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EFFECT OF PROXIMATE ANALYSIS ON THE STORAGE STABILITY AND COMBUSTION PERFORMANCE OF EFB-HDPE PYROLYZED CHAR PELLETS

Name	:	NUR HIDAYATUL FITRAH BINTI SOBRI
Student ID	:	2023105413
Program	:	AS245
Course code	:	FSG671
Mobile Phone	:	019-9278029
E-mail	:	2023105413@student.uitm.edu.my

Approval by Main Supervisor :

I certify that the work conducted by the above student is completed and approve this report to be submitted for evaluation.

Supervisor's name	:	ASNIDA YANTI BINTI ANI
Date	:	27/7/2025
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NUR HIDAYATUL FITRAH BINTI SOBRI

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ABSTRACT

EFFECT OF PROXIMATE ANALYSIS ON THE STORAGE STABILITY AND COMBUSTION PERFORMANCE ON EFB-HDPE PYROLYZED CHAR PELLETS

The increasing amount of agricultural and plastic waste is a major environmental issue that leads to land pollution and underutilized resources. This research evaluates the combustion performance of Empty Fruit Bunch (EFB) and High-Density Polyethylene (HDPE) pyrolyzed char. The study specifically assessed the modification of EFB-HDPE ratios, storage conditions, which is ambient and vacuum, and storage time on moisture content, calorific value, and the stability of the pellets. It was found that higher amounts of HDPE reduced moisture content from 4.51% at 100% EFB to 0.89% at 25% EFB and fixed carbon but increased in volatile matter and calorific value up to 98.09% and 4409 Kcal/kg, respectively. Pellets stored under vacuum showed lower moisture absorption than those stored in ambient conditions. Fourier Transform Infrared Spectroscopy (FTIR) analysis showed higher peak intensity of O–H functional groups in pure EFB which means those samples had higher moisture affinity. Overall, the data suggests that char pellets derived from EFB and HDPE could sustain high energy potential while maintaining structural rigidity and durability, possibly serving as an efficient renewable energy source.

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