

## Status of bamboo species in Cachar district of Barak valley, Assam, India

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### ABSTRACT

Cachar is one of the largest district in Barak Valley, Assam (India) which harbours rich diversity of bamboos due to its congenial climate and topography. The bamboos play a vital role in fulfilling SDGs (Sustainable Development Goals). Statistical data about bamboo diversity of a region can be sourced to implement socio-economic advancement for sustainable yield. In this study, intensive field visits were carried out throughout the year since December-2020 to December-2022. Samples had been collected from field and critically analysed and investigated in their natural habitat. Standard methodologies were adopted for collection, preservation and identification. Herbariums were prepared and submitted in the "Herbarium, Department of Botany, Cachar College, Silchar". In field survey, a total of fifteen different species of bamboos belonging to eight genera had been catalogued from Cachar. The most common species listed were *Bambusa polymorpha*, *B. balcooa*, *Melocanna bambusoides* and *Teinostachyum dullooa*. *Bambusa* genus had been reported as the dominant flora among different types of bamboos; and among these, *B. polymorpha* had been recorded as one of the luxuriously growing bamboo species in Cachar. Wealthy diversity of bamboo is a good source of earnings for the people of Cachar. However, practicing increased domestic cultivation and plantation of bamboos in forest areas under native climatic environment (which favours the luxurious growth of bamboos) should be encouraged. As a result, valuable sustainable production can be achieved and would be sourced as raw material to export in other cities or even in countries. In addition, trainings have to be provided (by Government and private sector) to strengthen entrepreneurship and skill development courses for procreating sustainable source of income in villages from raw materials of bamboos to accomplish SDGs.

**Keywords:** Bamboo, *Bambusa* species, Poaceae, diversity, Cachar, Barak valley.

### INTRODUCTION

Bamboo (*Bambusa* species) represent astonishing giant woody grass group and are included in family Poaceae (subfamily Bambusoideae). There are about 90 genera and 1200 species of bamboo found worldwide (Hossain *et al.*, 2015). The present paper reports on bamboo diversity in Cachar district (Fig-1) of Barak valley (Assam, India). Barak valley is comprised of three districts namely Cachar, Hailakandi and Karimganj. The district falls approximately between latitude 24°8' and 24°8' and longitude 92°15' and 93°15' covering an area of 6,922 km, and is located in Southern most part of Assam, North-East India. Cultivation of bamboo species for personal use as well as economic wellbeing (small-scale business) of local communities is a common practice in the villages of Cachar district. Here, bamboos make a dominating flora due to heavy, well distributed rainfall and having a warm climatic condition. The soil condition is acidic (Mandal *et al.*, 2013).

Plants are said to be stressed if their growth or reproductive ability is affected. This may lead to loss of yield and can reduce the quality of vegetation. Plants react to stress factors with morphological, physiological and biochemical adaptations designed to increase their resistance towards stress. The shrubs or tree like members of the tribe *Bambusae* are the characteristic of the tropical region of growth; often tall with persistent culms, grown in single or in clumps; usually greyish green to green in colour. Leaves are more or less lanceolate, flat, usually petiole like base, articulated with sheath. Gregarious flowering (spikelet inflorescence) was reported in 1912 and in 1956 in Cachar District. Later, in 2011 sporadic flowering in case of *Dendrocalamus hamiltonii* was reported (Das *et al.*, 2018). *Bambusa balcooa* also flowered in 2011 and 2015 (Das *et al.*, 2017). Recently, in 2019, gregarious flowering in case of *B. pallida* was documented in Barak Valley (Debnath *et al.*, 2020). Flowering is wonderful phenomenon in the life cycle of bamboo and also a mystery of

nature. The span of life cycle varies from species to species. After flowering the entire bamboo clump dies and there is a fresh growth of culm or clump from the rhizome.

Quite a good number of research works related to bamboo species have been carried out by several workers in different districts of Assam which give valuable information. Some of the district level floristic approaches on bamboo species in Cachar as well as Assam include - Nath and Das (2008), Bora *et al.* (2017), Sharma and Saikia (2016), Das *et al.* (2017, 2018), Debnath *et al.* (2020) etc. The exact number of genus and number of bamboo species occurring luxuriously in the various study area with special reference to Saidpur Part-II is uncertain due to inadequate exploration. To fill this gap, the present study was executed which included enumeration of bamboo diversity in Cachar, and also, to provide a comprehensive list of different types of genera representing different species of bamboos present in the district.

