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Bamboo Info

A quarterly newsletter of Bamboo Technical Support Group (BTSG) - KFRI

Gregarious Flowering of *Bambusa bambos* (L.) Voss in Parambikulam-Annamalai Tiger Reserve Landscape: Ecological Implications of Monocarpic Mass Flowering

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National Bamboo Conclave 2026

A national-level bamboo conclave held on 9th January 2026 in Bhubaneswar brought together a wide range of stakeholders including policymakers, researchers, academicians, industry representatives, architects, artisans, and development professionals.

Bamboo tissue culture

Several bamboo species flower only once in 30 to 100 years, so the large-scale production of quality planting materials is possible through tissue culture technology. In this method, superior genetic stock of each species is maintained, and the nodal buds of culms and parts of young shoots from this stock are used for tissue culture. These parts are known as 'explants'. Along with seed-based propagation, tissue culture technology is also essential for commercial-scale bamboo cultivation.

Editor's Desk

Dear readers,

Welcome to the second issue of Volume II of Bamboo Info, your source for all things that are bamboo-related!

In this edition of Bamboo Info, we bring into focus some of the significant developments, research updates, and field-level initiatives shaping the bamboo sector. The issue features an insightful article on the gregarious flowering of *Bambusa bambos* in the Parambikulam-Annamalai Tiger Reserve landscape, highlighting the ecological implications of monocarpic mass flowering and its relevance to forest ecosystems and biodiversity conservation.

The edition also carries updates from the National Bamboo Conclave 2026 held at Odisha and also the training programme held at KFRI for farmers, artisans and other stakeholders.

At BTSG, we believe that through comprehensive training programs, community engagement and hands-on projects, we can transform landscapes and improve livelihoods by bringing farms to homes, creating sustainable solutions for a brighter tomorrow. By prompting local self-government institutions to cultivate bamboo, we aim to cultivate change, improve livelihoods, and foster sustainable development. We invite you to join us as we navigate the intersection of tradition and technology, seamlessly blending ancient wisdom with modern solutions.

As we launch Bamboo Info, we invite you to become an integral part of this interactive space. Use it to stay connected, share your stories, and be inspired by the groups' efforts that amplify the impact of bamboo and contribute to a more sustainable and resilient world.

Thank you for joining us on this exciting journey!

Editorial team,
Bamboo Info

Advanced Approaches in the Bamboo Field

"Nowadays, bamboo has global attention as a sustainable and versatile natural resource. In recent years, several advanced approaches have been introduced in the bamboo sector to enhance its productivity, utilization, and economic value. The technologies such as tissue culture, genetic improvement, and scientific plantation management have significantly improved the propagation and cultivation of bamboo. DNA barcoding for species identification, Bamboo Molecular plastic, Bamboo based ethanol production etc. made significant impact to promote plantation of commercially important species among farmers. The availabilty of quality planting material is a major challenge, for this tissue culture technique enables the rapid multiplication of economically significant bamboo species, which ensures the production of healthy and uniform planting materials and also meets the growing demand for quality planting stock. However, superior mother clumps should be identified for the tissue culture technique. For this process, assessment of genetic diversity parameters and programme trails should be needed. Overall, advanced technologies and innovative approaches are transforming the bamboo sector, making it more sustainable, productive, and economically viable."

VB Sreekumar
Coordinator, BTSG-KFRI

V Anitha
Associate Coordinator, BTSG-KFRI

Spotlight

Gregarious Flowering of *Bambusa bambos* (L.) Voss in Parambikulam-Annamalai Tiger Reserve Landscape: Ecological Implications of Monocarpic Mass Flowering

Bamboo flowering is an enigmatic phenomenon, as the precise biological mechanisms that triggers synchronized flowering cycles are still poorly understood. Bamboo flowering patterns can be characterized as sporadic, gregarious, combined massive synchronized or partial; among these, gregarious or massive synchronized flowering is particularly interesting due to its profound ecological and socio-economic implications. Gregarious flowering is considered a rare biological phenomenon where entire populations of bamboo flower simultaneously over vast geographical area before undergoing programmed senescence leading to death. It is well established that bamboo clones propagated either through conventional vegetative methods or tissue culture remain synchronized with the parent plant and flowering happens simultaneously with the original mother clump, even when separated across vast geographical distances and regardless of regional weather conditions. It is widely considered that bamboo possesses an elusive "physiological or molecular clock", an internal counting mechanism that regulates flowering. Gregarious flowering is therefore thought to be triggered by internal physiological clocks rather than environmental factors.

