EARLY PERFORMANCE TRIAL OF FOUR MALAYSIAN COMMERCIAL BAMBOOS IN SOUTHERN PENINSULAR MALAYSIA

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ABSTRACT. *Bamboo has been recognized as the second importance non-timber forest produced by Malaysian Government. It can be a good substitute for timber in producing high value added products. In realizing the importance of this plant, the raw materials need to be exploited and tried on the suitability of planting bamboo as a plantation basis. Even though some planting trials have been done in the country, there is no study done on the growth performance of commercial Malaysian bamboos in Johore. In 1992, four Malaysian commercial bamboos were planted at East Johore Development Authority (Lembaga Kemajuan Johor Tenggara – KEJORA). The species were* Bambusa vulgaris, Dendrocalamus asper, Gigantochloa 'Brang' *and* Gigantochloa levis*. Six months year old planting materials from branch cuttings were planted at Forest Research Institute Malaysia's (FRIM) nursery and later transferred to Johore with a distance of 6 x 6 m. A simple randomized complete block designed was used with four replicates where each replicate consisted of alternate single line of each four commercial species mentioned earlier with 16 holes per line. Parameters such as the number of shoots sprouted, diameter at breast height (dbh) and plant's height were monitored. The data were observed for 17 months.* Dendrocalamus asper *and* Gigantochloa levis*, both showed high survival rates. In addition, their basal area showed more coverage area than the other two species.*

KEYWORDS. Raw materials, performance, commercial species, shoots, Dbh

INTRODUCTION

Bamboo has been recognised as the second importance non-timber forest produced by the government in Malaysia next to rattan (Azmy & Norini 1990) It has been relished as food and used in various forms, from traditional uses to commercial products. Most of the commercial products are baskets, chopsticks, skewers,joss papers and handicraft items (Wong 1989 & Azmy 1989).

In Malaysia, the bamboo resources have been found to be distributed on hillslope, river banks, logged-over areas and on flat land. The vegetation can be of pure stand or mixed with other tree species in the forest (Ng & Md. Noor 1980). There are 50 species of bamboo found in Malaysia, of which 25 are indigenous and 25 exotic. The Genera found in the country are *Bambusa, Dendrocalamus, Dinochloa, Gigantochloa, Racemobambos, Schizostachyum, Thyrsostachys, Chusqua, Phyllostachys* and *Yushania* (Azmy *et. al.*, 1997). Of all the species available, fourteen Malaysian bamboo have been identified as commercial species (Azmy & Abd. Razak 1991 & Azmy 1992).

With the rapid exploitation of bamboo culms throughout Peninsular Malaysia, bamboo resources need to be maintained for bamboo cottage industries especially for joss sticks, chopsticks, basket-making, toothpicks and joss-papers. Bamboo supply in the forest need to be managed systematically otherwise it would be depleted. The Malaysian commercial bamboo species need to be exploited as plantation basis so as to sustain the supply of bamboo resources for future demand. In relation to this, propagation trial of Malaysian commercial bamboos have been done at few sites but not on the whole Peninsular Malaysia.

In view for the site suitability growth of these bamboos in Peninsular Malaysia, a propagation trial of four Malaysian commercial bamboo have been done at Lembaga Kemajuan Johor Tenggara (KEJORA), Peninsular Malaysia. The objective of this study was to assess the growth suitability of four commercial bamboo species of Dendrocalamus asper (buluh betung), Bambusa vulgaris (buluh minyak), Gigantochloa 'Brang' (buluh 'Brang' and Gigantochloa levis (buluh beting) by using branch cutting as propagation materials at Johore, South Peninsular Malaysia.

MATERIALS AND METHODS

The experiment started in June 1992 and was done at Lembaga Kemajuan Johor Tenggara (KEJORA) area at Bukit Saga. Planting materials from branch cutting portions of four Malaysian commercial bamboo of *Bambusa vulgaris* (buluh minyak), *Dendrocalamus asper* (buluh betung), *Gigantochloa* 'Brang'(buluh 'Brang') and *Gigantochloa levis* (buluh beting) from each species of a length of about 20 cm consisting of two nodes were obtained and planted in the polybag at Forest Research Institute Malaysia's (FRIM) nursery for six months. These propagating materials were later planted at Bukit Saga, Johore on a one hectare area with a spacing of 6 x 6m.

