

## Evaluasi Pengaruh Kulit Kayu pada Kualitas Pelet Kaliandra (*Calliandra calothyrsus*) Sebagai Sumber Energi Terbarukan Oleh:

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### INTISARI

Pelet adalah salah satu sumber energi terbarukan yang banyak digunakan. Bahan baku pelet dapat diperoleh dari berbagai jenis biomasa salah satunya adalah kayu. Pembuatan pelet kayu banyak dilakukan dengan bahan kayu beserta kulitnya untuk memudahkan proses pembuatan pelet kayu. Penelitian ini bertujuan untuk mengetahui pengaruh proporsi kulit kaliandra (*Calliandra calothyrsus*) pada kualitas pelet kayu kaliandra.

Penelitian pelet kayu kaliandra dilakukan dengan menggunakan rancangan acak lengkap (*Completely Randomized Design*) dengan 3 faktor perlakuan, yaitu ukuran partikel (0,42-0,85; 0,25-0,42; and 0,18-0,25 mm), proporsi kayu dan kulit kaliandra (92,5:7,5%; 90:10%; 87,5:12,5%, dan 85:15%), dan tekanan kempa (70 dan 100 kg/cm<sup>2</sup>). Evaluasi kualitas pelet kayu kaliandra yang diamati antara lain sifat fisika (berat jenis, respon higroskopisitas, dan keteguhan tekan), sifat proksimat (kadar air, kadar abu, zat mudah menguap, dan karbon terikat) dan nilai kalor. Hasil penelitian kemudian dibandingkan dengan beberapa standar yang berlaku yaitu SNI, ENPlus, ISO, dan IWPB.

Hasil penelitian menunjukkan bahwa faktor interaksi ukuran partikel bahan baku, proporsi bahan baku dan tekanan kempa berpengaruh signifikan terhadap sifat fisika (kekuatan tekan radial, respon adsorpsi dan pengembangan) dan sifat kimia (kadar air, kadar zat mudah menguap, kadar abu dan kadar karbon terikat). Proporsi kulit dan kayu memberikan pengaruh signifikan terhadap sifat fisika, proksimat dan nilai kalor pelet kayu kaliandra. Dengan bertambahnya proporsi kulit kayu akan meningkatkan nilai kekuatan tekan radial, kadar air, dan kadar abu. Sebaliknya respon adsorpsi, kadar karbon terikat dan nilai kalor menurun dengan meningkatnya proporsi kulit. Pelet kayu kaliandra terbaik dihasilkan pada kombinasi serbuk kayu dan kulit 92,5:7,5%; ukuran partikel 0,18-0,25 mm; dan tekanan kempa 100 kg/cm<sup>2</sup>. Kombinasi proporsi bahan baku tersebut menghasilkan pelet dengan nilai kekuatan tekan radial 738,60 N/mm; berat jenis 1,05; kadar air 10,84%; kadar zat mudah menguap 85,84%; kadar abu 1,68%; karbon terikat 12,48%; dan nilai kalor 4581,40 kal/g. Hasil penelitian ini menunjukkan bahwa pelet kombinasi kayu dan kulit kaliandra telah memenuhi SNI.

Kata Kunci: biomasa, proporsi kulit, tekanan kempa, analisis proksimat, nilai kalo

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## **Evaluation of the Effect of Bark on the Quality of Calliandra (*Calliandra calothyrsus*) Pellets as a Renewable Energy Source**

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### **ABSTRACT**

Pellet is one of the widely used renewable energy sources. The raw material for pellets can be obtained from various types of biomass, including wood. The manufacture of wood pellets can be combined wood and bark to simplify the process of producing wood pellets. This study aims to determine the effect of the proportions of calliandra (*Calliandra calothyrsus*) wood and bark on pellet quality.

This research was conducted using a Completely Randomized Design (CRD) with 3 treatment factors, that are particle size (0.42-0.85, 0.25-0.42, and 0.18-0.25 mm), wood and bark proportion (92.5:7.5%; 90:10%; 87.5:12.5%, and 85:15%), and press loads (70 and 100 kg/cm<sup>2</sup>). The evaluation of calliandra wood pellet quality was observed including physical properties (specific gravity, hygroscopicity response, and compressive strength), proximate analysis (moisture content, ash content, and volatile matter content), and calorific value. The results were then compared with some applicable standards, including SNI, EnPlus, ISO, and IWPB.

The results showed that the interaction factor of particle size of raw materials, proportion of raw materials, and press loads significantly affected the physical properties (radial compressive strength, adsorption response, and swelling) and chemical properties (moisture content, volatile matter content, ash content, and fixed carbon). The proportion of bark and bark significantly affected the physical properties, proximate and calorific value of calliandra wood pellets. As bark proportion increased, radial compressive strength, moisture content, and ash content were increased. In contrast, adsorption response, fixed carbon content and calorific value were decreased due to an increasing of bark proportion. The best quality of wood pellet was obtained from combination of 92.5% wood and 7.5% bark, particle size of 18-0,25 mm, and press loads of 100 kg/cm<sup>2</sup>. Furthermore, this pellet showed the average value of radial compressive strength at 738.60 N/mm, specific gravity at 1.05, water content at 10.84%, volatile matter content at 85.84%, ash content at 1.68%, fixed carbon at 12.48%, and calorific value at 4581.40 cal/g. These results were met with the grade regulation of SNI.

**Keywords:** biomass, bark proportion, press load, proximate analysis, calorific value

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