

GENERAL PAPER

Diversity, distribution pattern and utilization of bamboos in Sikkim

Bishnu Kumar Sharma^{1*}, Musadiq Hussain Bhat², Mufida Fayaz², Amit Kumar³ and Ashok Kumar Jain³

¹Department of Botany, Namchi Government College, South Sikkim - 737126, Sikkim

²School of Studies in Botany, Jiwaji University, Gwalior - 474011, M.P.

³Institute of Ethnobiology, Jiwaji University, Gwalior – 474011, M.P.

ABSTRACT

Out of 30 species recorded from Sikkim, only 3 species (10%) under 2 genera are monopodial type and 27 (90%) species under 8 genera are sympodial type. About 25 species were found in tropical (0-900m), followed by 17 species in subtropical (900-1800m), 8 species in temperate (1800-2700m), 6 species in sub-alpine forests (2700-3500m) and only 3 species in alpine forests (3500-4500m). Sixteen species (53.33%) have been described as wild, nine (30%) as cultivated and five species (16.66%) as both cultivated and wild. The survey revealed that some species are edible, and a good number of species are used for construction, flooring, fencing and for many agriculture purposes. Most commonly used bamboo species are *Bambusa nutans*, *Sinarundinaria hookeriana* and *Dendrocalamus sikkimensis*.

KEYWORDS: Bamboo, culm, *Dendrocalamus*, North-east, Sikkim, sympodial.

Received 2 January 2018, Accepted 5 March 2018 | Email: buttsuraya@ymail.com

Introduction

Bamboo is an extremely diverse plant, which easily adapts to different climatic and soil conditions (Ohrnberger 1999). Bamboos are naturally distributed in the tropical and subtropical belt between approximately 46° N and 47° S latitude up to 4000 m (asl) altitude, and is commonly found in Africa, Asia and Central and South America (Lobovikov et al. 2007). The geographical distribution of bamboo is greatly influenced by human activities (Holttum, 1958). Forest destruction for dam and building constructions and, road development purposes has encouraged the spread of native bamboos, which subsequently become abundant and form bamboo forests (Manilal and Kumar 1998).

Around 75 genera and 1250 species of bamboo are known to exist throughout the world. (Yang et al 2004). India has rich species diversity of bamboo. About 25% of bamboo species of the world are found in India distributed widely in most of the states with abundance in the Western Ghats and North-east India (Biswas 1988, Rai and Chauhan 1998). Bamboos occupy 13% of the total forest area of the country (Varmah and Bahadur 1980), growing right from the coastal plains to the elevations of 3700 meters in the Himalayas (Mehra and Sharma 1975). According to a later report by

INBAR (2005), a total of 145 species belonging to 23 genera were reported to be found in India.

The North-eastern states of India harbour nearly 90 species of bamboos, 41 of which are endemic to that region (Sharma and Nirmala 2015). The physical geography along with precipitation, temperature and altitudinal variations, play a significant role in the diversity and richness of the bamboo flora of North-eastern and eastern region forests of Indian Himalayas. Bamboo is one of the most important forest resources in Sikkim. The indigenous people of Sikkim living in hilly areas dependent on rich biodiversity resources have always been enquiring in exploring the plant resources of their immediate surroundings in order to sustain their traditional livelihood system. Bamboos play an important role in local economies throughout the world and are of major national and international commercial importance in the Asia-Pacific region (INBAR 1999). Bamboos are traditionally important in supplying housing, tools and other implements, musical instruments and other handicrafts (McClure 1966). Due to modern technological advances bamboos have become important in world markets in the form of pulp for paper, parquet, ply bamboo and as canned vegetable (Dransfield and Widjaja 1995).

Despite the economic, social and conservation significance of bamboos, data on bamboo distribution and resources, especially in natural forests, are very limited. The aim of present study is to give a detailed account of diversity, distribution and uses of bamboos of Sikkim through literature and extensive field surveys.

