MECHANICAL PROPERTIES AND DEGRADABILITY OF PLA/PP REINFORCED DURIAN SKIN FIBER TREATED WITH GLUT PALMITATE SALT

NURUL SYAFAWANI BINTI FIZAL

BACHELOR OF SCIENCE (Hons.) BIOLOGY
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA

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NURUL SYAFAWANI BINTI FIZAL

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This Final Year Project Report entitled **"Mechanical Properties and Degradability of PLA/PP Reinforced Durian Skin Fiber Treated with Glut Palmitate Salt"** was submitted by Nurul Syafawani Binti Fizal in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Biology, in the Faculty of Applied Sciences, and was approved by

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Sarina Mohamad
Supervisor
B. Sc. (Hons.) Biology
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau, Perlis

_____

Nor Mazlina Abdul Wahab
Co-Supervisor
B. Sc. (Hons.) Polymer Technology
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau, Perlis

_____

Muhammad Syukri Noor Azman
Project Coordinator
B. Sc. (Hons.) Biology
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau, Perlis

_____

Zalina Zainal Abidin
Head of Programme
B. Sc. (Hons.) Physics
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau, Perlis

Date: _____

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ABSTRACT

MECHANICAL PROPERTIES AND DEGRADABILITY OF PLA/PP REINFORCED DURIAN SKIN FIBER TREATED WITH GLUT PALMITATE

PLA matrix provides good mechanical, physical and degradability properties, but somehow PLA alone is not good enough to produce a product. Natural fiber such as Durian skin fiber can be incorporated into PLA/PP as a biopolymer to achieve the desired properties and better degradation which resulting a good bio-composite. Therefore, the study was carried out to produce bio-composite of PLA/PP incorporated with DSF as natural fiber and GP as compatibilizer. In this study, the bio-composite was used to study its mechanical properties (tensile properties and impact strength), physical properties (water absorption ability and density) and degradability. The bio-composites has been successfully developed at different filler (DSF) loadings (0 php, 15 php, 30 php, 45 php and 60 php) with melt mixing blending. Synthesize of GP was a success due to the presence of broad peak of O-H in IR spectra of the bio-composite with the addition of GP. Increasing of DSF filler loading to 60 php DSF in PLA/PP bio-composite with the addition of GP resulted an increment increased in tensile strength 5.14 ± 0.15 MPa, impact test 3874.82 ± 131.89 J/m^2 and elongation at break 3.19 ± 0.96% due to enhanced interfacial bonding and strong adhesion between the polymer matrix and the filler due to the presence of compatibilizer. However, increased filler loading to 60 php DSF, shows a decreasing result of 82.32 ± 13.77 MPa for the tensile modulus representing high flexibility of the bio-composites. Furthermore, PLA/PP reinforced with DSF bio-composite absorption of water increases to 15.10 ± 6.06% with the increasing filler loading. More amount of water was absorbed by the bio-composite until it reaches the saturation point. Moreover, increased in filler loading also displays a better degradability of the PLA/PP reinforced DSF bio-composite to 23.2651 ± 3.21 % after 30 days of soil burial due better compatibility of the bio-composites in the environment causing the sample to decay more quickly in soil. Statistical analysis using ANOVA shows that P-value for tensile strength, tensile modulus, elongation at break, impact strength, density, water absorption, and degradability of the hybrid bio-composites were 0.66, 0.38, 0.68, 0.38, 0.92, 0.76 and 0.96 respectively. Meaning there were no significant between the means of all samples for those tests. The T-test analysis of the treated and untreated hybrid bio-composites for tensile strength, tensile modulus, elongation at break and impact test were 0.097, 0.21, 0.11 and 0.02 respectively. There were no significant between means of these tests for both treated and untreated bio-composites. However, for impact strength there is a significant different between means of both treated and untreated bio-composites. This study concludes that the PLA/PP reinforced with DSF with the addition of GP was suitable to be used in the production of bioplastic by many industries and the benefits can be used by the society and also environmental friendly.