

Flowering records of *Dendrocalamus longispathus* bamboo in North East India

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(Received 20 August, 2023; Accepted 26 October, 2023)

ABSTRACT

Northeast India is known as one of the most biodiverse regions in the world. In North-East India, bamboo holds an important place in the natural environment as well as in the socio-cultural and economic life of the people. Bamboo is a popular plant around the world with an unusual flowering cycle. Bamboo species exhibits sporadic or annually flowering behavior as well as gregarious flowering. With respect to flowering timing, it shows wide variation (1-120 years). *Dendrocalamus longispathus* (Kurz) Kurz is a very useful bamboo species naturally growing in the forests of north east India and neighboring countries. Due to high demand and unusual flowering cycle of this species, availability is decreased in the northeast India. Here, we collected information on bamboo flowering events of *Dendrocalamus longispathus* in North East India by investigating historical documents and field studies. This bamboo flowering data of *Dendrocalamus longispathus* will provide basis to conserve this species and valuable reference material for understanding bamboo flowering cycle.

Key words: Northeast India, Bamboos, Bamboo flowering, *Dendrocalamus longispathus*

Introduction

Bamboos are fast growing perennial plants belongs to subfamily Bambusoideae of poaceae family are found worldwide. Bamboos play important role in socioeconomic, cultural and ecological development of bamboo growing region. Owing to its worldwide distribution, bamboo species play key role in biodiversity conservation, carbon sequestration, combat climate change and conservation of soil moisture. More than 88 genera and 1,642 bamboo species are available worldwide, of which 28 genera and more than 120 species are herbaceous bamboo (Vorontsova *et al.*, 2016). Except Europe and Antarctica, bamboo is widely distributed in the tropical, subtropical, and temperate regions of all continents, from lowlands to ~4,000m above sea level (Zheng *et al.*, 2020).

In India, bamboo is found naturally in all the states except Kashmir region. India has about 125 indigenous and 11 exotic bamboo species from 23 genera. Northeast region of India is a major storehouse of the country's bamboo resources. As per the India State of Forest Report (ISFR) 2021 north-eastern states and West Bengal accounts for more than 50 per cent of bamboo resources of the country. Flowering in bamboos is a strange phenomenon. Bamboos grow vegetatively for a species-specific period before flowering, after that seeding and dying happen in bamboo. Most bamboo plants flower only once in their life cycle. Bamboo flowering is mysterious phenomenon. All members of a species, or at least of a particular clone, will flower together wherever they are. This means forests of bamboo separated by hundreds of kilometers will flower simultaneously. In 2009, *Bambusabalcoa*, *B. tulda*,

Dendrocalamus hamiltonii, and *Stapletonia arunachalensis* flowered in Arunachal Pradesh, India, due to this phenomenon rodent outbreaks happened and severe damage in many agricultural crops occurred (Kumawat *et al.*, 2014). This proved that flowering of bamboo can have a negative impact on the livelihood of farmers and this incident can cause famine in that area. Bamboo flowering data is very informative as in 1960, people of Northeast states have seen the harsh impact of gregarious flowering in *Melocanna baccifera* (Mautak) in Mizoram, turned into a terrifying spiral of crop devastation and food shortages, which triggered a bamboo famine known as Mautam. Recently as per India State of Forest Report (ISFR) 2021, Northeast India has lost 615 sq. kms of bamboo bearing areas in just two years between 2019 and 2021. *D. longispathus* is known to exhibit both sporadic and gregarious nature of flowering (Naithani, 2015). *Dendrocalamus longispathus* usually occurs in moist hill slopes and alongstreams in the moist fertile loamy soil and particularly shaded fringes of the forest cover (Yadav *et al.*, 2019). Flowering and non-flowering clumps can be found within the same site of where *D. longispathus* flowering occurs. Few individual in the same population did not flower at all. This peculiar flowering pattern of *D. longispathus* is a cause of concern for all those who are associated with it. An attempt has been made in this paper to include historical flowering records of *Dendrocalamus longispathus* as well as latest flowering records of from north east India.

Materials and Method

Extensive field survey was performed in different states of northeast India to collect and observe flowering behavior of *Dendrocalamus longispathus*. For historical flowering incidence of *D. longispathus* secondary data were collected from literature and other reports.

***Dendrocalamus longispathus*: An important bamboo species of northeast India**

The bamboo *Dendrocalamus longispathus* is caespitose bamboo. Young shoots yellowish green with reflexes blades, covered with shining blackish hairs. 20 m tall Culms, diameter upto 10 cm, in glaucous-green when young, greyish green or yellowish-green when old; 25-60 cm long internodes. It is distributed widely in Bangladesh, India, Myanmar, Thailand and Northeast India. In north eastern region of India

the species is distributed in Assam, Mizoram, Manipur, Tripura, Nagaland and Khasi hills of Meghalaya (Barooah and Borthakur, 2003; Banik, 2000, 2015). In Assam it is found in Cachar, Dholai block, Hobaithung and Kamrup area, whereas in Manipur it is available in Moram, Bishnupur, Dailon, Gamhui, Patuthmun, and Imphal. Common name of *Dendrocalamus longispathus* in different region of northeast India are 'Waloo' (Dimosa) of North Cachar Hills, 'Khang', 'Rupali' and 'Ruphai' (Cachar). Manipur: 'Wui', 'Uil' (Manipuri), 'Gothé' (Paite), 'Dujangpai' (Kabui). Mizoram: 'Rawnal', (Mizo), 'Rahnia' (Mara), 'Pharbuabas' (Chakma), 'Unamlib' (Brer Rieng), and Rupai (Tripura).

