

**SHORT COMMUNICATION****Flowering of *Dendrocalamus hamiltonii* in Northeast India during recent years**Mukta Chandra Das<sup>1,2</sup>, Pator Singnar<sup>1</sup>, Arun Jyoti Nath<sup>1</sup> and Ashesh Kumar Das<sup>1</sup><sup>1</sup>Department of Ecology and Environmental Science, Assam University Silchar<sup>2</sup>Department of Earth Science, University of Science and Technology, Meghalaya

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**Introduction**

*Dendrocalamus hamiltonii* Ness and Arn ex Munro locally called Kako/Pechabanh. Globally the bamboo species is distributed in India, Bhutan, Nepal, Myanmar and Thailand (Banik, 2000). In north eastern region of India the species is distributed in Assam, Meghalaya, Manipur, Tripura, Nagaland, Sikkim and Arunachal Pradesh (Banik, 2000). *D. hamiltonii* is a deciduous bamboo species and naturally grows up to 1200 m with sporadic and gregarious flowering habits, with an intervening vegetative phase of 30-40 years for the latter (Gupta, 1972; Varmah and Bahadur, 1980). This is a large bamboo, evergreen or deciduous, ceasptiose, densely clumped, sometimes growing tall and erect, but more often sending out its stems at an angle or curved downwards (Rao and Ramakrishnan, 1987; Banik, 2000). The height of culm is usually 12-20 m or up to 25m tall, 10-18.5 cm diameter, usually naked below, much branched above. Sometimes the branches are as long as culm. Internodes 30-50 cm long, wall 1.25 cm thick, nodes marked with root scars (Banik, 2000). Long and stiff, variable in size, those of lower part of large culm 35-45 cm long, about 20 cm broad. It often forms the dominant vegetation in the humid tropical and some parts of Montane subtropical region (Banik, 2000). In south and southeast Asia, *D. hamiltonii* is one of the most economically important species used for making pulp, paper and rayon, building construction, fencing, ceiling, walling native huts, scaffolding, basket-making, fuel, handicrafts and floats for timber rafts (Rao *et al.*, 1998). It is also used in development of farm oriented cottage industry in almost every villages of Meghalaya (Rao and Ramakrishnan, 1987). The young shoots are edible and culms are also used as medicine for curing fever and food poisoning (Wang *et al.*, 2002).

Flowering in bamboos are of two types: gregarious and sporadic. Gregarious flowering is the phenomenon of

massive flowering and fruiting at intermittent intervals that is synchronized within a species across large areas (Janzen, 1976). India has 72 species of bamboo that flowers gregariously (Gadgil and Prasad, 1984), and this flowering phenomena has also been reported in other parts of Asia, Africa, and the Americas (McClure, 1966). In sporadic flowering a few clumps or few culms in a clump flowers at a time (Janzen, 1976, Seethalakshmi and Kumar, 1998; Das *et al.*, 2014). The flowering cycle and nature of flowering of bamboos varies according to the species (Das *et al.*, 2017). Assessment of flowering cycle is very speculative due to lack of proper flowering information.

**Flowering nature of *D. hamiltonii***

The bamboo often flowers sporadically almost every year. The species may also flower gregariously. Clumps flowered gregariously in Cachar, Assam (India) in 1912 and again in 1956 after 44 years of interval. In 1996-97 clumps started flowering in Pathariya reserves of sylhet forest bordering Indian Cachar area of Assam after 40±5 years of interval. The species also flowered in 1990-2000 in Khadim Nagar area of Sylhet forest (Banik, 2000). Considering Sylhet and Cachar hill sources of same origin the estimated flowering cycle of the species is about 44 years (from 1956 to 2000). Two clumps at Bangladesh Forest Research Institute (BFRI) bambusetum also flowered in November 1996 (Banik, 2000). It is also reported that the species flowered after long 98±5 years interval in Sikkim and Dehradun in 1894 and again in 1992. However, the species in Sikkim and Dehradun might have flowered after 45 years during 1940s and might remained unnoticed or unreported. Just after flowering completion, the species sets seeds and the flowering culms started to die. Within three years from flowering the species died. Seeds are viable and fertile. The dormant periods is less as in the same year the seedling arises in the study site (Banik, 2000).

### Flowering of the species in recent years

During field survey authors observed presence of seedlings beneath *D. hamiltonii* clump in Baghbaharte garden forest adjoining areas (N24°34.667'; E92°40.650'); Borakhoi tea garden forest adjoining areas (N24°37.801'; E92°40.747'), presence of seedlings (One year aged) indicates the species flowered in the previous year (in 2011). The sporadic nature of flowering was also observed in Longki Millik village, Thekerajan of KarbiAnlong district (N 26°03.011'; N 93°22.420') of Assam. In 2017-18 the species flowered in Rhi-bhoi district (N 26°06.395' E 91°50.844') of Meghalaya. During 2011-12 no flowering clump/culm were observed in Borakhoi and Bagbahar tea garden adjoining areas, only regeneration seedling of one year aged were observed. One clump was observed in flowering condition at KarbiAnglong district in 2016 and it continued till 2017. The flowering at Rhi-bhoi district started in 2017 and continued till April 2018. Viable seeds were produced after flowering and seeds started to germinate soon after establishment in the soil under the flowering clump.



**Figure 1.** A. Flowering clump, B. Flowering branch and C. Seeds of *D. hamiltonii*.

**Table 1.** Previous flowering records of *Dendrocalamus hamiltonii* in Indian Subcontinent.

Country/locality	Flowering date	Estimated flowering cycle	Referneces
Sikkim, Dehradun	1894	98±2	Gamble, 1896
Dehradun	1992 (Gregarious)		Tewari, 1992
Darjeeling	1900 (Gregarious)		Banik, 2000
Assam (Lakhimpur)	1905	44 years	Cavendish, 1905
Assam (Cachar)	1912, 1955,56		Gupta, 1972; Naithani, 2011
Arunachal Pradesh		90±10	Banik, 2000
Western Kameng	1983-84	(1894-1983,84,90,93,94,95)	Banik, 2000
Kameng	1990		Banik, 2000
Siang	1994		Banik, 2000
Subansiri	1993-94		Banik, 2000
Siang & Papum Pare	1994-95		Banik, 2000
Bangladesh			
Chittagong BFRI Bambusetum (clump sources; Pathariaresv., Sylhet nearer to Cachar hills)	1997-98	43±5 (1955,56-1997,98)	Banik, 2000
Sylhet Khadim Nagar	1999-2000	44(1956-2000)	Banik, 2000
Mizoram	2008	--	Sharmah, 2008
Assam Cachar district (Baghbahar & Borokhoi tea garden)	2011	Sporadic flowering	Present study
Assam KarbiAnglong (Longki Millik Village Thekerajan)	2016	Sporadic flowering	Present study
Assam KarbiAnglong (Longki Millik Village Thekerajan)	2017	Sporadic flowering	Present Study
Meghalaya Ribhoi district	2017-18	Sporadic flowering	Present study

From the present study it can be concluded that the flowering nature of the species *D. hamiltonii* is mostly sporadic and occasionally gregarious. Due to its important role in early successional vegetation, conservation of the species in its natural habitat after sporadic/gregarious flowering may ensure long term sustainability of such systems.

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