

(REVIEW ARTICLE)



Gregarious flowering in *Dendrocalamus strictus* (Roxb.) Nees in Mussoorie Hills, Uttarakhand, India

Chandrima Debi ^{1, *}, Sas. Biswas ² and Kahkashan Naseem ³

¹ Forest Research Institute, Dehradun, Uttarakhand, India.

² Department of Forestry, Dolphin (PG) Institute of Biomedical and Natural Sciences, Dehradun, Uttarakhand, India.

³ IFS, Mussoorie Forest Division, Mussoorie, Uttarakhand, India.

GSC Biological and Pharmaceutical Sciences, 2021, 15(03), 124–126

Publication history: Received on 01 May 2021; revised on 04 June 2021; accepted on 07 June 2021

Article DOI: <https://doi.org/10.30574/gscbps.2021.15.3.0154>

Abstract

Dendrocalamus strictus (Roxb.) Nees has started flowering and synchronous flowering can be observed in the hillslopes and roadside of Mussoorie and vicinity areas. The synchronous flowering of *D. strictus* was observed in few locations along hillslopes of Mussoorie – Dehradun roadway. The GPS locations of the site are 30024'55' N and 7804'41'E, 30024'52" N and 7804'43" E and 30024'49" and 7804'43" E at an elevation of around 1130 msl. The bamboo clumps were overladen with flowers showing synchronous flowering.

Keywords: Bamboo flowering; Monocarpic; Flowering cycle; Remote sensing; Germplasm Bank

1. Introduction

Dendrocalamus strictus (Roxb.) Nees is one of the most important bamboo species and contributing about 53% of the total bamboo area in India. *D. strictus* is one of the important bamboo species in Uttarakhand and dominantly found in deciduous forests along hill slopes, ravines, and alluvial plains of north and central India. Recently, this species has started flowering and synchronous flowering can be observed in the hillslopes and roadside of Mussoorie and vicinity areas. It is a significant phenomenon depicting monocarpic flowering where the plant dies after flowering.

Bamboo flowering is an intriguing botanical phenomenon for botanists and foresters and the reasons behind the long flowering intervals are still unclear. *D. strictus* shows gregarious or sporadic flowering with flowering cycle of 25-45 years. The inflorescence in this species is a large branching panicle with florets in heads. Fertile florets are intermixed with smaller sterile ones. There are six stamens. The ovary is stipitate and turbinate. The style is long, and the stigma is bifid and plumose. *D. strictus* is anemophilous (1). Flowering occurs when bamboo reaches its maturity stage, i.e. the flowering cycle. After flowering, irrespective of culm and rhizome ages, the clump dies within few months. The synchronous flowering of *D. strictus* was observed in few locations along hillslopes of Mussoorie – Dehradun roadway. The flowering started in the month of February -March and can be still observed in the site. The GPS locations of the site are 30024'55' N and 7804'41'E, 30024'52" N and 7804'43" E and 30024'49" and 7804'43" E at an elevation of around 1130 msl. The bamboo clumps were overladen with flowers showing synchronous flowering (Fig. 1-4).

There are various reports of synchronous or gregarious flowering of different bamboo species in different parts of India, but there are few reports of synchronous bamboo flowering in Uttarakhand. Earlier in the year 2015, *Dendrocalamus strictus* flowered in the foothills of Nainital district in Ramnagar forest division of Kumaon zone in Uttarakhand. In the year, 2019-2020, Ringal flowering was observed in Mussoorie and adjacent areas. In the past, there were few reports of gregarious flowering in *D. strictus* was reported by (2,3).

* Corresponding author: Chandrima Debi
Forest Research Institute, Dehradun, Uttarakhand, India.

