



Culm Yield And Productions Of Bamboo At The Ulu Muda Forest Reserve In Kedah

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Introduction

The Ulu Muda Forest Reserve of the state of Kedah consists of mainly lowland to hill dipterocarp forest and riverine forest with distinct dry periods (Sherrie et al. 2005). Exploiting and mismanaging our natural forest resources will eventually disrupt the forest's ecological balance. In Malaysia, there are approximately 59 known species of bamboo in 10 genera, but only 13 species are used by industry and the local people (Wong, K.M 1996). Previous research has also shown that bamboo stands from natural forests can produce a return in a shorter period of time, with only 2-3 years of proper silvicultural practices required to make it a reliable source of income for both the people and the government. Natural bamboo stands, like other commercial timber species, have been severely depleted, and the supply continues to decline. As a result, implementing sustainable practices for natural bamboo stands will improve production and sustainability, ensuring high yield and uniform quality.

Methodology

The sampling procedure was carried out in September 2021 in two areas of the reserve, logged areas < 30 years and unlogged forest areas (areas with no history of logging). 9 plots with sizes of 50 x 50 m were randomly established in each area with total of 18 plots established for both areas for the purpose of sampling the existing bamboo clumps. The line transects running from the east-west direction was adopted for each sampling plot. Bamboo culms with a DBH > 3cm within the plots were measured and identified to the species level. The diameter at breast height (DBH) at the middle of the internode of culms was measured in each 50 m x 50 m field plot. The average culm length and DBH (1.3 m from the base) were calculated by measuring three (3) randomly selected culms in each clump. The culms were then cut into three sections, and the total weight was recorded.



Figure 1A & 2: Bamboo culms are cut and weighed.

Findings

Bamboo was found in 16 of the 18 plots measured, with the majority of clumps found in the logged over forest. Bamboo populations are typically mixed with other forest species, and multiple species have been found in the same area. The study site contained 143 bamboo clumps (DBH of 3cm) from four different species. The frequency and species identified in the trial plots are shown in Table 1. The most common bamboo found (63 clumps) is *Gigantochloa scortechinii*, followed by *Schizostachyum grande* (41 clumps) and *Dendrocalamus pendulus* (5 clumps). These three species are the most common and can be found in the foothills of the peninsula's northern half. However, *D. pendulus* and *S. grande* appear to be more restricted to slopes, roadsides, hilltops, and hillsides. Four clumps of *Bambusa farinacea*, also known locally as *Buluh Aur Bukit*, were discovered in the logged forest plots, but none were discovered in the unlogged forest plots. *B. farinacea* is a truly indigenous *Bambusa* species in Malaysia, found in patches

along streams and valleys at higher elevations (>600m asl) of this forest. This species is less common than the other three and is found only in the northern part of the peninsula, where the distinct dry season occurs early in the year.



Figure 3 & 4: *S. grande* and *G. scortechinii* clumps with new shoots.

Figure 5 & 6: Shoots of *B. farinacea* and *G. scortechinii*.

The height and DBH of bamboo clumps in logged and unlogged forests were compared (Chart 1). Bamboo appears to be more abundant in the logged forest than in the unlogged forest. The mean height and DBH of *G. scortechinii* in the logged and unlogged forest were 12.4 metre and 8.6 centimetres, respectively, while the same species has a 0.8 metre and 1.6 cm lower DBH and height at the unlogged sites. All other bamboo species' DBH and height for both sites show a similar trend to *G. scortechinii*. The opening of the canopy during logging changed the light condition of the forest floor, allowing bamboo to grow quickly.

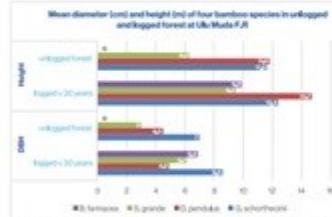


Chart 1: The average (DBH) and mean culm heights of four bamboo species in logged and unlogged forest.