Materials and Methods

Study Area

The study has been conducted in the Sikkim state, one of the North-eastern states of India which lies between 27°00'46" and 28°07'48"N latitudes and 88°00'58" and 88°55'25"E longitudes with geographical area of 7, 096 Km² which contributes only 0.22 % to total geographical area of India (Fig. 1). Administratively, it has been divided into four districts and 16 sub-districts. Population comprises many ethnic, linguistic and cultural groups. The different communities of Sikkim are characterized by their individual culture, custom, and tradition. The main groups are the Lepchas, Bhutias and Nepalis. The topography of Sikkim is characterized by the lofty mountains and ridges in the alpine areas and by the valleys in the tropical areas. The climate is highly variable owing to the variation in topography. Subtropical climate prevails in the lower slopes characterised by warm winters and hot humid summers. In the interior regions of Sikkim, temperate climate prevails. Annual mean temperature range from 11.3°C to a maximum of 19.8°C, December to February being the coldest and June to September the warmest months. Average relative humidity is 80%. The average annual rainfall is 3580.5 mm. Maximum rainfall occurs during May-August, while as November and December remain dry. East district receives the highest rainfall and northern parts receive very scanty rains.

Survey Methods

Field visits for documentation of the diversity, distribution of bamboo species and its indigenous items were undertaken in four districts of Sikkim. Bamboos were classified under five distribution classes i.e. tropical (0-900m), subtropical (900-1800m), temperate (1800-2700m), sub-alpine forests (2700-3500m) and alpine vegetation (3500-4500m). The identification of bamboo was made using some manuals, taxonomical keys, floras, local people and later with the help of experts. The local people were interviewed for documenting the utilization of bamboos. After collection, bamboo specimens were identified with the help of local floras and deposited in Department of Botany, Namchi Government College, South Sikkim (India).

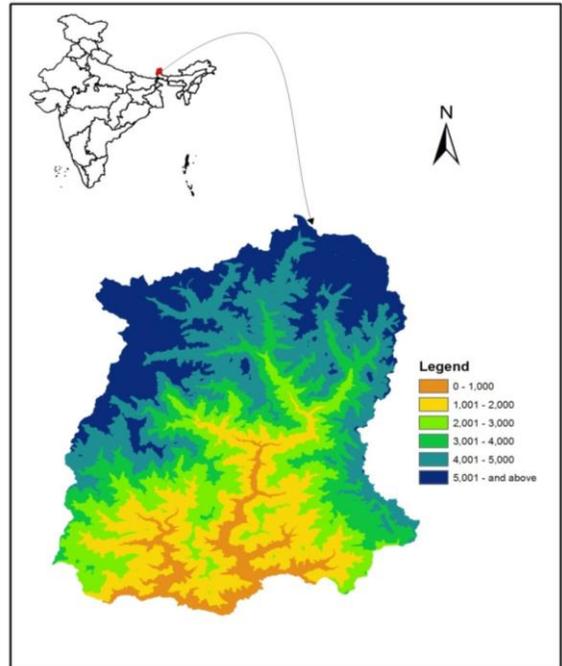


Figure 1. Location map of the study area.

Results

Diversity

Bamboos are widely distributed throughout Sikkim state, usually found in the moist valleys, low hill slopes of southern part, near streams, moist deciduous, wet temperate and sub-alpine coniferous forests of the state. The main genera found in the state are *Arundinaria*, *Sinarundinaria*, *Phyllostachys*, *Bambusa*, *Dendrocalamus*, and *Schizostachyum* (Fig. 2). Cultivated bamboos are also found in the agricultural land areas, roadsides, private and government areas. The main species found in Sikkim are *Bambusa nutans*, *B. tulda*, *Dendrocalamus hamiltonii*, *Sinarundinaria hookeriana* etc. (Fig. 3). *B. nutans*, *B. tulda* and *D. hamiltonii* are common throughout the state. Thirty bamboo species under 8 genera were recorded during the field survey conducted throughout the state (Table 1). Only 3 species under 2 genera were monopodial type and 27 species under 6 genera were sympodial type (Table 2). Sixteen species (53.33%) have been described as wild, nine (30%) as cultivated and five species (16.66%) as both cultivated and wild (Table 5). 27 species were found in East district, 16 species in North district, 14 species in West district and 9 species were found in South district (Table 3).