## METHODS AND MATERIALS

To enumerate diversity of Bamboo species, survey of different localities was organised and conducted throughout the year from December-2020 to December-2022. Among various localities explored (Narsingpur, Shulonumber, Kachudaram, Dholai, Khashpur, Saidpur Part-II, Durgapally, Atalbasti, Madhura, Pangram etc), extensive field study was carried out in Saidpur Part-II (Sabashpur) as a model area, which fall approximately between latitude

24.765687<sup>0</sup> and longitude 92.806882<sup>0</sup>. Interaction with local communities, Forest Department and literature surveys were made to document different species of bamboos. A substantive number of species have been collected from the study area and critically analysed them in their natural habitats and also in the laboratory. Standard procedures were adopted for the collection, preservation and identification. Herbarium methods and techniques were followed as recommended by Jain and Rao (1977). For authentic identification, the collected specimens were identified mainly with the help of "Flora of Assam" volume 5 (Kanjalil *et al.* and N.L. Bor 1934-1940) "Assam's Flora: present status of vascular plants" (Choudhury, 2005), "The Bambuseae of British India" (Gamble, 1896) and consulting with the expert of Herbarium scientist of BSI-ERC (BOTANICAL SURVEY OF INDIA, EASTERN REGIONAL CIRCLE), Shillong, Meghalaya. Voucher specimens have been deposited in the Herbarium, Department of Botany, Cachar College, Silchar.

## RESULT AND DISCUSSION

In the present study a total of fifteen species of bamboo had been recorded (Table 1) from various localities. However, most of the places surveyed include cultivated bamboo species. Comparative analysis of all the fifteen species revealed that though they look more or less alike but they bear some distinguishing characteristic differences.

Table 1: List of different types of Bamboo species documented in Cachar district of Barak Valley, Assam, and India

| Sl. No. | Botanical Name                                  | Vernacular Name / Local Bengali Name |
|---------|---|--------------------------------------|
| 1       | <i>Bambusa polymorpha</i> Munro                 | Bethua/ Jama                         |
| 2       | <i>B. pallida</i> Munro                         | Bakal                                |
| 3       | <i>B. tulda</i> Benth.                          | Mirtinga/ Jati                       |
| 4       | <i>B. balcooa</i> Roxb.                         | Bhulka/ Sil barua                    |
| 5       | <i>B. vulgaris</i> Schrad.                      | Kaligoda                             |
| 6       | <i>Dendrocalamus giganteus</i> Munro            | Jai barua                            |
| 7       | <i>D. strictus</i> (Roxb.) Nees                 | Karail                               |
| 8       | <i>D. longispathus</i> (Kurz) Kurz              | Khang                                |
| 9       | <i>D. hamiltonii</i> Nees ex Arn. & Munro       | Pecha / Kako                         |
| 10      | <i>Dinochloa machalands</i> -----               | Lota                                 |
| 11      | <i>Melocalamus compactiflorus</i> (Kurz.) Benth | Daral                                |
| 12      | <i>Melocanna baccifera</i> (Roxb.) Kurz         | Muli                                 |
| 13      | <i>Gigantochloa albociliata</i> (Munro) Kurz    | -----                                |
| 14      | <i>Pseudostachyum polymorpha</i> Munro          | Bojal/ Nal (A)                       |
| 15      | <i>Schizostachyum dullooa</i> Gamble            | Dolu-bansh                           |

They differ from each other in height, thickness, colour, flowering cycle, texture etc. Even in the single culm, the lower internode is smaller than the upper internode in length and there are a few species which climb on other trees (viz. *Dinochloa machalands*). During survey period, a total of eight genera (Table 2) were catalogued from different localities in Cachar. Sarma et. al in 2010 reported 10 genera of bamboos from Assam. It is quite impressive that eight genera among 10 genera are existing in Cachar. In another report by Bora et al. (2017) six genera were documented from Barail Wildlife Sanctuary in Assam. Again, it had been observed

that the most dominant genus was *Bambusa* with five species followed by *Dendrocalamus* with four species. Besides, other genera listed were *Dinochloa*, *Melocalamus*, *Melocanna*, *Oxytenanthera*, *Pseudostachyum*, *Teinostachyum* with single species respectively. Bora et al. (2017) reported five species of *Bambusa* from Borail Wildlife Sanctuary of Assam which is *Bambusacacharensis*, *B. tulda*, *B. vulgaris*, *B. balcooa* and *B. jaintiana*. Among the five different species found in Cachar and Borail Wildlife Sanctuary, Assam, three species that is *B. tulda*, *B. vulgaris* and *B. balcooa* are found to be common.

