HIMALAYAN JOURNAL
OF BASIC & APPLIED SCIENCES
An open-access, peer-reviewed platform for basic and applied sciences
himalayanjournal.org
RESEARCH ARTICLE
Volume: 2 | Issue: 3
Date, Month, Year: 1, June 2026
Pages: 33-39
Doi: doi.org/10.5281/zenodo.20849304
ISSN (Online): 3107-9113
editor@orchidsocietyofassam.com

Diversity and Distribution of Bamboo Species in Dibrugarh District of Assam, India

Neha Shah[1]*, Jitu Gogoi[2]
[1,2] Department of Botany, Silapathar Science College, Silapathar, Assam, India-787059
*Corresponding address: ns2491680@gmail.com

Abstract

A study on bamboo diversity was conducted in 11 different areas of the Dibrugarh district of Assam, India. These areas were chosen based on urbanization by observing them over the land use land cover map of Dibrugarh district. A field survey was conducted in those chosen areas, which were divided into 3 different categories, namely rural, Suburban and urban. The study found 14 different prominent varieties of inventory bamboo species living in a synanthropic way within the district, namely, *Bambusa tulda* Roxb., *Pseudosasa japonica japonica* (Siebold & Zucc. ex Steud.) Makino ex Nakai., *Bambusa vulgaris* Schrad. ex J.C.Wendl., *Dendrocalamus giganteus* Munro, *Bambusa assamica* Barooah & Borthakur, *Bambusa bambos* (L.) Voss, *Oxytenanthera parvifolia* Brandis ex Gamble, *Bambusa nana* Roxb., *Bambusa pallida* Munro, *Bambusa pseudopallida* R.B. Majumdar, *Bambusa balcooa* Roxb., *Melocanna baccifera* (Roxb.) Kurz, *Bambusa wamin* Brandis ex E.G.Camus, and *Bambusa barpatharica* Borthakur & Barooah. The study shows how the diversity and distribution of bamboo species reduce with increasing urbanization in an area. The study found a greater number of species in the rural areas compared to the sub- urban and urban areas. The rural areas exhibited the highest diversity (n = 11) due to traditional home garden practices (Baris) and minimal anthropogenic pressure. Sub- urban areas show moderate decline in the number of species (n = 6) acting as transitional zones, while the urban areas were highly depauperate, restricted primarily to the highly resilient species (n = 2). This study aligns with the Urban- rural Gradient concept of ecology and underscore the urgent need to conserve the indigenous species and integrate in the Urban landscapes and sustainable landscapes of the district of upper Assam.

Keywords: *Bamboo diversity, Urban- Rural Gradient, Species Richness, Dibrugarh.*

Introduction

Bamboo is called the poor man's timber of Assam, as it serves as an inexpensive, highly versatile, and easily available alternative to wood and traditional construction timber. The optimum growth and development of the bamboo rhizome require nutrient-rich, acidic, alluvial soil with high organic matter content, which is commonly found in the Brahmaputra valley including the Dibrugarh district of Assam [1]. Bamboo is planted as fencing in the tea estates and many other agricultural fields. [2]. Extracts of various bamboos are used as medicines to cure many diseases like gout, cough, eczema etc. [3]. On economical side bamboo is not only a plant, it can be termed as "the poor man's timber" [4] because it needs a minimum investment as compared to other hard wood timbers.

Approximately 123 genera and more than 1500 species of bamboo plant have been identified across the world [5]. Out of which, 136 species (125 indigenous and 11 exotic) are found in India according to the National Bamboo mission [6]. Altogether 38 naturally growing species of bamboo are recorded in Assam according to Environment, Forest and Climate Change Department, Government of Assam [7]. A total of eight species of bamboo was reported in Cachar district of Assam [3].

The phytogeographical richness of Dibrugarh district of Upper Assam in India ensures a steady supply of bamboo species. The tea city of India is rapidly turning into an urban hub. Along with the development, there is a slight expansion of the land use changes due to many bridges, flyovers and factories emerging in the city. Due to this reason, the continuous patch of bamboo brakes is being broken into isolated patches, which prevents

Received:30th *May*, 2026; *Revised & Accepted: 8th June, 2026;* Published *Online*: 12th *June, 2026*
Published by Orchid Society of Assam

the natural creeping expansion of rhizomes, which eventually leads to the death of older clumps. The traditional living fencing, which was made by the plantation of bamboo patches, is now replaced by concrete walls, which are continuously eliminating the population of some important high-biomass Bamboo species from the local landscape. The heavy use of pesticides and herbicides in agricultural fields and tea estates seeps into the soil, causing soil pollution and changing the pH of the soil, whose chemical shift is rapidly inhibiting the growth of sensitive wild bamboo species in the locality. Frequent flash floods by the mighty Brahmaputra cause massive riverbank erosion, especially in the riverbanks, which wash away the land in a serious manner. Since the bamboos are excellent soil binders, these species may prevent erosion and may anchor the soil in its place.