Distribution pattern

Maximum number of bamboo species was found in subtropical forests (25), followed by 17 species in tropical forests, 8 species in temperate forests, 6 species in sub-alpine forests and 3 species in alpine vegetation (Table 4). *Arundinaria*, *Sinarundinaria* and *Thamnocalamus* are the only genera of the alpine and sub-alpine region. Besides the three genera of alpine and subalpine regions, the temperate region has also *Dendrocalamus* and *Schizostachyum*. The tropical and sub-tropical region has maximum diversity of bamboos and has *Bambusa*, *Dendrocalamus*, *Melocanna*, *Phyllostachys*, *Schizostachyum* and *Sinarundinaria*. Several species like

Sinarundinaria intermedia and *Schizostachyum capitatum* had wide altitudinal distribution covering different regions and few were confined to tropical and subtropical regions only. While as *B. vulgaris* var. *vittata*, *B. vulgaris* var. *waminii* and *Dendrocalamus asper* were found in East district only and *Sinarundinaria falconeri*, *Schizostachyum fuchsianum* and *S. sharmae* in the North district, *Bambusa nutans*, *B. tulda*, *Dendrocalamus hamiltonii* var. *hamiltonii*, *D. hamiltonii* var. *edulis*, *D. hookeri*, *D. patellaris*, *Sinarundinaria hookeriana* and *S. maling* have wide altitudinal range and are found to be present in all the four districts of the state (Table 1 and 3).

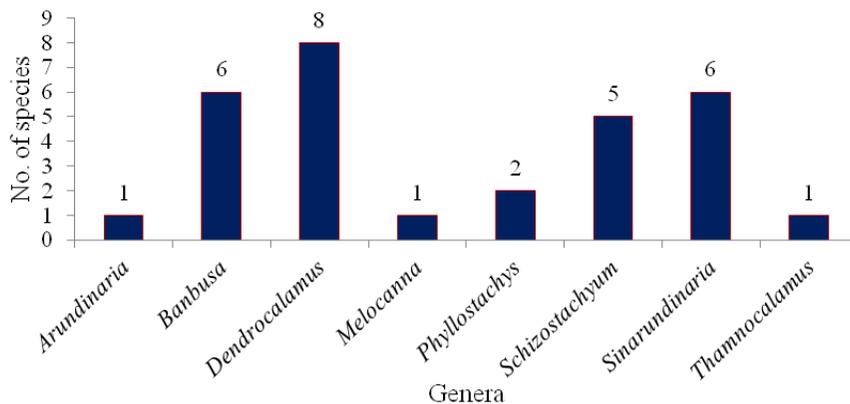


Figure 2. Genera-wise diversity of bamboos in Sikkim.

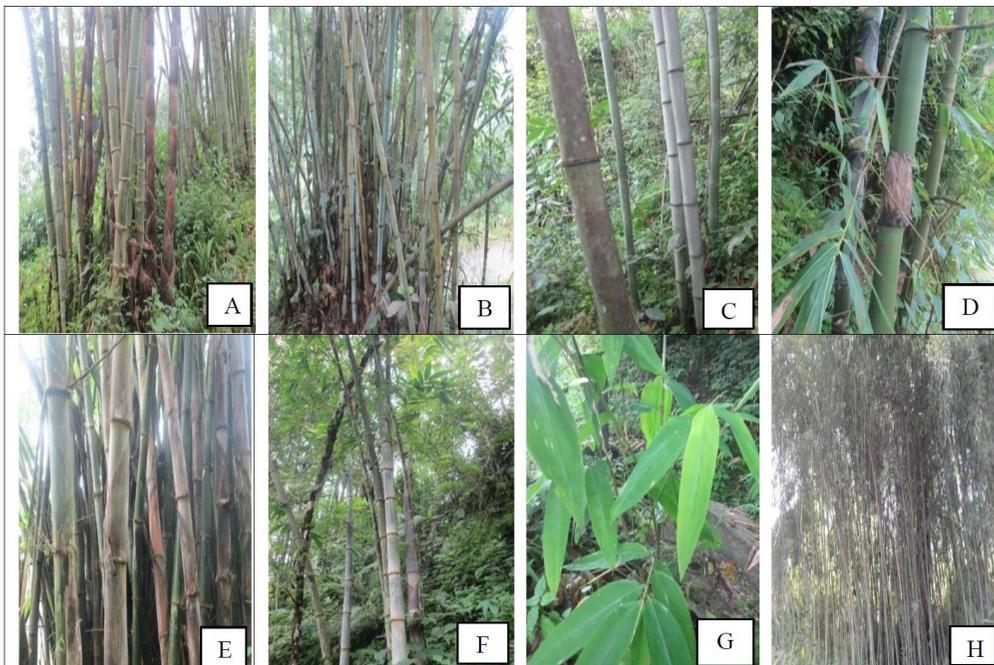


Figure 3. Bamboo diversity of Sikkim. A. *Dendrocalamus sikkimensis* B. *Sinarundinaria hookeriana* C. *Phyllostachys aurea* D. *Bambusa nutans* E. *Dendrocalamus hamiltonii* var. *hamiltonii* F. *Dendrocalamus hamiltonii* var. *edulis* G. Plantlet of *Dendrocalamus patellaris* H. *Sinarundinaria maling*.