Table 2: Ulu Muda FR Kedah stand and stock table of four bamboo species

	Logged < 30 Years			
	Clumps / Ha	Culms / Clump	Culms / Ha	Avg wt / Culms (KG)
<i>G. scortechinii</i>	20	15.8	216	22.2
<i>D. pendulus</i>	2	11	52	6.5
<i>S. grande</i>	14	11.6	162	9.9
<i>B. farinacea</i>	2	10.5	22	22.7
Total	38		482	8368
	Unlogged Forest			
	Clumps / Ha	Culms / Clump	Culms / Ha	Avg wt / Culms (KG)
<i>G. scortechinii</i>	6	10.2	61	14.5
<i>D. pendulus</i>	2	13	20	6.7
<i>S. grande</i>	4	5	20	7.8
<i>B. farinacea</i>	-	-	-	-
Total	14		121	1468

Conclusion

Gigantochloa scortechinii, *Dendrocalamus pendulus*, *Schizostachyum grande*, and *Bambusa farinacea* are the bamboo species found in the study area. The dominant species, *G. scortechinii*, also known as *buluh Semantan* in Malaysia, is the most useful bamboo. In this forest, bamboo grows in patches but is widespread. The logged forest has 38 clumps per hectare and the unlogged forest has 14 clumps per hectare. The logged forest had higher species richness, stand density, and culm production than the unlogged forest. Despite the fact that the data from this study does not include details of annual increments of parameters related to culms production associated with bamboo growth factors, it is still useful for an overall management strategy of this natural resource.

Table 1: A general description of the bamboo species found in the Ulu Muda Forest Reserve in Kedah.

Local Name	Scientific Name	Numbers of Clumps Measured	
		Logged < 30 Years	Unlogged Forest
Buluh Semantan	<i>Gigantochloa scortechinii</i>	44	19
Buluh Ajar	<i>Dendrocalamus pendulus</i>	5	4
Buluh Tomaling	<i>Schizostachyum grande</i>	32	9
Buluh Aur Bukit	<i>Bambusa farinacea</i>	4	nd

The villages near the forest reserves harvested fresh bamboo internodes of the thin wall *S. grande*, which are used as a container for cooking lemang, a glutinous rice dish flavoured with coconut milk that is popular during Hari Raya.



Figure 7: Evidence of *S. grande* culms harvested by the villagers for making lemang.

Weight value comparisons in the stand and stock table (Table 2) reveal that the mean culms yield of bamboo varied with species. *G. scortechinii* is the most dominant species in terms of total weight/ha of culms, producing >70% of culms/ha in the logged forest and contributing >80% of bamboo culms stocking from the unlogged forest. The logged forest yielded 482 culms, whereas the unlogged forest yielded 121 culms. The logged forest was five times more productive than the unlogged forest. In terms of weight, the logged forest produced 8.4 tons/ha of bamboo stock, while the unlogged areas produced only 1.5 tons/ha. This is far less than Abd. Razak and Abdul Latif's (1998) estimate of 20 tons/ha of average standing stocks/ha in peninsula Malaysia. According to the Second National Forest Inventory (NFII- 1981/82), the average number of bamboo extracted per tonne basis was approximately 95.5 pieces for the logged forest and 115.3 pieces for the unlogged forest (Kamuzuzman 1992). This results in an average culm weight of 92.5 kg for the logged forest and 6.5 kg for the unlogged forest (6 metre culms). The mean culms weight for this study was calculated by dividing the total weight (whole culms) by the total number of culms measured. The results show that the logged forest has 83 (121 kg/culms) and unlogged forest has 57 (17.4 kg/culms) culms/tonnes.

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Acknowledgements

I would like to thank Dr. Rosdi Koter, the head of the forest plantation programme, for his encouragement and support of the studies. Special thanks are also extended to members of the Forest Plantation Programme for assisting with data collection, as well as the Economics and Strategic Analysis Program for providing the opportunity to participate in this research.