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Short Communication

Flowering of *Guadua angustifolia* Kunth in vegetative propagation stage - first report

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INTRODUCTION

Guadua angustifolia Kunth (*Bambusa guadua* Humb & Bonpl) is a large sympodial bamboo, native to South America, grows up to a height of 30 m and 20 cm in diameter. The culms are dark green with white bands at nodes with short internodes and thorny branches. Due to its extraordinary mechanical strength properties and durability, this bamboo species is often known as "Vegetable Steel" and is mostly used as a substitute for timber in various construction activities such as house building, furniture, handicrafts, veneer and flooring (Viswanath *et al*. 2012). This has been introduced in India only a decade back by Late N.S. Adkoli, IFS (Retd), Founder President, Bamboo Society of India. Scientist from Rain Forest Research Institute (RFRI), Jorhat, Assam had collected 20 vegetatively propagated plants of the same species from Institute of Wood Science & Technology (IWST), Bangalore in the year 2010. Out of these, three plants were planted in RFRI Bambusetum in August, 2011. At present, three clumps are standing and are being used as source for further propagation.

Guadua angustifolia is not much familiar to the people of North East India. Farmers and artisans are not aware about the usefulness of this bamboo species. Keeping this in view, mass propagation through vegetative means was initiated in RFRI during 2017–2018. Literature revealed that *Guadua angustifolia* was successfully propagated *in vitro* from axillary buds (Jimenez *et al.* 2006). Vegetative propagation of the same species through air layering was carried out at RFRI during 2013 and found that the method air layering was the lowest cost-effective method from any other used method for macro-propagation. Air layering is relatively simple and easily adapted by the farmers due to the higher survival rate *i.e.* 80% (per.com) in comparison to the mortality of the plants (Verma *et al.* 2013). During February to April, 2017, vegetative propagation of this species through culm cuttings was initiated (Fig. 1). Cuttings were collected from 1.5 to 2 years old culms and treated with different concentrations *viz*. 100 ppm, 200 ppm and 500 ppm of growth regulators namely Indole -3 Butyric Acid (IBA) and Naphthalene Acetic Acid (NAA). More than 60% rooting was achieved with the cuttings treated with 200 ppm IBA. The same experiments were repeated in 2018.

Figure 1. New shoot development in two nodded culm cuttings of *Guadua angustifolia* Kunth raised in nursery beds.

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Figure 2. Flowering of *Guadua angustifolia* Kunth in culm cutting.

Cuttings were raised in two phases during February and May, 2018 respectively. Sprouting was noticed after 8–10 days of planting in nursery beds. After three months of planting, two cuttings, raised during May, started flowering (Fig. 2). The cuttings produced only a few flowering branches and flowers fell down completely within a week without setting seeds. The cuttings which produced flowers stayed alive but no new shoots were emerging out of the cuttings till uprooting for macroproliferation. The clump established in the Bambusetum of RFRI from where the planting materials were collected, did not flower and no symptom of flowering was noticed (Fig. 3). It was then investigated whether the mother clump in IWST, Bangalore flowered or not and information was received that no flowering occurred in the mother clump (Fig. 4).

Figure 3. *Guadua angustifolia* Kunth clump at Rain Forest Research Institute (RFRI), Jorhat, Assam.

Such a behavior though, not very common was also reported earlier in case of *Bambusa nutans* Wall.ex Munro at Bilaspur, Himachal Pradesh (Kaushal *et al*. 2015) and *Bambusa longispiculata* Gamble ex Brandis at Bangladesh Forest Research Institute (BFRI) Bambusetum, Chittagong (Banik 1997). Not much information on flowering cycle of *Guadua angustifolia* is available. In its native habitat, it is described as a non-gregarious flowering species. However, Schroder (2011) reported both gregarious as well as sporadic flowering of *Guadua angustifolia*.

Figure 4. *Guadua angustifolia* Kunth clump at Institute of Wood Science & Technology (IWST) Bangalore, Karnataka.

The reason for flowering at the vegetative propagation stage is not known. Even though, in the present study, the authors opined that the flowering of the culm cuttings at vegetatively growing stage might be due to the environmental stress condition in the field as the sprouted cuttings along with the new shoots in the nursery beds received day long sun light during sunny days and on the other hand due to prolong rainy season, the cuttings received much more water which might be a cause of flowering of the cuttings. Recently, Zheng *et al.* (2020) reported that although the root cause of bamboo flowering is internal genetic factors and flowering occurs at physiologically matured age, but it might be modulated by environmental conditions also. Franklin (2010) reported that severe environmental pressures may also force one-off changes to bamboo flowering schedules. Flowering due to environmental influences was also reported in other plant species. Borogayary *et al*. (2018) reported that temperature and rainfall might be the major determinants of the vegetative and reproductive phenology of *Aquilaria malaccensis*. Thakur *et al.* (2003) also reported that availability of sunlight might be a cause of early flowering and fruiting of *Dipterocarpus retusus.* From the review of literature, it is found that there is no such report of flowering of *Guadua angustifolia* during vegetative propagation stage. Hence, this may be considered as the first report of flowering in *Guadua angustifolia* during vegetative propagation.

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