

UNIVERSITI TEKNOLOGI MARA

**THE PHYSICAL PROPERTIES AND FIBER MORPHOLOGY OF MATURED
ACACIA MANGIUM**

By

**YASMIN TAHA
SITI ANIS ANIHA ISA
IFFAH IZZAH MAIDIN
DAYANG SRI MASAIN ABD. RAHIM**

**Final Project Paper Submitted in Partial Fulfillment for the Diploma in
Wood Industry, Faculty of Applied Sciences.
Universiti Teknologi MARA**

April 2010

ACKNOWLEDEGMENTS

Assalamualaikum warahmatullahi wabarakatuh...

First of all, we would like to thank to the Almighty ALLAH S.W.T for He Blessing and Strength rendered to us to complete our thesis regarding on physical properties and fiber morphology of mature *Acacia mangium*.

Thanks to our advisor, Miss Siti Zalifah Binti Mahmud whose willingness to contribute her knowledge, time and effort till us had completed our final project for guiding, reading and offering comment as the project involved. We gratefully acknowledge her helpful suggestion.

Also, a lot of thanks should been given to all of lecturers and staff in the Department of Wood Industry University Technology MARA especially Mr.Ahmad Fauzi Bin Othman as Head Program for their help during our three years studies in this UiTM. Deep appreciation to Associate Prof. Dr. Jamaludin Kasim as Coordinator Final Project (WTE 375).

We also would like to thanks to all our friends because they were given a lot of cooperation to make this project paper become successfully. Without them, this project will become difficult.

Lastly we wish to our special gratitude to our beloved parents and family for their support throughout my study period.

TABLE OF CONTENTS

DEDICATION	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF PLATES	xi
LIST OF ABBREVIATIONS	x
ABSTRACT	xii
ABSTRAK	xiii
CHAPTER 1: INTRODUCTION	1
1.1 Introduction	1
1.2 Justification	3
1.3 Objective	3
CHAPTER 2: LITERATURE REVIEW	4
2.1 Acacia mangium	4
2.1.1 Acacia mangium tree	4
2.1.2 Properties of acacia tree	6
2.1.3 Uses	7
2.2 Physical Properties of Wood Material	8
2.2.1 Density	8
2.2.2 Specific Gravity	9
2.2.3 Moisture Content	10
2.3 Fiber Morphology	11
2.3.1 Fiber Length	12
2.3.2 Cell Wall Thickness	12
2.3.3 Runkel Ratio (RR)	13
2.3.4 Felting Power (FP)	14
2.3.5 Coefficient of Suppleness (COS)	14
2.4 Effect of trunk height and trunk diameter	15
2.4.1 Effects of trunk height and trunk diameter toward Physical properties	15
2.4.2 Effects of trunk height and trunk diameter toward Fiber Morphology	15

CHAPTER 3: MATERIALS AND METHODS	16
3.1 Preparation of Raw Material	16
3.2 Procedure for Physical Properties	20
3.2.1 Density	20
3.2.2 Specific Gravity	20
3.2.3 Moisture Content	21
3.3 Procedure for Fiber Morphology	22
3.3.1 Fiber Maceration and Measurement Preparation	22
CHAPTER 4: RESULTS AND DISCUSSION	24
4.1 Introduction	24
4.2 Physical Properties	25
4.2.1 Density	25
4.2.2 Specific Gravity	27
4.2.3 Moisture Content	30
4.3 Fiber Morphology	33
4.3.1 Fiber Properties	33
4.3.2 Fiber Morphology	36
CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS	40
REFERENCES	41
APPENDICES	43
VITA	69

**PHYSICAL PROPERTIES AND FIBER MORPHOLOGY OF MATURED
ACACIA MANGIUM**

By

YASMIN BINTI TAHA

SITI ANIS ANIHA BINTI ISA

IFFAH IZZAH BINTI MAIDIN

DAYANG SRI MASAIN BTE ABD. RAHIM

April 2010

ABSTRACT

The research of physical properties and fiber morphology were performed on matured *Acacia mangium*. Physical properties of matured *A.mangium* were determined by density, specific gravity and moisture content. While fiber morphology of matured *A.mangium* were determined by fiber length, fiber diameter, lumen diameter, cell wall thickness, runkel ratio, felting power, and coefficient of suppleness. The objectives of this study were to determine the effect of physical properties and fiber morphology of matured *A.mangium* from their different trunk height (top, middle, and bottom) and trunk diameter (bark, intermediate, pith). From this study, properties and fiber morphology were significantly effected along the trunk height and across the trunk diameter of matured *A. mangium*.