used for building, basket and mat work , the young shoots are eaten as a vegetable: the inner layer of the culm sheath is used for covering Burmese cigarettes.

***Dendrocalamus longispathus* Kurz.**

Vernacular names: Khang (Bengali) Ora (Aracanese) Wa-ya and Talaya (Burmese)

Distribution: Eastern Bengal and Burma, chiefly along streams. It has been introduced into the Western peninsula and cultivated at Calcutta and Malabar etc.

Uses: Culms are not very strong, and as a building material it is generally inferior to many other bamboos. This is a beautiful species and is at once recognized by its long fragile papery sheaths.

***Dendrocalamus membranaceus* Munro**

Vernacular names: Wa-ya, Wa-yai , Wamu, Wapya (Burmese).

Distribution: Moist forests and low ground in eastern Burma down to Tenasserim.

Uses: It is used for building purposes.

***Dendrocalamus strictus* Nees**

Vernacular names: Bans, Bans Kaban (North India), Karail (Bengali), Salia bans (Uriya), Sandanapa vedru (Telugu), Myincoa (Burmese).

Distribution: Dry hills throughout India and Burma. It is common throughout the hills of Eastern and Western and Central and South India upto 1000 m msl.

Uses: This is the most common and most widely spread and most universally used of the Indian bamboos, and commonly known as the male

bamboo. Used for all purposes of building and furniture, for mats, askets, sticks and lance shafts etc.

Melocanna bambusoides Trim.

ernacular names: Muli, Metunga (Bengali);Tarai (Assamese), Wali Cachari), Artem, (Mikar), Turiah (Naga).

Distribution: Throughout Eastern Bengal and Burma from the Garo and hasia Hills to Chittagong and Arracan and again in Tenasserim.

Uses: This interesting and handsome species is one of the most aluable and important of the Indian bamboos. Millions of them are early required for building purposes.

Ochlandra scriptoria (Dennst.) C.E.C. Fisher (Syn. O. Rheedii)

Vernacular names: Ama, Eetta (Malayalam).

Distribution: West coast of India in Malabar, Cochin and Travancore. Found only on river banks in the wetter districts of Travancore (Bourdillon).

Uses: It is used for mat making, making arrows, baskets and writing pens, leaves are specific for tooth ache. It flowers annually, not dying down after flowering.

Ochlandra travancoria (Bedd.) Benth. ex Gamble

Vernacular names: Eetta (Malayalam), Irul, Irakalli (Tamil), Elephant grass (English).

Distribution: Mountains **of S.** India in Tinnelvelly and Travancore at 1000 to 1,500 meter elevation.

Uses: It makes splendid paper.

***Oxytenanthera monostigma* Beddome**

Vernacular names: Choomaree, Chowa, Chiwan, Chawa, Huda, Udha, Manga, Tandali .

Distribution: Western Ghats and hills of south west India from Mahabaleshwar to the Anamalai Hills.

Uses: One **of** the common bamboos, largely cut and used for all purposes.

***Oxytenanthera stocksii* Munro**

Vernacular names: Kondaman (Kanara), Mace (Mes)

Distribution: Concan, carwar, Coompta, S.E Wynad, Nilgiris, usually cultivated.

Uses: This species is not very well known; usually cut and used for a11 purposes.

***Thyrsostachys oliveri* Gamb1e**

Vernacular names: Thanawa '(Burmese), Mailong (Kachina)

Distribution: Hills **of** upper Burma in moist forests on ridges at 700 m elevation.

Uses: A beautiful species of bamboo. Stems are greatly used for building purposes; tool handles fishing rodes etc. seeds are eaten.

Thyrsostachys siamensis Gamble

Vernacular names: Tiyowa, Kyaaung wa (Burmese)

Distribution: Burma from Madalay down to tenasserim; Kyankse and Meiktila districts and siam; cultivated in Royal Botanic Gardens Calcutta.

Uses: Used for making umbrella handles, tool handles, cultivated in Gardens.

---

* Source: Gamble, J.S. 1896