This synchronized mass flowering and seed production in bamboo might also be linked to an evolutionary strategy often referred to as predator satiation or masting. By producing an overwhelming amount of seeds after flowering, bamboo ensures that local seed predators (rodents, birds, and wild herbivores) cannot consume the entire seed stock, thereby guaranteeing the survival of adequate seeds for the next generation.

In any case, such gregarious flowering events in bamboo have serious ecological and socio-economic repercussions for the landscape. For example, Mautam or Thingtam are cyclic ecological events reported from Mizoram and other northeastern states of India, as a direct consequence of the gregarious flowering of *Melocanna bacciferra* (locally known as Mautuk) or *Bambusa tulda* (Rawthing), occurring approximately every 48-50 years. The sudden abundance of nutrient-rich bamboo seeds triggers a massive increase in the rodent population. Once the bamboo seed supply is exhausted, these rodents often migrate from forest areas to nearby villages and feed on harvested crops such as rice, which often lead to significant agricultural losses and many a times, severe famine in the region.

Extensive tracts of senescent bamboo "skeletons" now dominate the Anamalai Tiger Reserve landscape following a significant gregarious flowering event of *Bambusa bambos* in the region.

The last recorded "Thingtam" was in 2025, resulted in severe shortages of food reserves in several villages across Mizoram.

Bambusa bambos (L.) Voss (family Poaceae), commonly known as Thorny Bamboo (कांटा बांस; ஐல்லி) is one of the dominant bamboo species in the Kerala part of the Western Ghats. It is a multipurpose tropical bamboo species that supports rural livelihoods through edible shoots and the diverse use of harvested culms for furniture, construction materials, rafts, handicrafts, paper, pulp, plywood, and bioenergy, with well-managed extensive plantations across the country. *Bambusa bambos* was first described as *Bambusa arundinacea* by van Rheede, the erstwhile Dutch Governor of Malabar, in his book 'Hortus Malabaricus' as a species commonly referred to as 'Illy'. It is a monocarpic (semelparous) perennial species occurring both as dwarf and giant ecotypes, with a flowering cycle varyingly reported as 30–52 years or 43–49 years by various authors. During flowering, *Bambusa bambos* invests its entire starch reserve into a final reproductive effort and thereby produces an immense quantity of seeds, which is followed by senescence and

death of the clump. Earlier reports of gregarious flowering have been reported from various parts of India, including Andaman and Nicobar Islands, AndhraPradesh, Assam, Bihar, Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Punjab, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal by Naithani and Sanwal in 2017. In Kerala, gregarious flowering of *B. bambos* was reported by Menon in 1918 from the Tunacadavu Range. According to reports by Seethalakshmi and Kumar, similar flowering was observed in Wayanad during 1991–1992 and in Attappady during 1994–1995.

The dried Thorny bamboo biomass poses a heightened risk of increased forest fire incidences in the Parambikulam and Anammalai Tiger Reserves, especially during the summer season.

More recent cases of gregarious flowering in *Bambusa bambos* have been reported from vast areas of Uttarakhand and Uttar Pradesh between 2014-2016 by Naithani and Sanwal and from the Kamakhya hills of Assam during 2023-2024 by Mehmud and others. Recently in Kerala, Valara and Nagarampara forest stations in Neriamangalam Reserve Range (2021-2022) also witnessed to the gregarious flowering of *Bambusa bambos*.

Here we report the gregarious flowering of *Bambusa bambos* from the Parambikulam - Annamalai Tiger Reserve region during the period from 2024-2026. The Parambikulam Tiger Reserve is nestled within the picturesque Anamalai-Nelliyampathy landscape of the southern Western Ghats in Palakkad and Thrissur districts of Kerala and covering a total area of around 640 km^2. It is contiguous with the Anamalai Tiger reserve landscape, spanning over 1,479 km^2 and adjacent to the Eravikulam National Park and Chinnar Wildlife Sanctuary. Several large swathes of *Bambusa bambos* were observed to have already flowered and died in the Anamalai Tiger Reserve, whereas flowering was still ongoing in the adjacent Parambikulam Tiger Reserve during January-February 2026. One point of concern observed was the poor seed filling observed in the Parambikulam region, where the majority of seeds were found to be chaffy and underdeveloped. Further studies on seed germination, seedling survival and recruitment of *Bambusa bambos* in these regions following the monsoon season will

