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Effect of planting media and fertilization on *Gigantochloa albociliata* planting stock in nursery

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Abstract: *Gigantochloa albociliata* which is also known as 'Buluh Madu' in Malaysia is harvested for the shoots and widely consumed in the northern states of Perlis and Kedah. Most *G. albociliata* grown in Malaysia are originated from Thailand and some from China. It was introduced and planted in Malaysia because of high demand for bamboo shoots. Population in Malaysia and Asia generally utilizes bamboo shoots for food. Bamboos are easy to grow and can be harvested in a very short time which is normally 6-8 months. Although it is easy to grow, bamboos still need sufficient amount of fertilizer and suitable planting medium for its optimum growth. Hence, the study was conducted to examine the growth performance of *G. albociliata* shoots in nursery using four planting media, two fertilizer types (organic and inorganic) and four fertilizer rates. A split-split plot factorial design was used consisting of these three factors and the number of shoots, height of shoots and diameter of shoots were compared using analysis of variance (ANOVA) in SPSS. The results indicated that *G. albociliata* planted in soil and sand (3:1) planting medium and fertilized with NPK (25g) gave highest growth on shoots in nursery stage.

Key words: Planting media, fertilizer, *Gigantochloa albociliata*, bamboo shoots at nursery stage, shoot growth

INTRODUCTION

Bamboo is the second most important non-timber forest resource in the Southeast Asia region. Its strength to weight ratio, straightness, short rotation and easy propagation make it a versatile material suitable for variety of purposes (Abasolo and Fernandez, 2005). In Malaysia, bamboo based industries are more focussed on the production of skewers, chopsticks, toothpicks, furniture and craft (Mohd Azmi and Azmy, 2002). Besides the use of culm, another potential part which needs to be highlighted is the utilization of bamboo shoots.

Shoots from bamboo species such as *Dendrocalamus asper*, *Gigantochloa ligulata, Gigantochloa thoii, Bambusa vulgaris, Bambusa blumeana, and Gigantochloa latifolia* are much savoured as a delicacy in local cuisine (Azmy and Appanah, 2000). Among these, *Dendrocalamus asper* and *Gigantochloa ligulata* produced high quality shoots (Abd Razak and Ismail, 2006). Another bamboo species which found to be harvested for the shoots are *G. albociliata* which is also known as 'Buluh Madu' in Malay because of its sweetness compared to other species. Besides it sweetness, this

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species is not itchy which makes it easy to managed.

Due to higher import bill from abroad, the government has stressed the importance of self-sufficiency in food which can be produced locally. They are trying to cut the food import bill by encouraging people and agro-based agencies in the country to maximise food production (Azmy, 2006). Domestic consumption of bamboo shoots is increasing but the supply is still lacking. Bamboos that are grown naturally in the forest area are not so abundant and their shoot productivity cannot be controlled. The experiment on growth of bamboo by different techniques has been conducted by several researcher such as Gautam and Maitra (1995), Jamaluddin *et al*. (2001) and Muthukumar and Udaiyan (2006). According to Muthukumar *et al*. (2001) nurseries in tropical areas are not always optimum for quality seedling production due to low in nutrients and microbial populations. Hence, a study on the production and growth enhancement of the planting stock is needed in order to provide a productive planting stock of bamboo specifically on *G. albociliata* species. If a large scale plantation can be established, the production of the bamboo shoots will be increased This step is crucial because a nursery will provide as an initial stage for the bamboo planting stocks before it is ready to be transplanted to the plantations and in a huge scale.

MATERIALS AND METHODS

Rhizome offset of *G. albociliata* obtained from Kuala Nerang, Kedah were used as planting material. The rhizomes aged at one year were potted in 40 x 40 cm polythene bags. The plants were weeding and watering in the nursery at Fakulti Perhutanan, UPM Serdang for 6 months. A split-split plot factorial design was used consisting of three factors. The first factor consisted of four planting media (peatgro + soil (2:2), soil + sand (3:1), soil + sand (2:2), and compost + sand (2:2). The peatgro used for this study was obtained from Peat Organic (M) Sdn Bhd which was manufacturing the peat-based soil conditioner in Malaysia. The second factor consisted of two types of fertilizer (NPK 15:15:15 and Coconut shell (in dust form)). The last factor consisted of four rates of fertilizer (0 g, 25 g, 50 g and 75 g) which were applied in each polybag.

The experiment was conducted in a 4 x 2 x 4 factorial design with 5 replications. The total of 160 samples was observed in this experiment. The samples were planted under 75% shade to protect the seedlings from direct sunlight. During the first month of the planting, watering was done two times a day and care was taken to avoid over saturation. Data was collected four months after planting in the nursery and the collection period was completed within three months. The number of shoots, height of shoots and diameter of shoots were recorded. Data were subjected to analysis of variance (ANOVA) and the means were compared using Duncan's multiple range test (DMRT).