A simple randomized complete block design was used in the experiment. There were four replicates in the trial plot where each replicate consisted of alternate single line of each four commercial species mentioned earlier assigned with 16 holes per line. The planting hole of 1 x 1 x 1 m was used and filled with 0.5 kg chicken dung only and then covered back with soil.

The first data monitoring was done six months later in November 1992. The next successive counts were done in November 1993 and April 1994. The parameters measured were plant's height, diameter at breast height (dbh) and number of shoots per clump sprouted. The diameter were measured by taking at the middle of the standing culm and the height where the utmost tip of the plant start to droop.

Standing density was calculated for all culms and clumps and the basal area for each species trial in all the replicates were also calculated. The standing density was calculated by the number of culm per clump (no./clump) and the basal area was formulated from the diameter breast-height (dbh).

The rainfall and humidity distribution for the nearby Bukit Saga's area was taken from Kota Tinggi, Johore's climatic station (1991-1994). The soil comprised of red and yellow latosols and red and yellow podzolic soils on gently to strongly sloping land of variable fertility derived from a variety of sedimentary rocks.

RESULTS AND DISCUSSION

Data collected four months after planting showed that the survival rate were more than 80% for all the four species tested. *Dendrocalamus asper* and *Gigantochloa levies* species showed higher survival rates throughout the two years period. As for the average height, it turned out that *Bambusa vulgaris* and *Gigantochloa* 'Brang' did show higher height than the other two species as they grew from June 1992 till April 1994. In comparison, the average number of culms for *D. asper* and *G. levies* were less than *B. vulgaris* and *G.* 'Brang'. There were constant numbers of average shoots sprouted for all the species observed in the trial plot. All these results were shown in Figure 1.

From Figure 1, it was observed that *B.vulgaris* has the highest stand density and followed by *G.* 'Brang'. For *G. levies,* it has the biggest average Dbh compared to other species. The basal area for *G.levis* also tends to be bigger than *D.asper* due to its biggest average Dbh. The basal area for *G.levis* and *D.asper* showed more coverage area than the other two species; i.e. 0.00025 and 0.00023 m3 respectively. From the analysis of variance using SPSS, the Anova for culm's height and number of shoot gave 0.52 and 0.62 for the F-calculation respectively. There were no significant differences for both parameters.

Based from the survival rate, all the four species plated using branch cuttings can be grown at Johore area. Branch cutting can be adopted because it is simple and a large number of propagules can be obtained and easier to handle besides the survival rate was high (Abd. Razak *et.al* 1990, Chu and Chen *et.al* 1991, Sharma 1991, Shanmughavel e*t.al* 1997). In addition, *B. vulgaris, D.asper* and *G. levis* were recommended to be propagated by branch cuttings due to good survival rate (Abd. Razak & Hashim Md. Nor, 1992). This conformed to the species tried at Bukit Saga, Johore.

The growth development of new culms that develop from a clump varies by species, soil, climate conditions and size of a clump-culm relationship (Anonymous 1960). The season plays a very important role in rooting and sprouting of shoots in many bamboos. From the date of planting (June 1992), it showed that the planting materials were planted when the temperature and rainfall were at their average at Bukit Saga, Johore. Based from Figure 3, the bamboo should be planted on November 1992 instead of June 1992 because even though the temperature decreased but the rainfall level increased at this time. This will help the bamboo to establish its clump vigorously and quickly.