Table 1. Bamboo species of Sikkim and their distribution.

Species	Vernacular name	Worldwide distribution	Distribution in Sikkim
<i>Arundinaria ramosa</i> var. <i>sadoensi</i> (Makino ex Koidz.) Nakai	Sanu maling (Nepali), Phyum, Miknu (Lepcha), and Pheong, mheem (Bhutia)	Japan, India: Sikkim	North, West and East districts
<i>Bambusa multiplex</i> (Lour.) Raeusch. ex Schult. f.	Chinese bans	Pakistan, Iraq, Sri Lanka, China, Taiwan, Tropical and subtropical Asia, Australia, Africa and Madagascar, North, Central and South America, India: Assam, Arunachal Pradesh, Nagaland, West Bengal, Tripura, Sikkim, Tamil Nadu.	East district
<i>B. nutans</i> Wall. ex Munro	Mala bans (Nepali), Mahlu (Lepcha) and Jiu (Bhutia)	Nepal, India: Himachal Pradesh, Arunachal Pradesh, Manipur, Mizoram, Nagaland, Sikkim, Orissa, Tripura, west Bengal, Uttar Pradesh	Throughout Sikkim
<i>B. pallid</i> (L.) Voss.	Deo bans (Nepali), Pshi, pashipo (Lepcha) and Bongshing (Bhutia)	Bangladesh, Bhutan, Myanmar, China, Thailand, India: Assam, Meghalaya, Sikkim, Orissa, Tripura, west Bengal, Nagaland,	East district
<i>B. tulda</i> Roxb.	Sigray bans (Nepali), Paoshiding ying (Lepcha)	Bhutan, Nepal, Burma, Thailand, China, Indonesia, Philippines, Bangladesh, India: West Bengal, Meghalaya, Bihar, Karnataka, Mizoram, Uttar Pradesh, Andhra Pradesh, Tripura, Sikkim, Assam, Bihar.	Throughout Sikkim
<i>B. vulgaris</i> var. <i>vittata</i> Schrad. ex J.C.Wendl.	Telai bans	Japan, China, Phillipines, India: Sikkim, Manipur, Meghalaya	East district
<i>B. vulgaris</i> var. <i>waminii</i> Schrad. ex J.C.Wendl.	Lota bans	China, India: Sikkim, Meghalaya	East district
<i>Dendrocalamus asper</i> (Schult.) Backer	Thaitama bans	Malaysia, Indonesia, Thailand, China, Burma, Vietnam, Philippines, Hong Kong, Yunnan, Taiwan, Sri Lanka, Australia, Madagascar, America.	East district
<i>D. giganteus</i> Munro	Dhungre bans (Nepali), Giant bamboo (Nepali)	Burma, Malaysia, China, Thailand, India: Meghalaya, Nagaland, Assam	East and South district
<i>D. hamiltonii</i> var. <i>hamiltonii</i> Gamble	Choya bans, Tama (Nepali), Pao (Lepcha), Pashing (Bhutia)	China, Nepal, Bhutan, India: Tropical Himalaya and N.E region	Throughout Sikkim
<i>D. hamiltonii</i> var. <i>edulis</i> Gamble	Guliyio tama bans	Burma, India: Sikkim, W. Bengal, and other areas of N.E. India.	Throughout Sikkim
<i>D. hookeri</i> Munro	Tili bans (Nepali), Patu (Lepcha)	Nepal, Bhutan, Burma, India: north-eastern part including Eastern Himalayas.	North, South and East districts
<i>D. patellaris</i> Gamble	Neba bans (Nepali), Pagjiok (Lepcha)	China, India: Sikkim, Nagaland	North, West and East districts
<i>D. sikkimensis</i> Gamble ex Oliv.	Bhalu bans (Nepali), Pagriang (Lepcha)	Bhutan, Europe, China, India: Sikkim, Nagaland, West Bengal, Meghalaya, Arunachal Pradesh, Mizoram	North, West and East districts
<i>D. strictus</i> (Roxb.) Nees	Latthi bans (Nepali)	Nepal, China, Bangladesh, Burma, Thailand, Sri Lanka, Malaysia, Indonesia, Philippines, Vietnam, India: throughout India.	East district
<i>Melocanna baccifera</i> (Roxb.) Kurz	Lahure bans (Nepali)	Burma, China, Myanmar, Nepal, Bangladesh, India: Assam, Sikkim, Mizoram, Nagaland, West Bengal, Tripura, Arunachal Pradesh	East and West districts
<i>Phyllostachys aurea</i> Riviere & C.Riviere	Kata bans (Nepali)	China, Japan, Taiwan, Indonesia, New Zealand, India: Sikkim	East and West district
<i>P. nigra</i> (Lodd. ex Lindl.) Munro	Kalo nigalo (Nepali)	China, Japan, Philippines, Taiwan, Korea, Australia, India: Sikkim, Meghalaya	East district
<i>Schizostachyum capitatum</i> Munro.	Gobia, Gope (Nepali), Payong	Bhutan, Bangladesh, Burma, China, India:	North, West and East