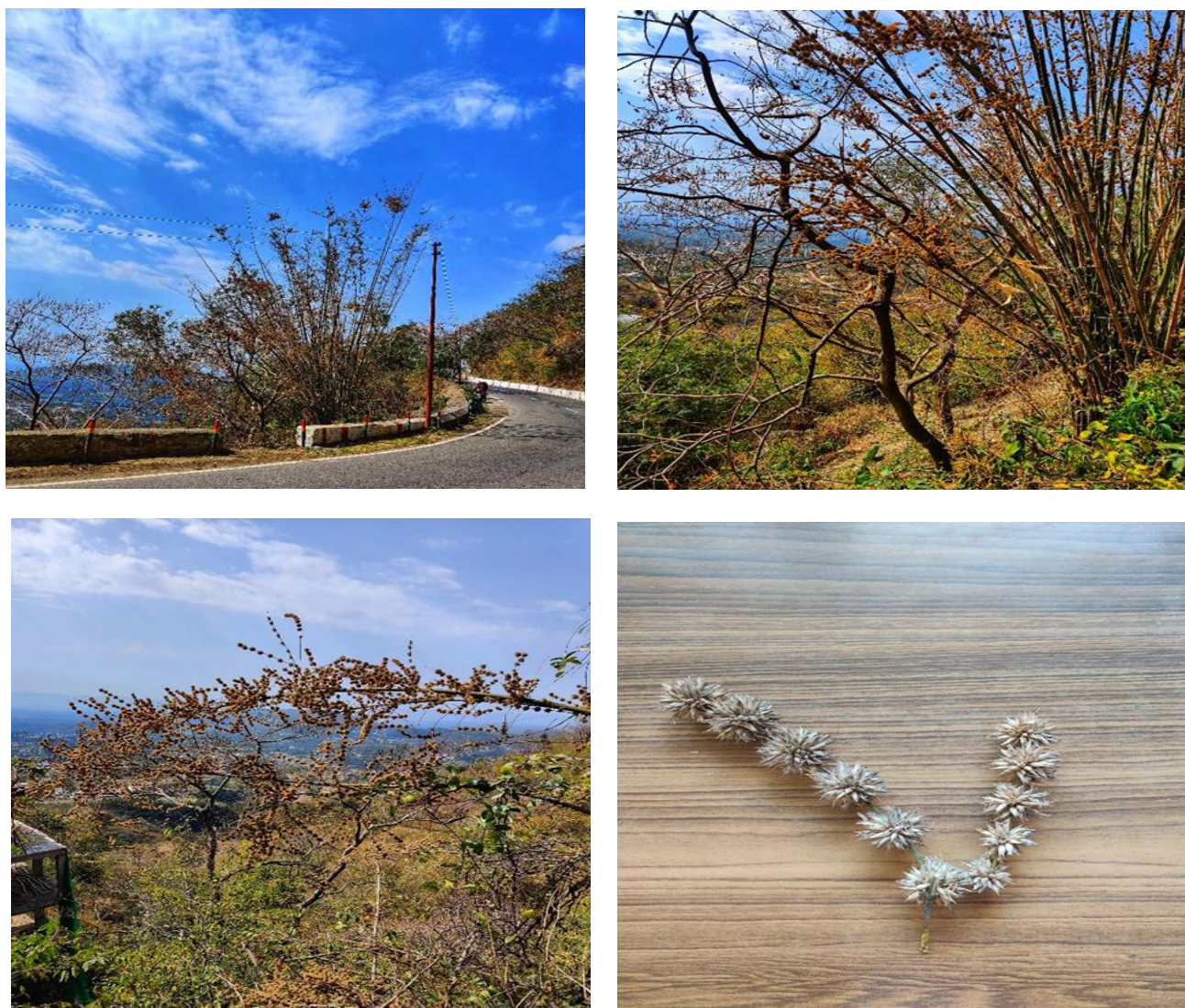


Figure 1 Flowering clumps, culm and panicle with florets in heads, **Source :** (9)

Bamboo flowering data collected from various sources shows that the phenomenon has contributed a lot to the understanding the flowering behavior. It is considered as a unique phenomenon where the flowering clumps of bamboo usually die in most of the bamboo species. Site quality and climatic conditions influence flowering of bamboo clumps (4). Bamboo species generally flower gregariously once in their lifetime but some flower either annually or irregularly which may be due to stress caused by climatic and physiological conditions. From the past experience, it can also be predicted that there is a high chance of ecosystem disturbances, natural calamities and famine after the gregarious flowering and death of whole population (5, 7, 8). It is therefore, suggested that mitigation measures be developed by the competent authorities to reduce the risk of natural calamities and famines. In order to conserve *Dendrocalamus strictus* extensive work has been carried on by Forest Research Institute, Dehradun and field Germplasm Bank of *Dendrocalamus strictus* was also created (6).