RESULTS AND DISCUSSION

The analysis showed that the effects of fertilizer application were highly significant on the growth of *G. albociliata* seedlings planted in polybags placed in the nursery. The

effects of both organic (Coconut shell) and inorganic (NPK) fertilizer application gave significant different on the number of shoots, height of shoots and diameter of shoots. Virtucio *et al*. (1992) claimed that fertilizer application significantly increased shoot production in *B. blumeana* var. *philippinensis*. Other study by Hoanh (1992) found that 300-400 g of complete (14-14-14) fertilizer per clump increased shoot number but the diameter and height of culms were not affected. The rates of fertilizer also showed significance on the number of shoots and height of shoots. The treatment with planting media only gave significant difference in the number of shoots and height of shoots.

From the Table 1-3, the results showed that the usage of soil + sand (3:1) performed better compared with other planting medium treatments. The application of soil and sand (3:1) highly affected the number of shoots and height of shoots compared to other planting media. The diameter of shoots was not affected by the planting medium. The application of compost + sand (2:2) and soil + sand (2:2) also gave significant on the number of shoots and height of shoots. While the application of Peatgro + sand (2:2) showed no significance on the growth of *G. albociliata.*

Table 1: Effects of planting medium on the number of shoots (NS), mean height of shoots (HS) and diameter of shoots (DS) of *Gigantochloa albociliata.*

Planting medium	Mean percentage value		
	NS	HS	DS
Peatgro + soil (2:2)	1.75b	9.02b	2.19a
Soil + sand (3:1)	6.13a	21.86a	2.07a
Soil + sand (2:2)	2.13b	10.40b	1.68a
Compost + sand (3:1)	1.00b	6.34c	1.24a

Note: Values with the same letter are not significantly different at $p < 0.05$

Duncan's new multiple range tests further revealed the application of NPK 15:15:15 with 25 g rates gave a significant growth effect to promote the production of shoots and their height (Table 2 and Table 3). Table 2 showed that the application of NPK (15:15:15) was significant on the number of shoots and height of shoots. The application of coconut shell was significant only on the height of shoots.

Table 2: Effects of fertilizer types on the number of shoots (NS), mean height of shoots (HS) and diameter of shoots (DS) of *Gigantochloa albociliata.*

Types of fertilizer	Mean percentage value		
	NS	HS	DS
NPK 15:15:15	2.009a	18.79a	2.94a
Coconut shell	1.224b	13.66b	2.31a

Note: Values with the same letter are not significantly different at $p < 0.05$.

Table 3 showed that 25 g rates of fertilizer performed highest number of shoots and height of *G. albociliata*. The other rates of fertilizer (0 g, 50 g, and 75 g) were not much affected the number of shoots, height of shoots and diameter of shoots. This means that 25 g of fertilizer per polybag (medium size) is enough to obtain maximum growth of *G. albociliata* shoots.

Table 3: Effects of fertilizer rates on the number of shoots (NS), mean height of shoots (HS) and diameter of shoots (DS) of *Gigantochloa albociliata.*

Rates of fertilizer	Mean percentage value		
	NS	HS	DS
0 g	2.009b	15.79b	2.32b
25 g	3.000a	18.89a	2.94a
50 g	2.000b	15.89b	2.32b
75 g	1.824b	13.66c	2.31b

Note: Values with the same letter are not significantly different at $p < 0.05$.

CONCLUSION

The experiment conducted in the nursery revealed that the application of fertilizers and planting media were crucial for *G. albociliata* shoot growth and production. From the experiment conducted, generally the planting medium was significant on the production of the shoots (in terms of number) while fertilizer types and fertilizer rates showed significance on the height of shoots. Among four types of planting medium, soil + sand (3:1) recorded significantly better performance of shoots. There are no significance differences on the diameter of shoots using any of the four planting medium. Among two types of fertilizers which were NPK (inorganic) and Coconut shell (organic), there are slightly significance differences on the number, diameter and height of shoots which recorded the NPK as better one. Thus, the NPK or inorganic fertilizer could be used to enhance the shoot growth of *G. albociliata.* The fertilizer rates of 25 g (per polybag) showed highest significance on the height of shoots. The number of shoots and diameter of shoots are not affected by the rates of the fertilizer. As a conclusion, it is recommended that *G. albociliata* planting stocks to be planted using soil + sand (3:1) and applied with 25 g of NPK (15:15:15) per polybag to yields a productive bamboo shoots in nursery stage.

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