COMPARISON ON PHYSICAL PROPERTIES OF JUVENILE AND MATURED GIGANTOCHLOA ALBOCILIATA

MOHD EMRAN BIN RAHMAN

FH 2019 66

COMPARISON ON PHYSICAL PROPERTIES OF JUVENILE AND MATURED *GIGANTOCHLOA ALBOCILIATA*

By

MOHD EMRAN BIN RAHMAN

A Project Report Submitted in Partial Fulfilment of the Requirements for the Degree of Bachelor of Wood Science and Technology in the Faculty of Forestry
Universiti Putra Malaysia

2019

ABSTRACT

Bamboo is a multipurpose plant that have a broad and plentiful of applications beyond imagination. For *Gigantochloa albociliata,* it is commonly used as edible shoots in some countries including Malaysia. The study aim was to identify the physical properties of *Gigantochloa albociliata* according to the parts and ages. From the result, it was found that the physical properties of *Gigantochloa albociliata* on each parts and ages have a significant different for each characteristics except for moisture content and bamboo height which both of it do not have a significant different. The best part of *Gigantochloa albociliata* was bottom part. Meanwhile, the best age of *Gigantochloa albociliata* was matured.

ABSTRAK

Buluh merupakan sejenis tumbuhan yang mempunyai pelbagai jenis penggunaan yang luas dan terdapat banyak fungsi di luar imaginasi. Bagi *Gigantochloa albociliata,* ianya biasa dituai hasil rebungnya di sesetengah negara termasuk Malaysia. Kajian ini bertujuan untuk mengenalpasti ciri-ciri fizikal *Gigantochloa albociliata* berpandukan pada bahagian dan umur. Dapatan kajian daripada ciri-ciri fizikal *Gigantochloa albociliata* untuk setiap bahagian dan umur mempunyai perbezaan yang ketara untuk setiap ciri-ciri kecuali kandungan lembapan dan ketinggian buluh yang tidak mempunyai perbezaan yang ketara. Sampel terbaik bagi bahagian dalam *Gigantochloa albociliata* adalah di bahagian bawah. Manakala sampel terbaik bagi umur dalam *Gigantochloa albociliata* adalah pada umur tua.

ACKNOWLEDGEMENT

I would like to express my gratitude to my supervisor, Assoc. Prof. Dr. Rasmina Halis. Her guidance, advises, and suggestions throughout the whole process of completing the thesis is really useful for me and I feel that the deepest appreciation has to give to her.

Appreciation also goes to the Dean of Faculty of Forestry and all the staffs who have been cooperated my studies in UPM for four years.

Lastly, I would like to take this opportunity to thank my beloved parents for their encouragement and not forget to thank all my course mates who had helped me to make this thesis a success.

APPROVAL SHEET

I certify that this research project report entitled “Comparison on Physical Properties of Matured and Juvenile *Gigantochloa Albociliata*” by Mohd Emran bin Rahman has been examined and approved as a partial fulfillment of the requirements for the Degree of Bachelor of Wood Science and Technology in the Faculty of Forestry, Universiti Putra Malaysia.

_____

Assoc. Prof. Dr. Rasmina Halis

Faculty of Forestry

Universiti Putra Malaysia

(Supervisor)

_____

Prof. Dr. Mohamed Zakaria Hussin

Dean

Faculty of Forestry

Universiti Putra Malaysia

Date: January 2019

TABLE OF CONTENTS

LISTS OF TABLES

LISTS OF FIGURES

LISTS OF ABBREVIATION

µm	Nanometer
Mm	Millimeter
Cm	Centimeter
M	Meter
US$	United State of America Dollar
RM	Ringgit Malaysia
%	percent
Hrs	Hours
ºC	Degree Celsius
NWFP	Non-wood forest product
G. Albociliata	*Gigantochloa Albociliata*

CHAPTER 1

INTRODUCTION

1.1 Background

Rapid population of human plus the increasing rate in people consumption, had growing a lot of pressure on natural production, which driven in decreasing of resources, mass damage on the ecosystem and give the bad effect to human life. Thus, non-wood forest product such as bamboo, fruit and medicine plant had been seen as one of the alternative resources as a backup for a human consumption needed such as food and shelter.