Although, the flowering of bamboo species in Uttarakhand has been studied by Forest Research Institute, Dehradun in the past but there are gaps in knowledge on the cause and biology of such bamboo flowering in Mussoorie hills Uttarakhand. Also, there are few records of data concerning the flowering pattern in various parts of the country. Modern remote sensing, drone technology and advanced scientific and statistical approaches should be applied towards the study of biological pattern and behavior of bamboo flowering. During the field visits, it was observed that all the clumps in the study area flowered simultaneously and overlaid with flowers as shown in photographs (9). *D. strictus* is ecologically as well as economically important species not only in Uttarakhand but also in different parts of India and therefore, proper measures should be adopted to protect such species and its population in natural habitat and further protect the stands from rampant grazing and anthropogenic pressure.

2. Conclusion

The periodic flowering of such economically important commonly occurring bamboo, *Dendrocalamus strictus* (Roxb.) Nees stresses the urgent need for collection of viable seeds for propagation and afforestation, and study on the factors responsible behind such phenological phenomena. Present study provides useful information to fill lacunae in knowledge on gregarious flowering and distribution of bamboo. There is need to study the socio-economic aspects of the species for the economical benefits of rural community in hills of Uttarakhand.

Compliance with ethical standards

Acknowledgments

The authors acknowledge Woodstock School, Landour, Mussoorie and Mr. Suman Mitra for field support in survey, collection of data and photography of material.

Disclosure of conflict of interest

The authors declare no conflict of interest.

References

- [1] Nadgauda RS, John CK, Mascarenhas AF. Floral biology and breeding behavior in the bamboo *Dendrocalamus strictus* (Roxb.) Nees. *Tree Physiol.* 1993; 13(4): 401-8.
- [2] Naithani HB, Pal M. Gregarious Flowering of Bamboo *Dendrocalamus strictus*. 2001; 127(7).
- [3] Banik RL. A short note on the flowering of *Dendrocalamus strictus* Nees (Lathi bansh) in Chittagong - Short communications. *Bano Biggyan Patrika.* 1981; 10(1&2): 94-96.
- [4] Dwivedi AP. Gregarious flowering in *Dendrocalamus strictus* in Shahdol (Madya Pradesh): Some management considerations. *Indian Forester.* 1988; 114(9): 87-89.
- [5] Jeeva, S., Kiruba, S., Lalhruaitluanga, H., Prasad, M.N.V. & Rao, R.R. Flowering of *Melocanna baccifera* (Bambusaceae) in northeastern India. *Current Sci.*, 2009; 96 (9), 1165-1166.
- [6] Nautiyal S, Nautiyal DP, Mishra A, Kumar M, Biswas Sas, Negi S. Creation of Field Germplasm Bank of *Dendrocalamus strictus*, In: Biswas, Sas. et al. (Eds.) Proceeding of International seminar "Role of Plant Taxonomy for Biodiversity Management and Human Welfare" from 1-3 December 2008, organized by Forest Research Institute, Dehradun, India. 2008; 89-90.
- [7] Panwar P. Poor Man's timber is flowering Let's get prepared. *Indian Forester*, 2004; 130:1343-1344
- [8] Panwar P. Bamboo and Famine. *Current Sci.* 2008; 94. 12 (2008): 1547.
- [9] Chandrima Debi. www.chandrimadebi.com Mussoorie, Uttarakhand; [28/02/2021] Available from <http://chandrimadebi.com/2021/02/28/bamboo-flowering-natures-alarm/>