Since, Dibrugarh has all sorts of availability of the environmental and edaphic conditions needed for the growth of rare, native and massive bamboos, it is now the need of the hour to explore the district and study the varieties and distribution of these species so that it can be conserved from the growing urbanization in the area.

Thus, the present study tries to identify and document the bamboo resources of the region, their spatial distribution pattern and community structure in the vicinity of the urban to rural landscape gradient within Dibrugarh district of Assam and to systematically study the response of the same to the environment.

Materials and Methodology

The study area is Dibrugarh district of Assam, India, geographically located in between 27°5'- 38 to 27°42'-30''N latitude and 94°33'- 46'' to 95°29'-8''E longitude. The high annual rainfall (approx. 2300-3000 mm) results in a humid subtropical climate and rapid biomass buildup of Bamboo species thrives in the humid and rainy climate conditions and plays an important role in the ecology of the district. We have studied eleven different locations of the district namely, Lahoal, Banipur, Boiragimoth, Bongalgaon, Mohanbari, Hattiali, Chabua, Namrup, Bogibeel, Rohmoriya and Naharkatiya. The district is visually depicted in the study area graph (Fig.- 1) made through Qgis.

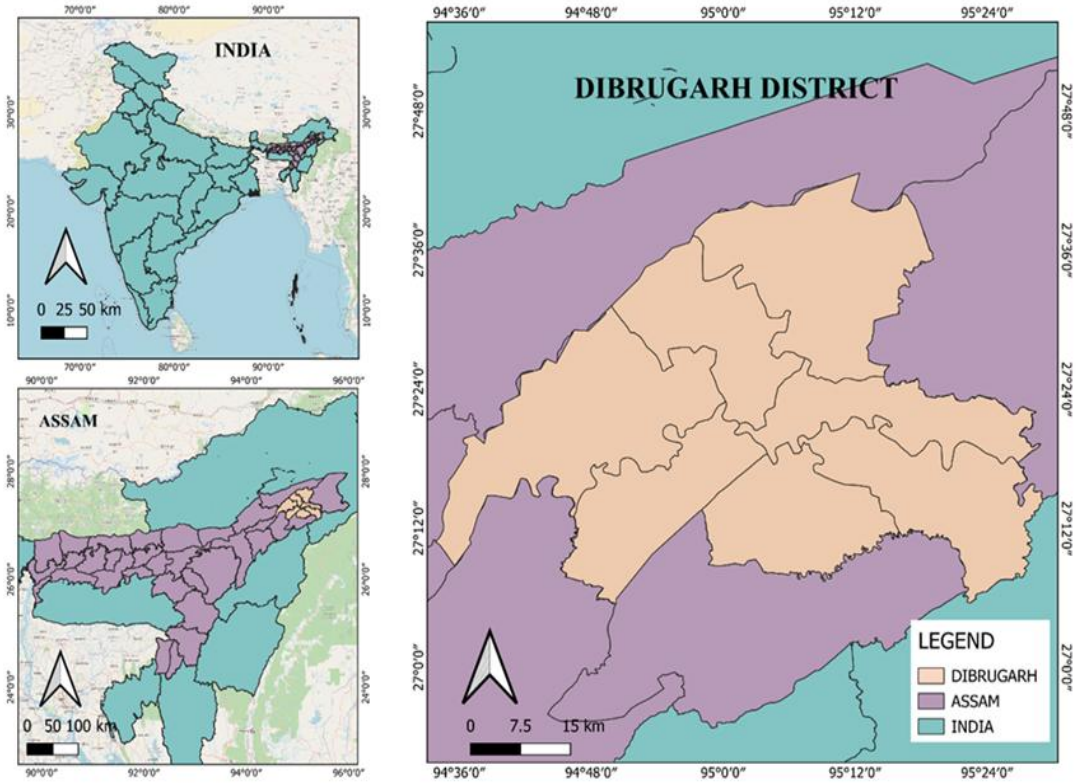

Fig 1. Map of the study area (Dibrugarh district)

Sampling was done mainly by analyzing the LULC data of Dibrugarh district to eliminate bias and ensure a correct representative assessment of bamboo population and then in those locations randomly bamboo species were searched. The study area was chosen based on Urban, Sub- Urban and Rural areas of district as shown in the LULC map (Fig 2) through field surveys.