There are high number of industries which using the non-wood forest product (NWFP) as their main income. In domestic level, NWFP additionally give crude materials to process industry in a large scale. At some part, bamboo material also plays a big role in export and import trade. Nowadays, there are about 150 NWFP which give an important role in worldwide exchange. For example, such as Some NWFP are also honey, gum arabic, rattan, bamboo, cork, nuts, mushrooms, resins, essential oils, and plant and some of animal section which usable for medicine product. for pharmaceutical products. NWFP have already pulled in significant worldwide interest for the recent years because of the increasing the high on awareness of environmental, including the preservation of organic biodiversity (Harizamrry, 2016).

bamboo is the bounteously advancement is known as the principle assets of non-wood item at the tropical and subtropical zone. Bamboo also has been generated as an exceptionally profitable and unrivaled exchange for wood composite assemble such as for pulp and paper, stripboards, mat boards, veneer, plywood, particleboard and fiberboard. Moreover, a few inquiries about have utilized it as crude material for structural composites such as Oriented Strand Board, Glue Laminated Timber, Parallel Strip Lumber and Oriented Strand Lumber. In this time, there are numerous sorts of bamboo composite that are being assemble and exchanged the world (Chaowana, 2013).

Bamboo has some positive aspects compared to wood which is can grow on slopes and other areas where foresting of wood is not possible, and it grows fast. Besides, it can replace tropical hardwood, so it can mitigate the decrease of tropical forest area. It is also can support the local economies in the third world (Vogtlander, 2010).

Bamboos are plenteous and broadly conveyed in Malaysia. Malaysian bamboos mostly develop gregariously, yet in confined fixes on the river area, in area of lowlands, and on hillside and their edge tops. The diversity of bamboo stands in the mixing with different species in the Malaysia forest. Generally, bamboos were viewed as weeds with regards to Malaysian Forestry. Nowadays, it is positioned as the second financial significance in Peninsular Malaysia among the non-timber product items next to a rattan (Mohamed, 2007).

In other hands, macroscopic and microscopic characteristics, chemical composition, physical and mechanical properties had some contrasts amongst the bamboo and wood. Due to this issues, innovation and hardware which are used for wood handling cannot be straightforwardly used in the way we handling the bamboo usage. The data on bamboo properties, practical advancements and administrations are important for the further research on this species. With present day strategies and adjusted innovations, bamboo can be undergo into an extensive variety of items which effectively compete with other raw materials such as wood and other crude materials (Chaowana, 2013).

1.2 **Justification**

The reason for my research in the *Gigantochloa albociliata* species is to compare the physical properties in a scope of anatomical, physical and fiber morphology between age in order to recognize their potential in market. *G. albociliata* had a directed accessibility sources in Malaysia and been used as a food product by the local people. However, for the potential in wood industry are not yet been studied and discovered by people. In order to observe the capability of this species, one of essential requirement is by study the physical properties of *G. albociliata*. By doing a research on the three major component of physical properties which is physical structures, anatomical characteristic and fiber morphology, we can analyze their physical properties. As a result, we can determine either the *G. albociliata* can be used as a raw material for the wood based industry.

At the end of this studies, I had been able to recognize the differences by their physical structures of this species for every part and age. A part from that, I had been gain my knowledge on the anatomical structure by the macro view for every part and age. Besides, I also had been able to differentiate fiber morphology of this species for every part and age. As a result, the result from the research that I do can be used as a reference for the future study in this field.

1.3 **Objective**

The general objective of this study is to determine the differences on physical properties between matured and juvenile of *Gigantochloa albociliata*

The specific objectives of this study are:

1. To identify the physical structure of *G. albociliata* with three different part (top, middle, bottom)
2. To compare the anatomical structural by matured and juvenile of *G. albociliata* with three different part (top, middle, bottom)
3. To compare the fibre morphology of matured and juvenile of *G. albociliata* with three different part (top, middle, bottom)

REFERENCES

Anonymous. (2009). 8th World bamboo congress proceedings. Retrieved from http://www.worldbamboo.net/wbcviii/WBCVIII.pdf

Arnold, J., & Pérez, M. (2001). "Can non-timber forest products match tropical forest conservation and development objectives". *Ecological Economics, 39*(3), 437-447.