	(Lepcha)	Sikkim, Arunachal Pradesh, Meghalaya.	district
<i>S. dullooa</i> (Gamble) Majumdar	Tokre bans (Nepali), Pogslo, Puksalu (Lepcha)	Bangladesh, Burma, Laos, Cambodia, Vietnam, Bhutan, India: north-eastern part: Sikkim, Meghalaya, Assam, West Bengal	East district
<i>S. fuchsianum</i> (Gamble) R.B.Majumdar	Palom (Lepcha)	Nepal, Bangladesh, Bhutan, Burma, India: Sikkim, Arunachal Pradesh, Manipur, Naga Hills.	North district
<i>S. polymorphum</i> (Gamble) R.B.Majumdar	Pheling bans (Nepali), Parhoik (Lepcha)	Nepal, Myanmar, Europe, Bhutan, Thailand, Uganda, India: Sikkim, Meghalaya, Assam, Arunachal Pradesh, West Bengal, Mizoram, Nagaland	East and North district
<i>S. sharmae</i> S.Kumar & P.Singh	Palom(Lepcha)	Bangladesh, China, India: Assam, Sikkim	North district
<i>Sinarundinaria hookeriana</i> (Munro) C.S.Chao & Renvoize	Parang, Singhani (Nepali), Prong (Lepcha)	Bhutan, Nepal, India: Sikkim, West Bengal.	Throughout Sikkim
<i>S. intermedia</i> (Munro) C.S.Chao & Renvoize	Titay nigalo(Nepali), Parmoik(Lepcha)	Bhutan, Nepal, India: Sikkim, Arunachal Pradesh, Manipur, Assam, West Bengal.	East and North district
<i>S. maling</i> (Munro) C.S.Chao & Renvoize	Malingo (Nepali), Phum (Bhutia) and Phuem miknu (Lepcha)	Nepal, Bhutan, India: Sikkim, West Bengal, Manipur, Assam, Arunachal Pradesh.	Throughout Sikkim
<i>S. microphylla</i> C.S.Chao & Renvoize	Deonigalo (Nepali)	Bhutan, Nepal, India: Sikkim, Meghalaya.	East and West district
<i>S. pantlingii</i> (Munro) C.S.Chao & Renvoize	Rani malingo (Nepali)	Bhutan, India: West Bengal, Sikkim, Arunachal Pradesh	East district
<i>S. falconeri</i> Hook.f.ex Munro	Pummon (Lepcha)	India: Sikkim	North district
<i>Thamnocalamus aristatus</i> (Gamble) E.G. Camus	Rato nigalo (Nepali)	Bhutan, Nepal, India: Sikkim, West Bengal	West and East district

Table 2. Rhizome types of bamboos in Sikkim.