The area of Dibrugarh district was stratified into three distinct zones based on the human population density, structural built-up area and percentage of impervious surface cover:

(i). Rural Zones: This zone was dominated by traditional agrarian landscape, low human population density and extensive indigenous home gardens (Bari). The areas under this category are- Hatiali, Bongalgaon, Mohanbari, Lahoal, Naharkatiya, Bogibeel and Rohmoria

(ii). Sub- Urban Zones: These areas are the transition zones from rural to urbans. It exhibits active land-use conversions, fragmented habitats and moderate residential infrastructures. The areas under this category includes- Banipur and Boiragimoth.

(iii). Urban Zones: This area includes heavily structural built-ups, high human population, high impervious soil cover, very minimal open soil and managed cultivated landscaping. Only Chabua and Namrup falls under this zone.

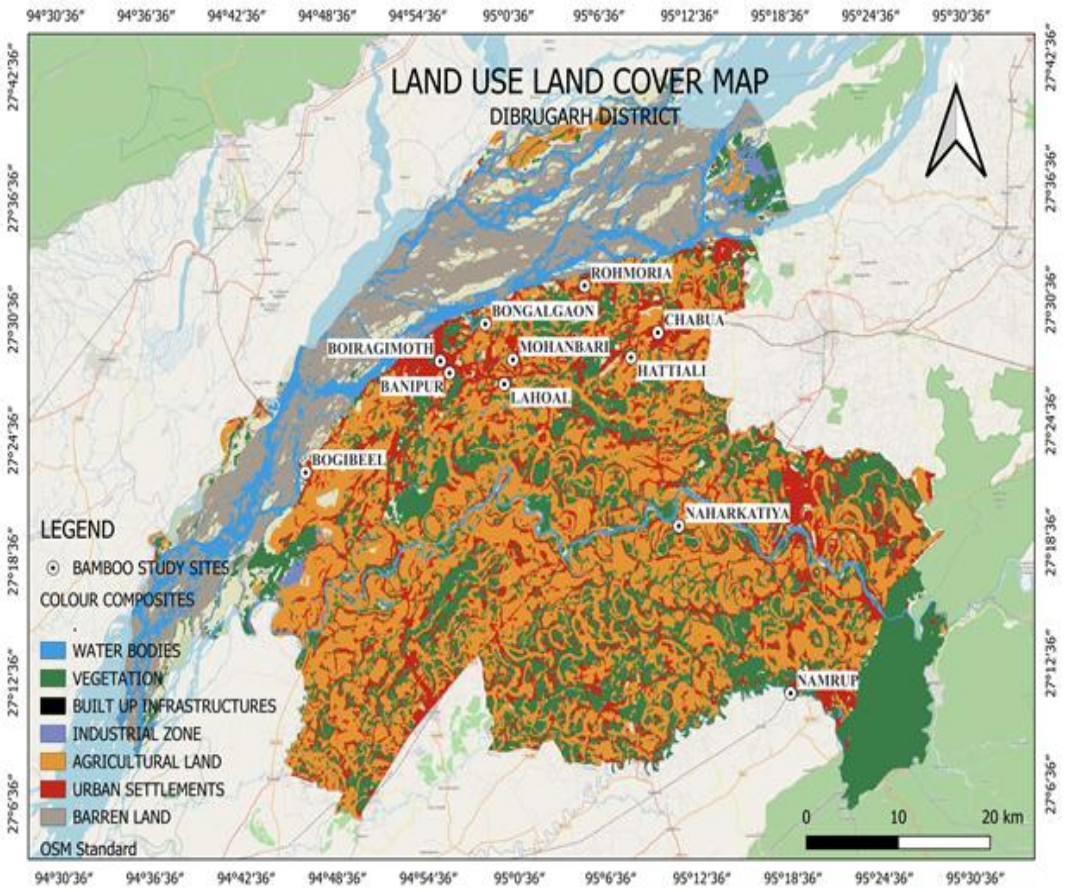

Fig 2. LULC map of Dibrugarh district

Species identification was performed directly in the field using identifiable morphological and behavioral characteristics. The culm characters, culm color, height, girth diameter, culm sheath, branching and leaf profiles were noted for correctly identifying them. Taxonomic confirmations were systematically verified by cross checking the high- resolution pictures with standard regional flora, literature and works done on bamboo species and validated botanical keys for North east India.

