

ABSTRAK

Pengaruh Kecepatan Putaran *Screw* Terhadap Hasil Dan Kualitas Biopelet Berbahan Biji Pinang Menggunakan *Screw Oil Press Machine*

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Kebutuhan energi yang terus meningkat serta keterbatasan sumber energi fosil mendorong pemanfaatan biomassa sebagai sumber energi terbarukan. Salah satu biomassa yang berpotensi dimanfaatkan adalah biji pinang (*Areca catechu* L.) yang memiliki kandungan lignoselulosa sehingga dapat diolah menjadi biopelet. Penelitian ini bertujuan untuk mengetahui pengaruh kecepatan putaran *screw* terhadap jumlah produk, karakteristik biopelet yang meliputi analisis proksimat, kerapatan, laju pembakaran, *drop test*, serta nilai kalor biopelet berbahan biji pinang menggunakan *Screw Oil Press Machine*. Penelitian dilakukan dengan temperatur operasi tetap 150°C dan variasi putaran *screw* sebesar 15, 20, 30, 40, dan 45 Hz. Karakteristik biopelet dianalisis melalui pengujian kadar air, kadar abu, zat terbang, karbon tetap, kerapatan, laju pembakaran, *drop test*, dan nilai kalor. Hasil penelitian menunjukkan bahwa peningkatan kecepatan putaran *screw* meningkatkan jumlah produk biopelet dari 145,10 g menjadi 158,60 g serta meningkatkan kerapatan dari 1,10 g/cm³ menjadi 1,18 g/cm³. Kadar air menurun dari 17,58% menjadi 13,24%, sedangkan kadar abu meningkat dari 0,48% menjadi 0,61% dan kadar zat terbang meningkat dari 63,24% menjadi 67,18%. Nilai kalor tertinggi diperoleh pada putaran 15 Hz sebesar 5938,10 kal/g, sedangkan nilai kalor terendah pada putaran 45 Hz sebesar 4385,28 kal/g. Seluruh sampel biopelet memenuhi persyaratan nilai kalor minimum dan kadar abu berdasarkan SNI 8021:2014, namun kadar air masih berada di atas batas maksimum standar. Dengan demikian, kecepatan putaran *screw* berpengaruh terhadap kualitas biopelet biji pinang yang dihasilkan menggunakan *Screw Oil Press Machine*.

ABSTRACT

The Effect of Screw Rotation Speed on the Yield and Quality of Areca Nut-Based Biopellets Using a Screw Oil Press Machine

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The increasing demand for energy and the depletion of fossil fuel resources have encouraged the utilization of biomass as a renewable energy source. One potential biomass is areca nut (Areca catechu L.), which contains lignocellulosic compounds suitable for bio-pellet production. This study aimed to determine the effect of screw rotational speed on the product yield, bio-pellet characteristics, including proximate analysis, density, burning rate, drop test, and calorific value of areca nut bio-pellets produced using a Screw Oil Press Machine. The experiment was conducted at a constant operating temperature of 150°C with screw rotational speeds of 15, 20, 30, 40, and 45 Hz. The produced bio-pellets were characterized through moisture content, ash content, volatile matter, fixed carbon, density, burning rate, drop test, and calorific value analyses. The results showed that increasing the screw rotational speed increased the bio-pellet yield from 145.10 g to 158.60 g and the density from 1.10 g/cm³ to 1.18 g/cm³. Moisture content decreased from 17.58% to 13.24%, while ash content increased from 0.48% to 0.61% and volatile matter increased from 63.24% to 67.18%. The highest calorific value was obtained at 15 Hz, reaching 5938.10 cal/g, whereas the lowest was recorded at 45 Hz, with 4385.28 cal/g. All bio-pellet samples satisfied the minimum calorific value and ash content requirements specified in SNI 8021:2014; however, the moisture content remained above the standard limit. Therefore, screw rotational speed significantly affected the quality of areca nut bio-pellets produced using a Screw Oil Press Machine.