Rhizome type	Genera	Species
Monopodial	<i>Arundinaria</i>	<i>Arundinaria ramosa</i> var. <i>sadoensis</i>
	<i>Phyllostachys</i>	<i>Phyllostachys aurea</i> , <i>P. nigra</i>
Sympodial	<i>Bambusa</i>	<i>Bambusa multiplex</i> , <i>B. nutans</i> , <i>B. pallida</i> , <i>B. tulda</i> , <i>B. vulgaris</i> var. <i>vittata</i> , <i>B. vulgaris</i> var. <i>waminii</i>
	<i>Dendrocalamus</i>	<i>Dendrocalamus asper</i> , <i>D. giganteus</i> , <i>D. hamiltonii</i> var. <i>hamiltonii</i> , <i>D. hamiltonii</i> var. <i>edulis</i> , <i>D. hookeri</i> , <i>D. patellaris</i> , <i>D. sikkimensis</i> , <i>D. strictus</i>
	<i>Melocanna</i>	<i>Melocanna baccifera</i>
	<i>Schizostachyum</i>	<i>Schizostachyum capitatum</i> , <i>S. dulloa</i> , <i>S. fuchsianum</i> , <i>S. polymorphum</i> , <i>S. sharmae</i>
	<i>Sinarundinaria</i>	<i>Sinarundinaria hookeriana</i> , <i>S. intermedia</i> , <i>S. maling</i> , <i>S. microphylla</i> , <i>S. pantlingii</i> , <i>S. falconeri</i>
	<i>Thamnocalamus</i>	<i>Thamnocalamus aristatus</i>

Uses

Bamboos are used for various purposes mainly by poor and tribal population (Table 5). In Sikkim, bamboos are used for scaffolding in building construction and making small dwelling huts (Figure 4). Some bamboos are used for making mats, fishing traps, baskets, bows and arrows, making furniture, bridges, fencing farmlands, fodder for cattle and young shoots are edible. Culms of some species are used for religious rituals like hoisting prayer flags. Bamboos are used in making a traditional oil pouring item (Numchukuk). Dalo is used to measure paddy and maize, and Afloot for paddy storage. Sinka is an old indigenous item used as plate for eating food. Bhook (a fishing trap) is made from *D. hamiltonii*. For cardamom collection, an indigenous item called *Ghak* is used. Besides these, they

are also used for making chapani or soer to pour milk and tea and many other purposes like roofing, support for various agricultural crops and also as ornamentals.

Conclusion

In the present study 30 species of bamboo were recorded in Sikkim. Out of 30 species recorded from Sikkim, only 3 species (10%) under 2 genera are monopodial type and 27 (90%) species under 8 genera are sympodial type. About 25 species were found in tropical (0-900m), followed by 17 species in subtropical (900-1800m) 8 species in temperate (1800-2700m), 6 species sub-alpine forests (2700-3500m) and only 3 species in alpine forests (3500-4500m). Sixteen species (53.33%) have been described as wild, nine (30%) as cultivated and five species (16.66%) as both cultivated and wild. Genus *Dendrocalamus* represents the highest

number of species (8), followed by *Bambusa* and *Sinarundinaria* (6 each). Genus *Schizostachyum* have 5 species, *Phyllostachys* has 2 and 1 each from *Arundinaria*, *Melocanna* and *Thamnocalamus*. However extensive study is required to know emphatically about the bamboo diversity of the Himalayan state. Studies on distribution shows that due to over harvesting, forest fires, over exploitation, etc. the populations of some bamboo species in the state are depleting on an alarming rate. So, conservation is required for the conservation of such species.

Acknowledgments

The authors are grateful to the local people of for sharing their knowledge on description and utilization of bamboos. We also thank Namchi Government College, South Sikkim (Sikkim) India, for permitting to confirm the identified plant specimens with herbaria.

Table 3. Distribution of bamboo species in four districts of Sikkim

Name of the bamboo species	East District	West District	North District	South District
<i>Arundinaria ramosa</i> var. <i>sadoensis</i>	+	+	+	
<i>Bambusa multiplex</i>	+			
<i>B. nutans</i>	+	+	+	+
<i>B. pallida</i> .	+			
<i>B. tulda</i>	+	+	+	+
<i>B. vulgaris</i> var. <i>vittata</i>	+			
<i>B. vulgaris</i> var. <i>waminii</i>	+			
<i>Dendrocalamus asper</i>	+			
<i>D. giganteus</i>	+			+
<i>D. hamiltonii</i> var. <i>hamiltonii</i>	+	+	+	+
<i>D. hamiltonii</i> var. <i>edulis</i>	+	+	+	+
<i>D. hookeri</i>	+		+	+
<i>D. patellaris</i>	+	+	+	+
<i>D. sikkimensis</i>	+	+	+	
<i>D. strictus</i>	+			
<i>Melocanna baccifera</i>	+	+		
<i>Phyllostachys aurea</i>	+	+		
<i>P. nigra</i>	+			
<i>Schizostachyum capitatum</i>	+	+	+	
<i>S. dulloa</i>	+			
<i>S. fuchsianum</i>			+	
<i>S. polymorphum</i>	+		+	
<i>S. sharmae</i>			+	
<i>Sinarundinaria hookeriana</i>	+	+	+	+
<i>S. intermedia</i>	+		+	
<i>S. maling</i>	+	+	+	+
<i>S. microphylla</i>	+	+		
<i>S. pantlingii</i>	+			
<i>S. falconeri</i>			+	
<i>Thamnocalamus aristatus</i>	+	+		



