

## GREGARIOUS FLOWERING OF *DENDROCALAMUS PENDULUS* (BULUH AKAR) IN ULU GALAS FOREST RESERVE, KELANTAN, PENINSULAR MALAYSIA IN 1995

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There are 59 bamboo species found in Malaysia and 25 of them are exotic while 34 are indigenous (Wong 1995). Five of the indigenous species are natural stand bamboos, including *Dendrocalamus pendulus* (buluh akar). *Dendrocalamus pendulus* is also one of the 12 commercial Malaysian bamboos, widely used to make vegetable baskets (Azmy 1992a).

Natural bamboo stands are found in most logged over forest reserves in Peninsular Malaysia. Once a forest is logged, wild bamboos such as *Gigantochloa scortechinii* and *D. pendulus* invade the forest floor and, with their invasive characteristics, form the main indigenous species in the area. Natural stands of bamboo are found mainly in the states of Pahang, Kelantan, Perak, Negeri Sembilan, Johore, Terengganu, Selangor and Kedah. Pahang has the highest number of forest compartments colonised by bamboo, covering an area of 120 000 ha, followed by Kelantan with an area of 91 000 ha and Perak 68 000 ha (Lockman *et al.* 1992).

Bamboo species generally flower gregariously once in their lifetime but some flower either annually or irregularly due to stress caused by flood or climatic and physiological conditions. 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 a few years. However, seedlings that regenerated from seeds of the flowers do not die.

Flowering of bamboo is associated with three theories. These are (a) Nutrition Theory: Flowering is caused by lack of nutrients. Bamboos that have flowered showed a higher C:N ratio due to decreased nitrogen level compared with bamboos that have not flowered (Ueda 1960). However, the decrease in soluble nitrogen should not be considered as the main factor causing flowering in bamboo but instead it can be taken as a transient phenomenon from asexual to sexual condition; (b) Climatic Theory: Dry season and low temperature tend to promote flowering (Ueda 1960); and (c) Periodic Theory: Bamboo will flower once after reaching flowering maturity stage (Gonzales *et al.* 1998). Sympodial bamboos in the tropics have been reported to show 20, 40 and 70 years cycle. The species which bear well-developed seeds flower earlier than those with poor seeds (Ueda 1960). Sometimes flowering is sporadic, meaning some culms flower while others from the same species do not.

Site quality and climatic conditions influence flowering of bamboo clumps (Dwivedi 1988). Site with better quality tend to delay and decrease the extent of gregarious flowering.

In 1974, gregarious flowering of *D. pendulus* occurred at Kanching Valley, Selangor (Burgess 1975). In early April 1995, a mass gregarious flowering of this species was observed at the Ulu Galas Forest Reserve, Gua Musang, Kelantan (Figure 1). The compartments at

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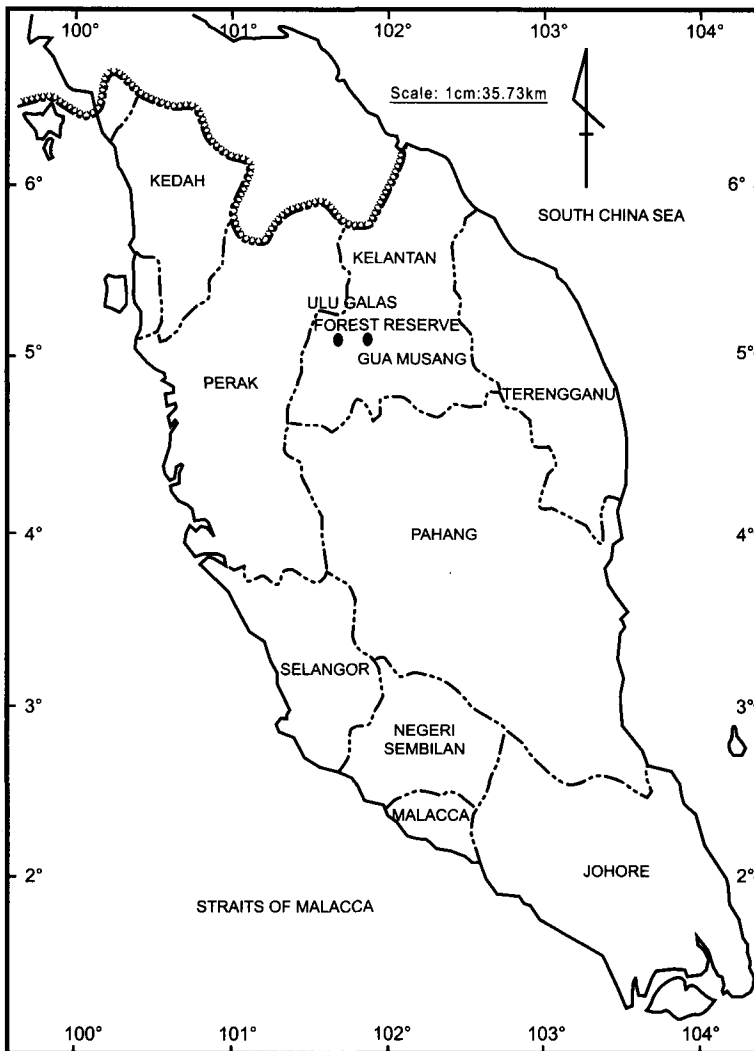
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this forest reserve comprised patches of clumps of *D. pendulus*, with an average of 35 to 45 culms per clump and covering an area of about 10 ha. The average diameters of the culms were 6 to 10 cm and the average heights were 8 to 10 m. All culms in the clumps flowered gregariously in August that particular year. All seeds remained on the culms for about six months. A year later, all the clumps died, after which seedlings were observed (Department of Forestry, pers. comm.). Each branch had 8 to 12 florets and each floret comprised 3 to 5 ripe seeds. The inflorescence are shown in Figure 2. The seeds were collected and weighed; each seed weighed about 0.005 g.

It is assumed that climatic condition triggered the flowering of *D. pendulus* at the Ulu Galas Forest Reserve. This is because the site experienced a dry season lasting several months before the flowering. Dry season also influenced the flowering of *G. ligulata* (buluh tumpat), another Malaysian commercial bamboo, at Kuala Nerang, Kedah (Azmy 1992b).



**Figure 1** Map showing Ulu Galas Forest Reserve where flowering of *Dendrocalamus pendulus* was observed



**Figure 2** Inflorescence of *Dendrocalamus pendulus*

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