Austin, R., & Ueda, K. (1978). *Bamboo 6th edition*. Tokyo, Japan: Japan Publishing.

Borah, E. D., Pathak, K. C., Deka, B., Neog, D., & Borah, K. (2008). Utilization aspects of bamboo and its market value. *Indian Forester*, 134(03), 423 - 427

Chaowana, P. (2013). Bamboo: an alternative raw material for wood and wood-based composites. *Journal of Materials Science Research*, 2(2), 90 – 102.

Ching, L. C. (2015). *The anatomical properties and fiber morphologies of three bamboo species* (Degree's thesis). Universiti Putra Malaysia, Seri Kembangan, Malaysia.

Conse, W., & Banik, R. (2015). *Genetic evaluation of nutritional and fodder quality of different bamboo species.* Retrieved from https://www.researchgate.net/profile/R_Kaushal/publication/278026778_Genetic_Evaluation_of_Nutritional_and_Fodder_Quality_of_Different_Bamboo_Species

Duriyaprapan, S. & Jansen, P. C. M. (2016). *Gigantochloa Albociliata* (PROSEA). Retrieved from https://uses.plantnet-project.org/en/Gigantochloa_albociliata_(PROSEA

Harizamrry. (2016). Panduan tanam buluh madu [Blog post]. Retrieved from https://harizamrry.com/2016/07/21/panduan-tanam-buluh-madu/

Li, X. (2004). Physical, chemical, and mechanical properties of bamboo. Retrieved from http://users.telenet.be/jeffstubbe/thesis/documenten/papers/PHYSICAL, CHEMICAL, AND MECHANICAL PROPERTIES OF BAMBOO .pdf

Lockman, M. S., Mohd, L.Y., Poh & J. Saroni. 1992. Distribution of bamboo and the potential development of the bamboo industry. *Towards the Management, Conservation, Marketing and Utilization of Bamboos,* 2(1), 6 - 19

Made, G., Triwiyono, A., Awaludin, A., & Siswosukarto, S. (2014). Effects of node, internode and height position on the mechanical properties of gigantochloa atroviolacea bamboo. *Procedia Engineering*, 95, 31–37.

Mohamed, A. H., Hall, J., Sulaiman, O., Wahab, R., & A., W. R. (2007). Quality management of the bamboo resource and its contribution to environmental conservation in Malaysia. *Management of Environmental Quality: An International Journal,* 18(6), 643-656.

Pulp, D., & From, P. (2012). Dissolving pulp production from bamboo. *Tropical Plants Database*, 7(2), 640–651.

Razali, W., Mohamed, A., Mustafa, M., & Hassan, A. (1992). Physical characteristics and anatomical properties of cultivated bamboo (bambusa vulgaris schrad.) culms. *Journal of Biological Sciences, 9*(7), 753-759.

Vogtländer, J., Lugt, P., & Brezet, H. (2010). The sustainability of bamboo products for local and western european applications . lcas and land-use. *Journal of Cleaner Production*, 18(13), 1260–1269.

Wang, H., Zhang, X., Jiang, Z., Li, W., & Yu, Y. (2015). A comparison study on the preparation of nanocellulose fibrils from fibers and parenchymal cells in bamboo (phyllostachys pubescens). *Industrial Crops & Products*, 71, 80–88.

Wang, K. L., Hong, L. T., & Ramanatha, R. (2005). *Bamboo resources and traditional culture in Xishuangbanna, Yunnan, Southwest China*. Yunnan, China: International Plant Genetic Resources Institute.

Zhang, Q., Jiang, S., & Tang, Y. (2002). *Industrial utilization on bamboo*. New Delhi, India: International Network for Bamboo and Rattan.