Table 2: Showing the dominant genera and species with their flowering cycles recorded in Cachar district of Barak Valley, Assam (India)

| Sl. No. | Species   | Flowering cycle (years) | References         |
|---------|---|-------------------------|--------------------|
| 1       | <i>Bambusa polymorpha</i> Munro,                | 54-80                   | Zheng et al., 2020 |
|         | <i>B. pallida</i> Munro                         | -----                   |                    |
|         | <i>B. tulda</i> Benth.                          | 48                      |                    |
|         | <i>B. balcooa</i> Roxb.                         | 32-34                   |                    |
|         | <i>B. vulgaris</i> Schrad.                      | >150                    |                    |
| 2       | <i>Dendrocalamus giganteus</i> Munro            | 76                      | Zheng et al., 2020 |
|         | <i>D. strictus</i> (Roxb.) Nees                 | 7-70                    |                    |
|         | <i>D. longispathus</i> (Kurz) Kurz,             | -----                   |                    |
|         | <i>D. hamiltonii</i> Nees ex Arn. & Munro       | 25/44                   |                    |
| 3       | <i>Dinochloa machalands</i> (Munro) Kurz.       | -----                   | -----              |
| 4       | <i>Melocalamus compactiflorus</i> (Kurz.) Benth | -----                   | -----              |
| 5       | <i>Melocanna baccifera</i> (Roxb.) Kurz         | -----                   | -----              |
| 6       | <i>Gigantochloa albociliata</i> (Munro) Kurz    | -----                   | -----              |
| 7       | <i>Pseudostachyum polymorpha</i> Munro          | -----                   | -----              |
| 8       | <i>Schizostachyum dullooa</i> Gamble            | 37-48                   | Zheng et al., 2020 |

Bamboo is a perennial plant and also have distinctive flowering life cycle; however, many species remain in vegetative phase for decades or even a century, followed by mass synchronous flowering and subsequent death (Janzen, 1976; Zheng et al., 2020). There are recent instances of flowering in Barak valley in *B. balcooa* during 2014 and 2015 (Das et al., 2017), and in *B. vulgaris* in 2015 (Das et al., 2017). During present survey, however, surprisingly no flowering of bamboo species was observed in any of the species in Cachar district. Comparing with the reports of Bora et al. (2017), Das et al. (2017, 2018) and Debnath et al. (2020), it has been reported here that *Bambusa* genus is the most common and dominant flora. Among different species, *B. polymorpha* had been observed growing luxuriously in different parts of Cachar district. It is also observed that

domestic plantation and cultivation of *B. polymorpha* is appreciated in villages since decades. In addition, people of the village areas are dependent on bamboo resources as these are used for making huts, baskets, granaries, packing materials, tapes, mats, musical instruments etc. Extracts of various bamboos are used as medicines to cure many diseases like gout, piles, cough, eczema etc.

From the survey it had been noticed that due to anthropogenic activities, industrialization, deforestation, constant road construction, floods, landslides etc. many species of bamboos are facing threats of categorisation under "endangered species". According to Aishwath and Lal (2016) "plants are said to react to stress factors with morphological, physiological and biochemical adaptations designed to increase their resistance to the stress". Among different

challenges, flood is one of the major factors which adversely affects bamboo cultivation/ plantation in plains of Cachar district. Besides, there were rare instances of flowering of bamboo observed from Cachar district except few (Debnath *et al.*, 2020 etc). So, there is a need for intense study to understand the flowering phenomenon occurring in Cachar district.

Lastly, it is strongly recommended to maintain the database of all the species of bamboos present in Cachar district and it is also suggested to conduct survey after every two / three years. Further, increase in nurseries, and cultivation of bamboo in both domestic and forest areas should be encouraged (because of favourable climate) which will proportionately uplift the livelihood of people in villages of Cachar. It will ensure successful-sustainable development of the environment and society through trainings if provided by Government and private sector. To strengthen entrepreneurship, introduction of skill enhancement courses (SEC) in higher institutions utilising bamboo resources

for generating sustainable sources of income in villages has been suggested which would accomplish sustainable development goals (SDGs).