Figure 4. Some bamboo made items. **A.** Basket, **B.** Bed **C.** Kitchen utensil, **D.** Musical Instrument, **E.** An old man making basket, **F.** Flower vase **G.** Lamp holder, **H.** Basket for carrying grain (Dalo), **I.** Hair band.

References

- Biswas, S. 1988. Studies on bamboo distribution in North-eastern region of India. *Indian Forester* 114(9): 514-531.
- Dransfield, S and Widjadja, E.A. 1995. Plant Resources of South-East Asia, Bamboos. Leiden, The Netherlands: Backhuys Publisher.
- Holttum, R.E. 1958. The bamboos of the Malay Peninsula, Volume 16, The Gardens Bulletin, Singapore 1135.
- INBAR. 2005. International Network for Bamboo and Rattan Web site (available at www.inbar.int).
- INBAR. 1999. Socio-economic Issues and Constraints in the Bamboo and Rattan Sectors: INBAR's Assessment. International Network for Bamboo and Rattan, Working paper 23:28.
- Lobovikov, M., Paudel, S., Piazza, M. and Wu, H.R. 2007. World Bamboo Resources: A Thematic Study Prepared in the Framework of the Global Forest Resources Assessment. Food and Agriculture Organization of the United Nations, Rome.
- Manilal, K.S., Kumar, M. 1998. Modern Trends in Bamboo Taxonomy Pp. 207-255. In *A Handbook on Taxonomy*.

- McClure, F.A. 1966. The Bamboos. A Fresh Perspective. Harvard University Press, Cambridge, Massachusetts.
- Mehra, P.N. and Sharma, M.L. 1975. Cytological studies in some central and eastern Himalayan Grasses V. *The Bambuseae, Cytologia* 40(2): 463-467.
- Ohrnberger, D. 1999. The Bamboos of the World. Elsevier, Amsterdam.
- Rai, S.N. and Chauhan, K.V.S. 1998. Distribution and growing stock of bamboos in India. *Indian Forester* 124(2): 89-97.
- Sharma, M.I. and Nirmala C. 2015. Bamboo diversity of India: An update. 10th World Bamboo Congress, Korea, Pp. 12.
- Varmah, J.C. and Bahadur, K.N. 1980. Country report and status of research on bamboos in India. *Indian Forest Record Botany* 6(1): 1-28.
- Yang, Y., Wang, K., Pei, S. and Hao, J. 2004. Bamboo Diversity and Traditional Uses in Yunnan, China. *Mountain Research and Development*, 24(2): 157–165.