Results and Discussion

Dibrugarh district is a home to varieties of bamboo species. The area includes rural, sub -urban and urban regions. For the sampling we have used LULC of Dibrugarh district to check such areas of Dibrugarh. By inquiring the locals nearby and field surveys fourteen different varieties of Bamboo were found. The Table 1 given below consolidates our field observations of all those bamboos in Dibrugarh district, integrating their botanical names, localised vernacular names, culm girth circumference ranges, specific habitat preferences. Some of the species were found in more than one location so their culm girth is mentioned as a range in the table below (Table-1).

Table 1. Comprehensive characterization and habitat distribution of Bamboo species in Dibrugarh district

Sl. No.	Botanical Name	Vernacular Names (Assamese)	Culm Girth Circumference Recorded(in cm)	Key Identifying Characters	Locations Found
1	*Bambusa tulda* Roxb.	Jati Bah	14-17	Asymmetrical culm, White rings below nodes	Hattiali, Banipur, Chabua, Bogibeel, Rohmoria, Namrup, Lahoal, Naharkatiya, Mohanbari Boiragimoth
2	*Bambusa assamica* Barooah & Borthakur	Horu Bijuli	3-4	Small, woody bamboo appearing yellow to green in colour	Hattiali, Banipur
3	*Bambusa balcooa* Roxb.	Bhulaka Bah	34-36	Massive densely tufted clumping bamboo, strong and structurally sound	Hattiali, Chabua, Rohmoria
4	*Bambusa pallida* Munro	Mokal Bah	6	Smooth straight culms, thin walled. Culm colour ranges from olive green to dark green in colour	Boiragimoth
5	*Pseudosasa japonica* (Siebold & Zucc. ex Steud.) Makino ex Nakai.	Arrow Bamboo	0.5	Culms are slender, thin walled, heavy foliage.	Banipur
6	*Dendrocalamus giganteus* Munro	Bora Bah	34-36	Tall and large clump, highly dense and thick culm walls.	Naharkatiya, Banipur
7	*Bambusa bambos* (L.) Voss	Kotoha Bah	9	Large, dense and viciously thorny growth habit.	Bongalgaon
8	*Bambusa pseudopallida* R.B. Majumdar	Bijuli Bah	3	Thin walled, weaving bamboo, densely tufted.	Hattiali
9	*Bambusa borpatharica* Borthakur & Barooah	Barpathar Bamboo	2	Heavily textured, Dark green in colour	Hattiali
10	*Melocanna baccifera* (Roxb.) Kurz	Muli Bah	12	Straight culms, smooth and bright green when young.	Hattiali
11	*Oxytenanthera parvifolia* Brandis ex Gamble	Paharia Jati Bah	14	Culms are cylindrical and smooth.	Hattiali
12	*Bambusa nana* Roxb.	Borosi- Dang bah	2	Very tight clumping variety, grows strictly upright.	Hattiali
13	*Bambusa vulgaris* Schrad. ex J.C.Wendl.	Deo bans	18	Deep green, smooth culms with faint green lines.	Banipur
14	*Bambusa wamin* Brandis ex E.G.Camus	Kolosi Banh	2	Highly compressed, swollen, bulbous lower internodes.	Mohanbari

Fig 3. a. *Bambusa tulda*; b. *Pseudosasa japonica*; c. *Bambusa assamica*; d. *Bambusa balcooa*; e. *Bambusa pseudopallida*; f. *Bambusa barpatharica*; g. *Melocanna baccifera*; h. *Oxytenanthera parvifolia*; i. *Bambusa nana*; j. *Dendrocalamus giganteus*; k. *Bambusa vulgaris*; l. *Bambusa wamin*; m. *Bambusa bambos*; n. *Bambusa pallida*.

In a classic landscape ecology, we often expect that the species richness declines from rural- urban locations. Where rural areas hold high native diversity and urban areas comparatively hold a very little. This study also proved the same. It is found that the diversity of species in various Urban, suburban and Rural localities of Dibrugarh district reduces from rural to urban regions. The species richness in this study is broken down below by specific study locations and by pooled landscape zones. The species counts for each individual site are as given in Table- 2.