This bamboo is mainly used in construction of houses, and it is also useful in thatching, basket making, fuel, chicks for doors, house posts and mat making, floats for timber and rafts and making furniture's, handicrafts, baskets etc. Young shoot is consumed for edible purpose in North East India.

Distribution Map

Flowering records of *Dendrocalamus longispathus*

Blatter (1931) reported that *Dendrocalamus longispathus* flowering comes under the class irregularly flowering gregariously and often sporadically. The estimated flowering cycle is 29-35 (± 2) years in Burma and nearby Cox Bazar area; while toward North Chittagong, Mizoram, Sylhet and Tripura the cycle appears to be little longer (45 ± 2) years stated by Das *et al.* (2017).

Gupta (1972) reported that the flowering of *Dendrocalamus longispathus* in 1968 from Katakhal Reserve Forest from Barak Valley, Assam and in Mizoram (1966-67). After 1972, there is no published report on flowering of the species from Barak Valley, he suggested that the flowering cycle of the species at 46 (± 2) years. In 1979, this species exhibit flowering at Forest Research Institute, Dehradun Bahadur (1979). Mohan Ram and Hari Gopal (1981) reported that at Lengpui of Mizoram flowering occurred in 1970-71 and 74. Bisht and Naithani (2010) reported that it was sporadically flowered in Tlungvel district of Mizoram 2007. The *Dendrocalamus longispathus* flowering was noticed from Teliamura sub-division under West district of Tripura during the year 2007 and 2008 (Sharma, 2010). Tripura Depacherra JFMC nursery, it flowered sporadically in 2010 (Banik, 2015). Sawmliana (2013) mentioned that it was flowering in 2011-2013

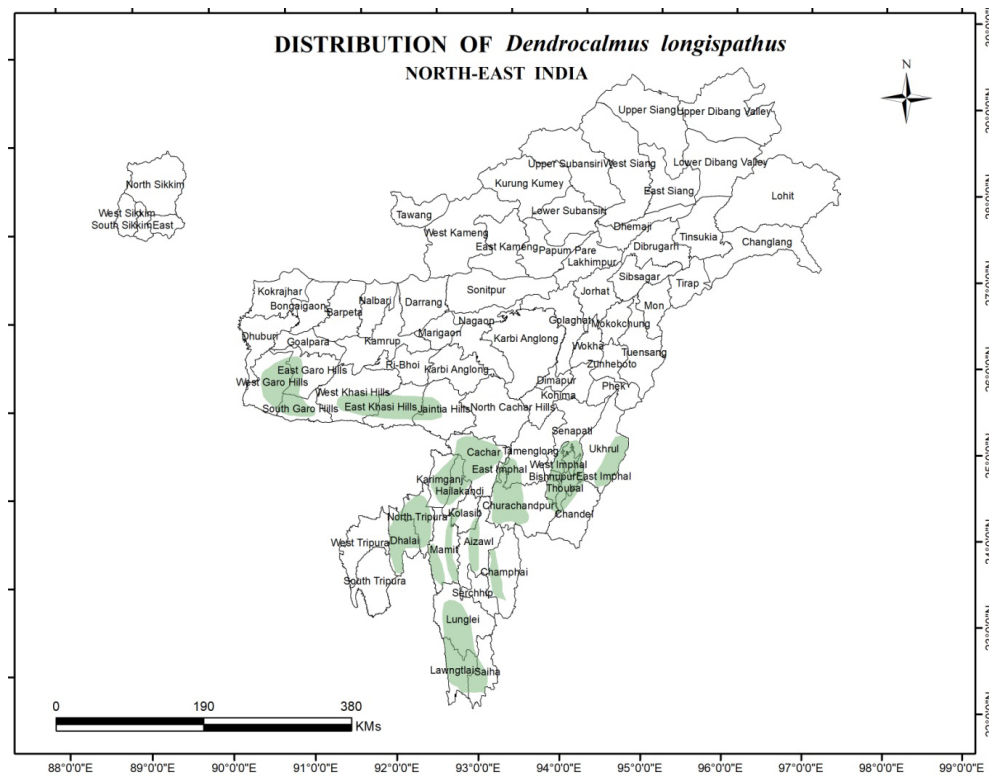


Table 1. Previous flowering records of *dendrocalamus longispathus* from North East India