Table 5. Utilization of Bamboo in Sikkim

Species Name	Habitat	Part used	Use
<i>Arundinaria ramosa</i> var. <i>sadoensis</i>	Wild	Culm and new shoot	Culm used for making musical instrument and fencing to protect the saplings from animals.
<i>Bambusa multiplex</i>	Cultivated	Culm	Culm used in religious rituals like hoisting prayer flags, used as kitchen utensil and also as roof cover.
<i>B. nutans</i>	Wild and Cultivated	Leaves, Culm and new shoot.	For making chairs, combs, musical instrument, bow and arrow, bridges and for scaffolding in building construction. Culm is used for hoisting prayer flags, for making thread and fencing to protect the sapling from other animals.
<i>B. pallida</i>	Wild	Young culm	Culm used for hoisting prayer flags, for making thread and to fence farmlands.
<i>B. tulda</i>	Wild	New shoot and young culm	For making chair, comb, musical instrument, bow and arrow.
<i>B. vulgaris</i> var. <i>vittata</i>	Wild and Cultivated	New shoot and culm	For making bridges, scaffolding in building construction and also used for grinding.
<i>B. vulgaris</i> var. <i>waminii</i>	Cultivated	Culm and young shoot.	For making bridge, scaffolding in building construction, storage of food grains, winnowing food grain and also used as grinding instrument.
<i>Dendrocalamus asper</i>	Wild and Cultivated	Culm, Leaves, new shoot	New shoots are used for making local wine and pickles and also used for collecting firewood and grasses from the forests, storing paddy, for roof cover, for pouring milk and tea and for cardamom collection.
<i>D. giganteus</i>	Wild and Cultivated	Culm	Culm used for making traditional plates (duna, tapara, bota), fishing trap, for drying meat, sinki, gundruk (fermented vegetables) and food grain, for pouring milk and tea, threads and kitchen utensils.
<i>D. hamiltonii</i> var. <i>hamiltonii</i>	Cultivated	Culm	Used in collection of firewood and grasses from the forest. It is also used for paddy and maize measuring, storing food grains, binding for fire wood and fodder. It is used in fire place for drying cardamom, for making traditional plates (duna, tapara, bota), baby bed, bridges and for pouring oil. It is used to carrying meat. Culm is used to hoist prayer flags and for scaffolding in building construction.
<i>D. hamiltonii</i> var. <i>edulis</i>	Cultivated	Young shoot and culm	Small culm used as hanging above the fire place (chula), culm used for making bridge, carrying meat, hoisting prayer flags and scaffolding in building construction, and new shoot used as pickle.
<i>D. hookeri</i>	Cultivated	Stem, culm and shoot	Culm used for storing the food grain, for binding fire wood and fodder, used in fire place for drying cardamom, making traditional plates (duna, tapara, bota), fishing trap, for drying meat and food grain storage.
<i>D. patellaris</i>	Cultivated	Culm and stem	Culm is used for fishing purposes. It is also used for hoisting prayer flags, scaffolding in building constructions,

<i>D. sikkimensis</i>	Cultivated	Culm and leaves	for making mouth cover of animals to protect the food grains in the fields. It is also used for making baby beds. It acts as support to creeper agricultural plants. Culm used to measure paddy and maize, for pouring milk and tea, for collecting cardamom, storing food grains and store curd, collecting and storing milk, for carrying water (Dheri), for using local wine, grinding instrument and for carrying meat.
<i>D. strictus</i>	Cultivated	Culm and young shoots	Culm used for hoisting prayer flags, for making thread and for fencing.
<i>Melocanna baccifera</i>	Cultivated	Culm and young shoot	Culm used for collecting firewood and grasses from the forest.
<i>Phyllostachys aurea</i>	Wild	Culm	Small culms used as support during trekking, binding for binding fire wood and fodder, it used in fire place for drying cardamom, for making traditional plates (duna, tapara, bota) and fishing traps.
<i>P. nigra</i>	Wild	Stem	Used for storing paddy, for roof cover, for collecting cardamom and threads.
<i>Schizostachyum capitatum</i>	Wild	Stem	Culm used for collecting firewood and grasses from the forest.
<i>S. dulloa</i>	Wild	Stem and young shoots	Support to creeper agricultural plants.
<i>S. fuchsianum</i>	Wild	Culm and new shoot	Culm used for collecting firewood and grasses from the forest and support to creeper agriculture plants.
<i>S. polymorphum</i>	Wild	Culm	For collecting firewood and grasses from the forest.
<i>S. sharmae</i>	Wild	Culm and young shoot	For firewood and grass collection from the forest.
<i>Sinarundinaria hookeriana</i>	Wild and Cultivated	Culm and new shoot	For collecting firewood and grasses from the forest, storing paddy, for roof cover, for pouring milk and tea, for collecting cardamom, for mouth cover of animal to protect the field crops. Also used for making threads and baby beds.
<i>S. intermedia</i>	Wild	Culm and new shoot	Used for winnowing food grains, storing paddy, for roof cover, cardamom collection and as thread.
<i>S. maling</i>	Wild	Leaves, Culm and young shoot	Used to store paddy and to collect cardamom. It is also used for mouth cover of animal to protect the field grain, and making threads, combs, musical instrument and baby bed. It is also used as roof cover.
<i>S. microphylla</i>	Wild	New shoot and Culm	For making musical instrument, bow and arrow, threads and kitchen utensils.
<i>S. pantlingii</i>	Wild	Culm	For making musical instrument, bow and arrow, threads. It is also used as fishing trap and kitchen utensils.
<i>S. falconeri</i>	Wild	Culm and new shoot	Culm used as support during trekking, for binding fire wood and fodder and also used in making threads, comb, musical instrument and baby beds.
<i>Thamnocalamus aristatus</i>	Wild	Culm and shoot	It is used for making musical instrument, bow and arrow, threads, fishing traps and kitchen utensil.