#### AUTHOR CONTRIBUTION

First author surveyed the field and wrote the whole manuscript. Second author also contributed in the script. Third author reviewed and added special comments to the manuscript.

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#### CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

#### REFERENCES

- Aishwath, O.P. (2016) Resilience of spices, medicinal and aromatic plants with climate change induced abiotic stresses. *Annals of Plant and Soil Research* **18**(2): 91-109
- Bor, N.L. (1940) *Flora of Assam*. Government of Assam Press, Shillong, Vol-5.
- Bora, A. Devi, M. and Bhattacharyya, D. (2017) Grasses and Bamboos of Barail Wildlife Sanctuary in Assam, India. *Pleione* **11**(2): 440-454
- Chen, T. (2015) Characteristic analysis of heavy metal contents in Soil and bamboo shoots in *Phyllostachys praecox* stands associated with various mulching times. Zhejiang Forestry University.
- Chowdhury, S. (2005) *Assam's Flora: Present Status of Vascular Plants*. Assam Science Technology and Environment Council (ASTEC).
- Chowdhury, S. (2021) *Plantas Assam*. Brahmaputra Offset. ISBN: 978-93-5593-569-4.
- Das, M.C., Singnar, P., Nath, A.J. and Das, A.K. (2017) Flowering in *Bambusa balcooa* Roxb. in Barak Valley of North East India. *Indian Forester* **143**:180-181.
- Das, M.C., Singnar, P., Nath, A.J. and Das, A.K. (2018) Flowering of *Dendrocalamus hamiltonii* in northeast India during recent years. *An International Journal of Environment and Biodiversity*. **9**(4):304-306.
- Debnath, N., Kumari, P., Naithani, H. and Singnar, P. (2020) Gregarious Flowering in *Bambusa pallida* Munro from Assam, India. *Indian Forester* **146**(7):653-654.
- Emamverdian, A., Ding, Y., Mokherdorran, F. and Xie, Y. (2018) Growth responses and Photosynthetic Indices of Bamboo Plant (*Indocalamus latifolius*) under Heavy Metal Stress. *The Scientific World Journal*. Article ID 1219364.
- Gadgil, M. and Prasad, S.N. (1984) Ecological determinants of life history evolution of two Indian bamboo species. *Biotropica* **16**:161-172.
- Gamble, J.S. (1896) *The Bambuseae of British India*. *Annals of Royal Botanic Garden*, Vol. VII, Calcutta: Printed at the Bengal Secretariat Press, London.
- Gupta, K.K. (1972) Flowering in different species of bamboos in Cachar district of Assam in recent times. *Indian Forester* **98**:83-85.

- Gupta, K.K. (1967) Gregarious flowering of *Oxytenanthera* species. *Indian Forester* **113**:385.
- Hossain, M.F., Islam M.A. and Numan S.M. (2015) Multipurpose Use of Bamboo Plant: A Review. *International Research Journal of Biological Sciences* **4**(12):57-60.
- Jain, S.K. & Rao, R.R. (1977) *A Hand book of Field and Herbarium methods*. Today and tomorrow's Printers and Publishers. New Delhi.
- Kanjilal, U.N., Kanjilal, P.C., De, R.N., Das, A. (1982) A flora of Assam Vol 111 – IV, (Avon Book Company, New Delhi).
- Liang, Z., Kovacs, G.P., Gyuricza, C. and Nemenyl, A. (2022) Potential use of bamboo in the phytoremediation of heavy metals: A review. *Acta Graria Debreceniensis* 91-97.
- Mandal, D. and Baruah, T. C. status of major nutrients in rubber soils of north-east India in relation to soil acidity. *Annals of Plant and Soil Research* **15**(1): 23-26.
- Nath, A. J. and Das, A. K. (2008) Bamboo resources in the home gardens of Assam: A case study from Barak Valley, *J Trop Agri* **46**: 46-49.
- Sarma, H., Sarma, A.M., Sarma, A. and Borah, S. (2010) A case of gregarious flowering in bamboo, dominated lowland forest of Assam, India: phenology, regeneration, impact on rural economy, and conservation. *Journal of Forestry Research* **21**(4):409-414.
- Zheng, X., Lin, S., Fu, H., Wan, Y. and Ding, Y. (2020) The Bamboo Flowering Cycle Sheds Light on Flowering Diversity. *Frontiers in Plant Sciences*. doi:0.3389/fpls.2020.00381.