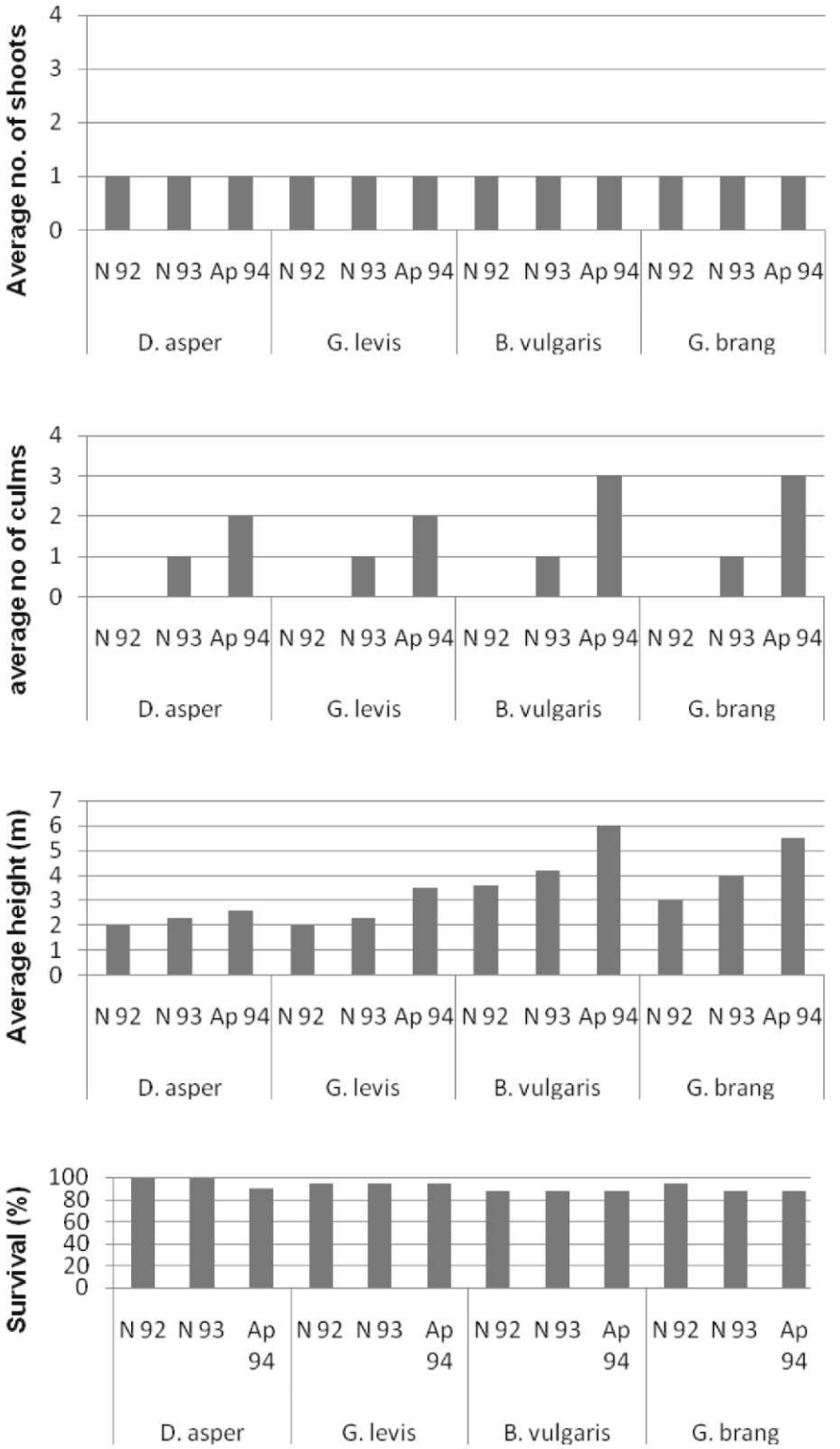

Figure 1. Growth and development of four Malaysian Commercial bamboos at Bukit Saga, Johore, Southern Malaysia

Furthermore, if the bamboo planted at Bukit Saga were to be watered frequently at the earlier stage, it can grow vigorously before the rainy season at the end of 1992. Unfortunately, the plot was only visited after 4 months period of planting and that was the time monitoring of the data was done. Bamboo likes water but cannot stand water-logging condition. Watering is needed in the dry season to keep the moisture balance inside the bamboo which can be favourable to survival of newly planted bamboo and rhizome expansion (Wan, A. 1991). For planting materials at Bukit Saga, due to logistical reasons, the trial plot was not watered manually during the establishment stage.

CONCLUSIONS

From the growth observation study, the survival rates for all the bamboo species showed better performances at Bukit Saga. In addition, the height for two bamboo species of *Bambusa vulgaris* and *Gigantochloa 'Brang'* tend to be better than the other two species. Furthermore, there were constant number of average shoots sprouted for all the species.

Based on the results obtained, certain inferences can be made.

1. During early establishment stage, the planting of the new propagules should be done prior to rainy season.

2. Watering of the new plant should be done frequently.

3. In terms of stand density, *Bambusa vulgaris* and *Gigantochloa 'Brang'* can be recommended for planting for culm purposes. This showed that these clump species can established very fast compared to the other two species. Thus, the culms can be planted for higher value added products such as parquet and other products from laminated bamboos.

4. It was found that all the four commercial Malaysian bamboos can be planted at Bukit Saga, Southern Peninsular Malaysia.

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