Table 2. Species richness analysis table of Dibrugarh District

Location	Landscape category	Species richness	Documented taxa
Hattiali	Rural	8	*Bambusa tulda* Roxb. *Bambusa assamica* Barooah & Borthakur, *Bambusa balcooa* Roxb. *Bambusa pseudopallida* R.B. Majumdar *Bambusa barpatharica* Borthakur & Barooah *Meloccana baccifera* (Roxb.) Kurz *Oxytenanthera parvifolia* Brandis ex Gamble *Bambusa nana* Roxb.
Banipur	Sub- urban	5	*Bambusa tulda* Roxb. *Dendrocalamus giganteus* Munro *Pseudosasa japonica* (Siebold & Zucc. ex Steud.) Makino ex Nakai. *Bambusa assamica* Barooah & Borthakur *Bambusa vulgaris* Schrad. ex J.C.Wendl.
Chabua	Urban	2	*Bambusa tulda* Roxb. *Bambusa balcooa* Roxb.
Boiragimoth	Sub- urban	2	*Bambusa pallida* Munro *Bambusa tulda* Roxb.
Bongalgaon	Rural	1	*Bambusa bambos* (L.) Voss
Mohanbari	Rural	2	*Bambusa wamin* Brandis ex E.G.Camus *Bambusa tulda* Roxb.
Lahoal	Rural	1	*Bambusa tulda* Roxb.
Naharkatiya	Rural	2	*Dendrocalamus giganteus* Munro *Bambusa tulda* Roxb.
Bogibeel	Rural	1	*Bambusa tulda* Roxb.
Rohmoria	Rural	2	*Bambusa tulda* Roxb. *Bambusa balcooa* Roxb.
Namrup	Urban	1	*Bambusa tulda* Roxb.

When pooling unique species across the structural categories, the absolute richness shifts dramatically:

(i). Rural (7 locations): Pools 11 unique species (*B. tulda*, *B. assamica*, *B. balcooa*, *B. pseudopallida*, *B. barpatharica*, *O. parvifolia*, *B. nana*, *B. bambos*, *D. giganteus*, *B. wamin*, *M. baccifera*)

(ii). Sub- urban (2 locations): Pools 6 unique species (*B. tulda*, *D. giganteus*, *P. japonica*, *B. assamica*, *B. pallida*, *B. vulgaris*)

(iii). Urban (2 location): Pools 2 unique species (*B. tulda*, *B. balcooa*)

As Bongalgaon area is covered with tea gardens thus only one variety was found which was spread all through the zone. The tracking matrix below shows how species moves across the different landscape zones, categorizing their ecological distribution profiles (Table-3).

Table 3. Table showing species distribution and occurrence

(Tick mark indicates the presence of the species in that particular zone)

Species	Urban	Sub- Urban	Rural
Bambusa tulda Roxb.	✓	✓	✓
Bambusa assamica Barooah & Borthakur		✓	✓
Bambusa balcooa Roxb.	✓		✓
Bambusa pallida Munro		✓	
Pseudosasa japonica (Siebold & Zucc. ex Steud.) Makino ex Nakai.		✓	
Dendrocalamus giganteus Munro		✓	✓
Bambusa bambos (L.) Voss			✓
Bambusa pseudopallida R.B. Majumdar			✓
Bambusa barpatharica Borthakur & Barooah			✓
Meloccana baccifera (Roxb.) Kurz			✓
Oxytenanthera parvifolia Brandis ex Gamble			✓
Bambusa nana Roxb.			✓
Bambusa vulgaris Schrad. ex J.C.Wendl.		✓	
Bambusa wamin Brandis ex E.G.Camus			✓

This model aligns beautifully with established theories of landscape ecology such as species- area relationship and the rural to urban diversity gradient. As seen in Table 2, the species richness peaks in rural zone (11 species), steps down to Sub-urban zone (6 species) and drops to its lowest in the urban zone (2 species). This classical gradient shows how increasing urbanization is restricting habitat fragmentation, reducing wild or diverse bamboo population, leaving only the highly resilient and deliberately cultivated species in urban localities like Chabua and Namrup.

The reduction in the number of species from 11 in rural environments to 1or 2 species in the urban zones demonstrate how severely urban land use transition restricts bamboo distribution. In rural sectors the preservation of 14 species shows their ties with the traditional homestead home gardening practices. These rural communities actively manage and conserve diverse and rare bamboo species like *B. tulda*, *B. balcooa* and *D. giganteus*, for everyday structural, agricultural and domestic needs. Whereas, the highly rare and specialised species like *O. parvifolia*, *B. nana*, *B. assamica*, *B. barpatharica*, *B. pseudopallida* and *B. bambos* find refuge in the undisturbed microhabitats and community woodlands of the rural landscape.

