

RINGKASAN

PEMANFAATAN BIJI KELOR MENJADI BIOPELET DENGAN PENGARUH VARIASI FREKUENSI PUTARAN SCREW TERHADAP KUALITAS BIOPELET MENGGUNAKAN

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Penelitian ini penting karena menjawab kebutuhan akan sumber energi alternatif yang lebih ramah lingkungan di tengah meningkatnya ketergantungan terhadap bahan bakar fosil. Kebutuhan energi yang terus naik, sementara ketersediaan energi fosil terbatas dan menimbulkan dampak lingkungan, mendorong perlunya pengembangan biomassa sebagai sumber energi terbarukan. Selain itu, biji kelor selama ini belum dimanfaatkan secara optimal, padahal memiliki potensi sebagai bahan baku bioenergi. Dan juga penting karena mengubah bahan yang belum banyak dimanfaatkan menjadi produk bernilai tambah, yaitu biopelet, sehingga dapat mendukung efisiensi pemanfaatan sumber daya lokal.

Penelitian ini bertujuan untuk menganalisis pengaruh variasi frekuensi putaran screw terhadap kualitas biopelet dari biji kelor (*Moringa oleifera*) yang diproduksi menggunakan metode *screw pressing*. Penelitian dilakukan di Laboratorium Teknik Kimia dan Laboratorium Teknik Energi Politeknik Negeri Sriwijaya dengan variasi frekuensi putaran *screw* 10 Hz, 15 Hz, 20 Hz, 25 Hz, 30 Hz, dan 35 Hz, pada suhu pemanasan 150°C. Parameter yang dianalisis meliputi kadar air, kadar abu, kadar zat terbang, kadar karbon tetap, kerapatan, nilai kalor, *Drop Test*, dan laju pembakaran.

Hasil penelitian menunjukkan bahwa variasi frekuensi putaran *screw* berpengaruh terhadap karakteristik biopelet yang dihasilkan. Biopelet dengan kualitas terbaik diperoleh pada frekuensi 35 Hz dengan kadar air 5,50%, kadar abu 4,91%, kadar zat terbang 76,78%, kadar karbon tetap 12,81%, kerapatan 1,8344 g/cm³, dan nilai kalor 5412,8382 kal/g. Berdasarkan hasil tersebut, biopelet biji kelor berpotensi menjadi bahan bakar alternatif yang memenuhi standar mutu SNI 8675:2018.

Kata Kunci : *Screw Oil Press Machine*, Biji Kelor, Frekuensi Screw

ABSTRACT
**CONVERSION OF MORINGA SEEDS INTO BIO-PELLETS: THE
EFFECT OF SCREW ROTATION FREQUENCY ON BIO-PELLET
QUALITY USING A SCREW PRESSING METHOD**

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This study is important as it addresses the growing need for environmentally friendly alternative energy sources amid increasing dependence on fossil fuels. Rising energy demand, coupled with the limited availability and environmental impact of fossil fuels, highlights the urgency of developing biomass as a renewable energy source. In addition, moringa seeds have not been optimally utilized, despite their potential as a bioenergy raw material. This research also contributes to adding value to underutilized resources by converting them into bio-pellets, thereby supporting the efficient use of local resources.

*This study aims to analyze the effect of screw rotation frequency variation on the quality of bio-pellets produced from moringa seeds (*Moringa oleifera*) using the screw pressing method. The research was conducted at the Chemical Engineering Laboratory and Energy Engineering Laboratory of Politeknik Negeri Sriwijaya. The screw rotation frequencies tested were 10 Hz, 15 Hz, 20 Hz, 25 Hz, 30 Hz, and 35 Hz at a heating temperature of 150°C. The parameters analyzed included moisture content, ash content, volatile matter, fixed carbon, density, calorific value, Drop Test, and combustion rate.*

The results showed that variations in screw rotation frequency significantly affected the characteristics of the produced bio-pellets. The best quality bio-pellets were obtained at a frequency of 35 Hz, with moisture content of 5.50%, ash content of 4.91%, volatile matter of 76.78%, fixed carbon of 12.81%, density of 1.8344 g/cm³, and a calorific value of 5412.8382 cal/g. Based on these results, moringa seed bio-pellets have strong potential as an alternative fuel that meets the quality standards of SNI 8675:2018.

Keywords: Screw Oil Press Machine, Moringa Seeds, Screw Frequency