

PENINGKATAN SIFAT BAHAN BAKAR PELET KAYU SENGON DENGAN PENAMBAHAN TEMPURUNG KELAPA SEBAGAI SUMBER ENERGI TERBARUKAN

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INTISARI

Kayu sengon menjadi salah satu bahan baku dalam pembuatan pelet kayu karena memiliki sifat yang cepat tumbuh. Akan tetapi pelet kayu sengon memiliki kadar abu, kadar sulfur dan nitrogen yang tinggi serta nilai kalor yang rendah sehingga belum dapat memenuhi spesifikasi standar pelet kayu (EnPlus). Untuk meningkatkan sifat bahan bakar pelet kayu maka dilakukan pencampuran bahan dengan serbuk tempurung kelapa. Diketahui tempurung kelapa memiliki nilai kalor yang tinggi, dan kadar abu, sulfur dan nitrogen yang rendah. Penelitian ini bertujuan untuk mengetahui pengaruh kombinasi bahan sengon dengan tempurung kelapa pada ukuran partikel dan tekanan kempa yang berbeda.

Penelitian ini menggunakan bahan dari limbah serbuk gergaji sengon (*Falcataria moluccana* (Miq.)) dan limbah tempurung kelapa (*Cocos nucifera*). Penelitian ini menggunakan rancangan acak lengkap (*Completely Randomized Design*) dengan 3 faktor perlakuan, yaitu ukuran partikel (20-40; 40-60; dan 60-80 *mesh*), persentase kombinasi bahan sengon dan tempurung kelapa (100:0%, 75:25%, 50:50%, dan 25:75%), dan tekanan kempa (70 dan 100 kg/m²). Parameter yang diamati antara lain sifat fisika (berat jenis, respon higroskopisitas, dan keteguhan tekan), sifat proksimat (kadar air, abu, zat terbang, dan karbon terikat), sifat ultimat (C, H, O, N, dan S), dan nilai kalor.

Hasil penelitian menunjukkan kombinasi bahan baku yang berbeda (sengon dan tempurung kelapa) memberikan pengaruh terhadap sifat fisika dan kimia pelet kayu. Pelet kayu terbaik dihasilkan pada kombinasi serbuk sengon dan tempurung kelapa 50:50%, ukuran partikel 60-80 *mesh*, dan tekanan kempa 100 kg/cm², menghasilkan pelet dengan kadar abu 1,02%, kadar N 0,38%, kadar S 0,05% dan nilai kalor 5177,04 kal/g. Hasil penelitian tersebut telah memenuhi standar EnPlus.

Kata kunci : Sengon, tempurung kelapa, pelet kayu, sifat proksimat, sifat ultimat, sifat fisika

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Improved Fuel Properties of *Falcataria moluccana* Pellets with the Addition of Coconut Shell as Renewable Energy Source

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ABSTRACT

Curently *Falcataria moluccana* wood became one of the raw materials in the manufactured of wood pellets, because *F. moluccana* has a fast growing properties. However *F. moluccana* pellets have a high ash content, and high S and N content, with low calorific value which could not meet requirement of EnPlus standard for pellet. To improve its properties, pellets were manufactured using mixtures of *F. moluccana* particles to coconut shell particles, and the properties were investigated. The objectives of this study were to determine effect of the combination material of *F. moluccana* with coconut shell on different particle size and different compressive force.

Materials was from *F. moluccana* sawdust waste and coconut shell waste (*Cocos nucifera* L.). In this study was applied Completely Randomized Design, treated by 3 factors, there were particle size (20-40; 40-60; and 60-80 mesh), various material combination of *F. moluccana* and coconut shell (100%:0%; 75%:25%; 50%:50%; and 25%:75%), and different compressive force (70 and 100 kg/cm²). Physical and chemical properties are investigated including compressive strength, hygroscopicity response, specific gravity, proximat analysis, ultimate analysis, and calorific value.

The result showed that adding coconut shell particles to *F. moluccana* particles was an effective way to improve fuel properties of *F. moluccana* pellets. The best mixed pellets are produced when adding 50% coconut shell to *F. moluccana*, with particle size 60-80 mesh and press load of 100 kg/cm² that produce mixed pellets with the following spesifications: ash content 1.02%, nitrogen content 0.38%, sulfur content 0.05%, furthermore calorific value also improved 5177.04 cal/g. The result from this research already comply the grade requirement of EnPlus standard.

Keywords: *F. moluccana*, coconut shell, pellet, chemical properties, physical properties

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