In sub- urban landscapes, land fragmentation acts as a major ecological shift. As this is a transition phase between rural and urban zones. Thus, this area includes newly built architectures, severely increasing the built-up structures. As a large part of the land is divided in residential development thus the large clump species like *D. giganteus* are found and the defensive, space consuming varieties were strictly unable to find. However, *B. vulgaris* were found in some of the fragmented areas.

The urban zones make it worse for the bamboo species to survive. The extreme reduction in species (n= 1, in Namrup and n=2, in Chabua) which is highlighted in our analysis speaks about two majorly affecting factors:

(i). Since the urban areas lacks much space, the massive clump forming sympodial bamboos which requires significant root volume and lateral space cannot thrive properly.

(ii). Since the urban areas believes more on beautification and aesthetics, the species like *B. wamin* are used ornamentally in private gardens and urban parks while those species like *M. baccifera* which are wild, thin and aggressive runner types are systematically excluded.

The structural shift from rural to urban areas reflects the Environmental Filtering Framework as said by, "The Urban- Rural Gradient Concept" [8] the species richness decreases as we move from rural to urban areas. When the rural habitats are severely fragmented and disturbed by anthropogenic factors only the synanthropic or intensively cultivated ornamental or widely cultivated species persists leading to exclusion of any wild and rare varieties as said by, "The immediate disturbance hypothesis" [9].

Conclusion

This assessment confirms that bamboo diversity in the Dibrugarh district is highly sensitive to the rural-urban development gradient. While rural lifestyles naturally preserve a variety of 11 species, a slight disturbance in the natural ecosystem reduces the species count to 6 species in sub- urban and when the fragmentation becomes severe it reduces again to 1 or 2 species only due to the increasing urbanisation.

These results have immediate implications for regional landscape management. As sub- urban areas in upper Assam undergo rapid real estate expansion, they risk losing important ecological bamboo resources. Local municipal bodies and urban planners must move away from non- native, hybrid ornamental flora to the indigenous, native bamboos into urban forestry, roadside green belts and riverine management strategies.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] Mazumder, A. F., Nath, A. J., & Das, A. K. (2025). Physico-chemical Characteristics of Soil in Bamboo Dominated Homegardens Across Different Physiographic Conditions in Assam. *International Journal of Ecology and Environmental Sciences*, 51(1), 139-154. https://doi.org/10.55863/ijees.2025.0536

[2] Kumar, D., Yadav, R. S., Kadam, D. M., Ahirwar, L. L., Dohare, A. K., & Singh, G. (2022). Development of bamboo-(*Bambusa bambos*) based bio-fence to protect field crops: Insights from a study in India's Bundelkhand region. *Frontiers in Ecology and Evolution*, 10, 943226. https://doi.org/10.3389/fevo.2022.943226

[3] Nath, S. S., Beypi, R. U. P. J. I. L. Y., & Baruah, M. K. (2024). Status of bamboo species in Cachar district of Barak valley, Assam, India. *Annals of Plant and Soil Research*, 26(2), 487-491. https://www.gkvsociety.com/control/uploads/4584116.pdf

[4] Dongre, D., Jain, K. K., Kar, S., Rout, S., & Kumar, K. (2020). BAMBOO: the poor man's timber-an overview. *Planta*, 1, 156-165. https://pgrindias.in/wp-content/uploads/2020/11/14.-031-sandeep-raut-odisha.pdf

[5] Ahmad, Z., Upadhyay, A., Ding, Y., Emamverdian, A., & Shahzad, A. (2021). Bamboo: Origin, habitat, distributions and global prospective. In *Biotechnological Advances in Bamboo: The "Green Gold" on the Earth* (pp. 1-31). Singapore: Springer Singapore.. https://doi.org/10.1007/978-981-16-1310-4_1

[6] National Bamboo Mission- https://horticulture.tg.nic.in/BMBMISSION/Bmbindex.html

[7] Environment, Forest and Climate Change Department, Government of Assam.- https://asbb.assam.gov.in/portlets/biodiversity-of-assam

[8] McDonnell, M. J., & Pickett, S. T. (1990). Ecosystem structure and function along urban-rural gradients: an unexploited opportunity for ecology. *Ecology*, 71(4), 1232-1237. https://doi.org/10.2307/1938259

[9] Fox, J. F. (1979). Intermediate-disturbance hypothesis. *Science*, 204(4399), 1344-1345. https://doi.org/10.1126/science.204.4399.1344