be essential to truly understand the long-term impact of this gregarious flowering event on the successional trajectory and composition of the landscape. This gregarious flowering of *Bambusa bambos* can potentially trigger a cascade of ecological shifts within the tiger reserve, as discussed below. An immediate concern is the increased risk for forest fires. The post-flowering mass die-off of *Bambusa bambos* has resulted in an unprecedented accumulation of dry, woody biomass (bamboo "skeletons"), which can act as a fuel load for wildfires. This significantly increases the vertical and horizontal fuel continuity, making the Parambikulam reserve even more susceptible to high-intensity forest fires during the summer months. In March 2017, an area of approximately 50 ha was destroyed by fire in Parambikulam Tiger Reserve, which required intervention from the Indian Airforce to quell. Intensified fire-line maintenance, especially during the summer months, along with controlled burning strategies, will be required to mitigate the risk posed by the dry bamboo culms. The gregarious flowering events also affect the socio-economic balance of tribal communities that exists within the reserve including: Kadar, Muthuvar, Malasar and Malamalasar who have been a part of community-based ecotourism in producing bamboo handicrafts and eco-friendly products.

Moreover, the bamboo seeds (often known as "bamboo rice") provide a nutritional windfall for rodents and wild

Gregarious flowering of *Bambusa bambos* observed on the way from Anamalai Tiger Reserve to Parambikulam Tiger Reserve.

boar, which can often trigger localized population explosions. On the contrary, larger herbivores like the Asian Elephant (*Elephas maximus*) and Gaur (*Bos gaurus*), which rely on bamboo foliage as a food source, may face temporary forage scarcity until the new "recruits" (seedlings) are established. This may lead to altered movement patterns and migration to different ranges within the reserve. Interestingly, the existing diversity and abundance of faunal and rodent populations within the Parambikulam landscape will decisively influence the successful recruitment and establishment of the next bamboo generation, highlighting complex ecological interplay and dynamics. Protecting emerging seedlings from overgrazing and fire is critical for the long-term sustainability of bamboo brakes.

It would be vital to gather viable seeds for ex-situ conservation and nursery propagation to aid restoration efforts in other degraded forest patches within the reserve.

Seeds of *Bambusa bambos* were observed to be largely unfilled and chaffy, which may pose a risk to the long-term genetic diversity and density of the bamboo brakes within the reserve.

Another threat is the colonization by alien invasive species. The collapse of continuous bamboo brakes opens up the forest canopy, leading to a temporary surge in light penetration. While this promotes the germination of bamboo seedlings, it also facilitates the colonization of invasive pioneers like *Lantana camara*, *Chromolaena odorata* and *Senna spectabilis*, among others, which are already wreaking havoc in other pristine forest reserves. Conversely, if millions of bamboo seedlings successfully

Flowering branch of *Bambusa bambos* showing clustered spikelets in different stages of maturity.

establish, they can create a "dense carpet" which can outcompete other tree and shrub seedlings. It remains to be seen which of these phenomena will play out in the long run in the Parambikulam-Annamalai landscape. Regular monitoring of germination rates, seed banks and recruitment patterns would be essential to understand these ecological outcomes and to develop effective management and mitigation strategies. Furthermore, a mass death of bamboo understory can dramatically slow down litter decomposition. Bamboo litter is of lower quality (higher C:N ratio) compared to overstory tree litter, which can lead to reduced nitrogen availability in the soil during the years immediately following a flowering event. This can affect tree seedling recruitment, soil microbe dynamics

Gregarious flowering of *Bambusa bambos* observed in large tracts of the Parambikulam Tiger Reserve.

and have other ecological implications.

The gregarious flowering of *Bambusa bambos* in Parambikulam reflects the dynamic interactions of flora and fauna across temporal scales in tropical forest ecology. While the death of the extensive bamboo brakes appears catastrophic, it paves the way for a vital regenerative process that ensures the genetic vigor and persistence of the species within the Western Ghats landscape. Such rare events illustrate that the forest dynamics are often governed by overlapping, multi-decadal biological cycles, which may not be witnessed within a human lifetime, yet serves as a form of ecological "reset button" that fundamentally reshapes the forest structure on a massive scale.

Donald James* Sreedevi C. D, Suma Arun Dev

Forest Genetics and Tree Breeding division, Biotechnology department, KSCSTE-Kerala Forest Research Institute, Peechi - 680 653, Kerala

**E-mail: donald@kfri.res.in*

A view of *Gigantochloa nigrociliata* (Buse) Kurz by VB Sreekumar

Bamboo Beats

Collection of news and activies from the bamboo sector.

