



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**PREPARATION AND CHARACTERIZATION OF BANANA FIBER
REINFORCED POLYPROPYLENE COMPOSITES**

This report submitted in accordance with requirement of the Universiti Teknikal
Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering
(Engineering Materials).

by

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I hereby, declared this report entitled "Preparation and Characterization of Banana Fiber Reinforced Polypropylene Composites" is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the Degree in Bachelor of Manufacturing Engineering (Engineering Materials). The member of the supervisory committee is as follow:



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ABSTRAK

Tujuan penyelidikan ini adalah untuk mempelajari ciri-ciri dan sifat mekanik kepada biodegradasi terhadap serat pisang yang diperkuatkan oleh polypropylene (PP). PP digunakan disebabkan sifat kitar semula sebagai elemen biodegradasi dalam matrik. Serat pisang (BF) pula digunakan sebagai tetulang kerana sifat pereputannya. BF dirawat untuk meningkatkan ikatan antara BF dan PP. Sampel diuji dengan ujian mekanikal dan pereputan. Untuk ujian mekanikal, ujian tarikan dijalankan manakala ujian pereputan terbahagi kepada dua iaitu ujian tanam dan ujian penyerapan air. Penyerapan air dan kesan dari penanaman di dalam tanah akan dapat mentafsirkan tahap biodegradasi komposit berkenaan. Kesan serangan mikroorganisma juga akan disiasat dalam ujian tanam. Semua ujian dijalankan untuk menyiasat kesan rawatan kimia dan juga kesan nisbah kandungan serat di dalam komposit.

ABSTRACT

The objective of this project was to study the mechanical properties and biodegradability of silane treated banana fiber (BF) reinforced polypropylene (PP) as matrix. The function of the chemical treatment for the banana fiber was to improve the adhesion between the BF and PP because of the hydrophilic and hydrophobic. Sodium hydroxide was used to remove the hemicelluloses and lignin because the cellulose was the only cell that wanted to be used from the natural fiber. The mixture of BF and PP were compounded in the internal mixer and followed by hot pressing. The composites were tested with filler loading at 5wt% BF, 10wt% BF, 15wt% BF and 30wt% BF with 2% of silane concentration added. For mechanical properties test, tensile test will be conducted to determine the mechanical properties of the composites and effect of the chemical treatment and effect of filler loading. Water absorption and soil burial test was conducted to determine the biodegradability of the composites. Mechanical and biodegradation were carry out by tensile test, water absorption and soil burial analysis respectively. High filler loading of composites shows the effected mechanical properties and the biodegradability. However the usage of silane improved the interfacial adhesion and it also increases the mechanical properties of the composites. FTIR were used to confirm the reaction of the chemical that had been used.

DEDICATION

This thesis is gratefully dedicated to my family and all my friends.

ACKNOWLEDGEMENT

I would like to thank to Allah for His blessing because I have accomplished this project. Firstly, I would like to extend my heartiest gratitude to Miss Chang Siang Yee, my supervisor who had given me guidance throughout this project. Also not forgetting to other lecturers, friends and others those whose name are not mentioned here. Secondly, I would like thank my lovely mother, Zainab Bt Mohamed Yusuf and family for support me to continue this study. My friend, Mohd Norfadzli B Nazri who has willing to help fiber preparation until latenight. With prayers and moral support from both of them, I had gained strength to endure in this study. Besides, my sincere appreciation to UTeM management for giving me the opportunity acquire priceless experiences and knowledge during the period of the research. Finally, thank you to everyone who has directly and indirectly helped towards the completion of this final year project.

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LIST OF ABBREVIATIONS

ASTM	-	American standard testing method
BF	-	Banana fiber
FTIR	-	Fourier transform infrared
MM	-	Milimetre
NaOH	-	Sodium hydroxide
RPM	-	Rotation per minutes
PP	-	Polypropylene
SEM	-	Scanning electron microscopy

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