Flowering nature	Place	Year	Reported by
Sporadic	I.L. Reserve, Doli Block, Cachar (Assam)	1969	Bahadur (1979)
Sporadic	Lengpui, Mizoram	1970-71, 1974, 1981	Mohan Ram and Gopal (1981)
Sporadic	Tlungvel, Mizoram	2007	Bisht and Naithani (2010)
Not known	Teliamura sub division under West district, Tripura	2007 and 2008	Sharma (2010)
Sporadic	Tripura Depacherra, JFMC nursery	2010	Banik (2015)
Gregarious	Lengpui, W Serzawl Mamit, Dapchhuah, Mizoram	2011	Naithani (2015)
Sporadic	Lengpui, Mizoram	2011-2013	Sawmliana (2013)
Gregarious	Damcherra, North Tripura	2013	Honnareddy (2014)
Gregarious	Kanchanpur Forest Division, Tripura	2013	Hemavati <i>et al.</i> (2015)
Gregarious	Lengpui, W. Serzawl, Mamit, Dapchhuah, Damparengpui-Old Chikha, Parthiantlang-Suarhliap areas of Mizoram	2013-2014	Naithani (2015)
Gregarious	Kalajhari hills in Tripura	2014	Honnareddy (2014)
Gregarious	Chawmanu, Jawaharnagar in Tripura	2014	Honnareddy (2014)
Gregarious	Manu Forest Division and Ambassa Forest Division, Babusai TSR Camp (Dhalai) of Tripura	2014	Hemavati <i>et al.</i> (2015)
Sporadic	Kolasib, and Mami, Mizoram	2014	Sharma <i>et al.</i> (2014)
Sporadic	Babusaipara of Gandhacherra subdivision under Dhalai district, Tripura	2014	Sinha and Roy (2014)
Sporadic	Dohaliya Forest Area, Karimganj, Assam	2014-15	Das <i>et al.</i> (2017)
Sporadic	Bazarghat (Karimganj), Assam	2015-16	Das <i>et al.</i> (2017)
Gregarious	Southern Assam and Tripura	2017-19	Debnath <i>et al.</i> (2020)

at Lengpui Mizoram. Gregariously flowering of *Dendrocalamus longispathus* in Lengpui, W Serzawl, Mamit, Dapchhuah district of Mizoram in 2011. Kalajhari Hills in Tripura (near to CHTs) flowering was observed gregariously in 2014 reported by (Honnareddy, 2014). *Dendrocalamus longispathus* flowering gregariously in 2013 Damcherrain North Tripura reported by (Honnareddy, 2014). The flowering of *Dendrocalamus longispathus* started in Tripura in 2013 along the border of Mizoram i.e. Kanchanpur Forest Division and later on in the year 2014, it was observed in large scale in Manu Forest Division and Ambassa Forest Division, Babusai TSR Camp (Dhalai district) of Tripura reported by (Hemavati, *et al.*, 2015)

The Sporadic flowering report on *Dendrocalamus longispathus* from the Babusai para of Gandhacherra sub-division under Dhalai district of Tripura during the year 2014 (Sinha and Roy, 2014). Chawmanu, Jawaharnagar in Tripura, flowered gregariously in 2014 reported by (Honnareddy, 2014). Sharma *et al.* (2014) reported that it was sporadically flowering in Kolasib and Mamit districts of Mizoram in 2014. In 2015 and 2016 the sporadic flowering extended to Bazarghat of Karimganj district of Assam where 7 clumps were observed in flowering condition reported by Das *et al.* (2017). Southern Assam and Tripura experience gregarious flowering of *D. longispathus* during 2017-19 (Debnath *et al.*, 2020). Yadav *et al.*, (2019) reported flowering of *D. longispathus* in different districts of Mizoram, i.e. Kolasib and Mamit district (2014), Kolasib, Mamit, and Sercchip (2015), Lengpui, Aizawl and Lunglei (2016), Lengte, Lawngtlai, Siaha and Mamit (2014).

Flowering of the *Dendrocalamus longispathus* from North East India in recent years

During field survey in recent years authors observed sporadic flowering behavior of *Dendrocalamus longispathus* from different states of North East India. In 2021, sporadic flowering observed at Zamuang Forest Range, (24°13'02.68"25'18.14" E) Mamit and Near Dampui village, Mamit (23°48'28.53" N92°29'49.01" E) of Mizoram state. In Tripura, it flowered sporadically North Laljuri (24°09'47.44" N92°13'08.03" E) and Kauribari (24°09'49.02" N92°13'05.07"E) in the year 2022. Recently in 2023, authors recorded sporadic flowering behavior of *Dendrocalamus longispathus* from Singngat (24°09'02.1384"N93°35'19.578"E), Manipur and North Vanlaiphai, Mizoram.

Conclusion

The flowering cycle and nature of flowering of bamboo varies species to the species. Assessment of flowering cycle is very important to record the flowering database and for prediction purpose in near future which can provide basis for further research in the conservation and mass multiplication of bamboo species. It is very important to collect bamboo flowering records timely for advance planning to prevent bamboo famine situation in Northeast India.

Acknowledgements

This work was carried out as field survey programme of All India Coordinated Research Programme on Bamboo (Component 6C: All India Bamboo flowering database). We are highly thankful to ICFRE, Dehradun and CAMPA for funding of the project. We are grateful to Director ICFRE-RFRI and other staff for support.

Conflict of interest: Authors have no conflicts of interest to disclose.

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