National Bamboo Conclave 2026

A national-level bamboo conclave held on 9th January 2026 in Bhubaneswar brought together a wide range of stakeholders including policymakers, researchers, academicians, industry representatives, architects, artisans, and development professionals to explore bamboo's expanding role in sustainable development and climate-resilient growth in India.

The event was inaugurated by Sri. Ganesh Ram Singh Khuntia, Minister for Forest, Environment & Climate Change and Labour & Employees' State Insurance, Government of Odisha, along with Sri. Gokulananda Mallik, Minister for Fisheries & Animal Resources Development and Micro, Small & Medium Enterprises. The gathering was also attended by Rebecca Reubens, World Bamboo Ambassador, Sri. Karthick V., IFS, Project Director, OBDA. Also several people working on bamboo sector like research, industries and policy were particiapted in the programme.

BTSG–KFRI Conducts Statewide Bamboo Training Programmes

The Bamboo Technical Support Group (BTSG) of the Kerala Forest Research Institute has successfully conducted a series of training programmes across the state in association with the Kerala State Bamboo Mission and the National Bamboo Mission. The programmes focused on key areas including bamboo propagation, plantation management, processing, treatment, and livelihood

Development. Experts and field practitioners delivered technical sessions along with hands-on training, enabling participants to enhance their skills and explore sustainable income opportunities in the bamboo sector. The initiatives witnessed active participation from artisans, entrepreneurs, and other stakeholders, contributing to the strengthening of bamboo-based livelihoods and the promotion of eco-friendly practices.

Submission guidelines

We at Bamboo Info are excited to invite you to contribute full-length articles, news snippets, reports, and announcements of bamboo-related events for our upcoming issues. We welcome submissions on a wide range of topics, including but not limited to:

Spotlight: share your knowledge and expertise on any aspect of bamboo you're passionate about. You may introduce readers to a topical issue in the bamboo sector that deserves more attention.

Out of the Box: Have you stumbled upon a design concept, product novelty, or innovation that uses bamboo in a unique and creative way? We want to hear about it! Please submit an illustrated note describing the species used, dimensions, and other relevant details. The design should be original.

Species in Focus: Do you have a particular species of bamboo that you find fascinating? Share your insights on its distribution, ecology, salient features, specific uses, cultivation, and economic potential.

Roots: Bamboo has a rich cultural history and is still used in many traditional ways today. We would love to showcase time-tested bamboo products, cultural uses of bamboo, and traditional technologies from far and wide.

Chronicles: We are interested in hearing stories from the field about bamboo resource development, technology adoption, training, and other related topics.

Bamboo Quill: This section will highlight relevant books or publications about an emergent aspect of bamboo.

To submit your notes and articles, please send them to btsg@kfri.res.in or btsgkfri@gmail.com.

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Cover Image

Tissue Culture Plantlets of Bamboo from the Biotechnology Department, KFRI

About Bamboo Info

Bamboo Info is a quarterly newsletter from the Bamboo Technical Support Group (BTSG)-KFRI. Contents do not necessarily reflect the views or policies of BTSG-KFRI. Articles may be reprinted without charge, provided BTSG-KFRI and the author are credited. All photos should be credited to BTSG-KFRI.

About BTSG-KFRI

The Bamboo Technical Support Group is hosted at KFRI and supported by the National Bamboo Mission of the Ministry of Agriculture and Farmers Welfare to serve as a unit providing support to the National Bamboo Cell in technical and research matters.

KFRI BTSG team has expertise in various areas relating to bamboo which includes taxonomy, propagation, germplasm conservation, plantation technology, preservative treatments, harvesting techniques, pest and disease management, Value addition and marketing of bamboo products, inventory of bamboo stocking using Remote Sensing and GIS, socio-economic and livelihood potential, training programmes, cluster development and livelihood improvement of artisans and farmers, etc.

Contact us

Bamboo Technical Support Group – KFRI
KSCSTE-Kerala Forest Research Institute
Peechi - 680 653, Thrissur, Kerala, India.
0487-2690100
9446505286
btsg@kfri.res.in; btsgkfri@gmail.com
www.bambooinfo.in

Bamboo Technical Support Group – KFRI
www.bambooinfo.in @BTSG-KFRI