

**PROPERTIES OF MOISTURE RESISTANCE
KELEMPAYAN *NEOLAMARCKIA CADAMBA* BASED
PLYWOOD**

By

MOHAMAD SUKRI BIN MOHD NOR SAMAWI

**This Final Year Project Report Submitted in Partial Fulfillment of the
Requirements for the Degree Bachelor of Science(Hons.) in Furniture
Technology in the Faculty of Applied Sciences**


Universiti Teknologi MARA

July 2016

CANDIDATE'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulation of University Technology MARA. It is original and is the result of my work, unless otherwise indicated or acknowledgment as reference work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

In the event that my thesis is found to violate the conditions mentioned above, I voluntarily waive the right of conferment of my degree and agree to be subjected to the disciplinary rules and regulation of University Technology MARA.

Signature of Candidates :  _____

Name : Mohamad Sukri Bin Mohd Nor Samawi

Student ID : 2014276762

Program : Bachelor of Science (Hons) in Furniture Technology

Faculty : Faculty of Applied Sciences

Thesis Title : PROPERTIES OF MOISTURE RESISTANCE KELEMPAYAN
NEOLAMARCKIA CADAMBA BASED PLYWOOD

ABSTRACT

Properties of Moisture Resistance Kelempayan *Neolamarckia* *Cadamba* Based Plywood

The purpose of this study was to evaluate the 3 ply plywood properties which utilize combination of Kelempayan and tropical veneers in term of their physical and mechanical properties. The Kelempayan species veneers used in this experiment were distinguished by two timeline of exposure to the surround environment. Another treatment applied to the plywood was the arrangement of veneer layer. There are three types of veneer arrangement which are the utilization of 100% veneer from Kelempayan, middle ply Kelempayan and middle ply tropical. The plywood process is standardized by using Urea Formaldehyde, hot pressed for 180s, and the glue spread value calculated for relevant surface areas. A test on physical properties on substrate wettability and buffer capacity was conducted prior to bonding. The Kelempayan veneers at 1 month and 3 month exposure pH are not significantly different. The tropical veneers are significantly different with 4.2 ml at $P \leq 0.05$. Plywood made was evaluated according to Japanese Agricultural Standard (JAS, 2014) for bending test, tensile test and wood failure test. With regards to veneer age, the new Kelempayan veneer and tropical species is not significantly different, but both of them had significantly higher strength than the old veneer Kelempayan. For arrangement there is a significant difference between the type of plywood arrangement, whereby the best mechanical properties of plywood come from middle ply Kelempayan with modulus of rupture 80.7 MPa and modulus of elasticity 10898 MPa. This experiment suggest to industry to utilize new Kelempayan veneer with a hybrid mix with tropical species veneer as the back and the face for plywood production.

TABLE OF CONTENTS

	Page
APPROVAL SHEET	i
DEDICATION	ii
CANDIDATES' DECLARATION	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF PLATES	xii
LIST OF ABBREVIATIONS	xiv
LIST OF SYMBOLS	xv
ABSTRACT	xvi
ABSTRAK	xvii
CHAPTER	
1 INTRODUCTION	
1.1 General Introduction	1
1.2 Problem Statement	5
1.3 Significant of Study	6
1.4 Limitation of Study	7
1.5 Objective of Study	7

2 LITERATURE REVIEW

2.1	Introduction to Plywood	
2.1.1	Introduction to Plywood	8
2.1.2	Characteristic of Plywood	10
2.1.3	Types of Plywood	11
2.1.4	Manufacturing of Plywood	14
2.2	Kelempayan	17
2.2.1	Field Characteristics	19
2.2.2	Strength Properties	20
2.2.3	Physical Properties	21
2.2.4	Macroscopic Structures	22
2.2.5	Functional Uses	22
2.3	Urea Formaldehyde	23
2.4	Moisture Resistance	24
2.5	Product Testing	
2.5.1	Bending Test	25
2.5.2	Tensile Test	26
2.5.3	Wettability	27
2.5.4	Buffer Capacity with Hydrochloric Acid	27

3 MATERIALS AND METHODS

3.1	Material Preparation	28
3.2	Plywood Making	29
3.2.1	Board Preparation	29
3.2.2	Preparation of Glue Spread Level	29
3.2.3	Glue Spreading	32
3.2.4	Cold Press	32