PENGARUH VARIASI SUHU KARBONISASI DAN TEKANAN KEMPA TERHADAP KUALITAS BRIKET ARANG LIMBAH CANGKANG
NYAMPLUNG (Calophyllum inophyllum L.)
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Maria Flora Yofi Nagerika[1], Johanes Pramana Gentur Sutapa[2]

INTISARI

Cangkang Nyamplung (*Calophyllum inophyllum* L.) merupakan salah satu limbah biomassa yang ketersediaannya melimpah dan dapat dimanfaatkan secara optimal sebagai alternatif pengganti energi fosil yang kian menipis. Penelitian ini bertujuan untuk mengolah limbah cangkang nyamplung menjadi sumber energi terbarukan dalam bentuk briket arang.

Penelitian ini menggunakan Rancangan Acak Lengkap (*Completely Randomized Design*) dengan percobaan faktorial dengan 2 faktor perlakuan, yaitu suhu karbonisasi (350ºC, 450ºC, dan 550ºC) dan tekanan kempa (2.000 psi, 2.500 psi, dan 3.000 psi). Proses karbonisasi limbah cangkang nyamplung dilakukan selama 3 jam menggunakan retort listrik. Kemudian, briket arang dibuat dengan mencampurkan perekat (pati dan air dengan perbandingan 1:16) sebanyak 5% dari 27 gram serbuk arang. Adonan briket arang dicetak menggunakan kempa hidrolik selama 15 menit dan dikeringkan. Briket arang yang dihasilkan diuji kualitasnya menggunakan parameter sifat fisika (kadar air, berat jenis, dan nilai kalor) dan sifat kimia (kadar abu, kadar zat mudah menguap, dan kadar karbon terikat).

Hasil penelitian menunjukkan bahwa briket arang limbah cangkang nyamplung memiliki sifat-sifat sebagai berikut: kadar air 5,95% - 7,23%; berat jenis 0,83 – 1,03; nilai kalor 6.377 kal/g – 6.969 kal/g; kadar abu 7,01% - 9,53%; kadar zat mudah menguap 4,27% - 27,81%; dan kadar karbon terikat 57,21% - 80,11%. Briket arang dengan kualitas terbaik dihasilkan oleh kombinasi perlakuan suhu karbonisasi 550ºC dan tekanan kempa 2.000 psi dengan hasil kadar air 7,08%, berat jenis 0,94, nilai kalor 6.936 kal/g, kadar abu 8,37%, kadar zat mudah menguap 6,72%, dan kadar karbon terikat 78,07%. Hasil pengujian briket arang limbah cangkang nyamplung telah memenuhi beberapa standar kualitas dari SNI 01-6235-2000, Jepang, Inggris, dan Amerika.

Kata Kunci: limbah cangkang nyamplung, briket arang, sifat fisika, sifat kimia

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[1] Mahasiswa Fakultas Kehutanan UGM
[2] Staff Pengajar Fakultas Kehutanan UGM

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THE EFFECT OF CARBONIZATION TEMPERATURE AND COMPACTION PRESSURE VARIATIONS ON THE QUALITY OF CHARCOAL BRIQUETTES MADE FROM NYAMPLUNG (*Calophyllum inophyllum* L.) SHELL WASTE

Maria Flora Yofi Nagerika[1], Johanes Pramana Gentur Sutapa[2]

ABSTRACT

Nyamplung (*Calophyllum inophyllum* L.) shells are a type of biomass waste that is abundant and can be optimally utilized as an alternative to dwindling fossil fuels. This research aims to process nyamplung shell waste into a renewable energy source in the form of charcoal briquettes.

This research used a *Completely Randomized Design* with a factorial experiment with 2 factors, namely carbonization temperature (350ºC, 450ºC, and 550ºC) and compression pressure (2,000 psi, 2,500 psi, and 3,000 psi). The carbonization process of nyamplung shell waste was carried out for 3 hours using an electric retort. Then, charcoal briquettes were made by mixing adhesive (starch and water with a ratio of 1:16) as much as 5% of 27 grams of charcoal powder. The briquette was molded using a hydraulic press for 15 minutes and dried. The quality of the resulting charcoal briquettes were tested using physical properties (moisture content, bulk density, and calorific value) and chemical properties (ash content, volatile matter content, and fixed carbon content).

The results of the research showed that the nyamplung shell waste charcoal briquettes had the following properties: moisture content 5.95% - 7.23%; bulk density 0.83 – 1.03; calorific value 6,377 cal/g – 6,969 cal/g; ash content 7.01% - 9.53%; volatile matter content 4.27% - 27.81%; and fixed carbon content 57.21% - 80.11%. The best quality charcoal briquettes were produced by a combination of 550ºC carbonization temperature and 3,000 psi compression pressure treatment with a moisture content of 7.08%, bulk density 0.94, calorific value 6,936 cal/g, ash content 8.37%, volatile matter content 6.72%, and fixed carbon content 78.07%. The results of testing nyamplung shell waste charcoal briquettes have met several quality standards of SNI 01-6235-2000, Japan, British, and America.

Keywords: *nyamplung shell waste, charcoal briquettes, physical properties, chemical properties*

[1] Student of Faculty of Forestry UGM
[2] Lecturer of Faculty of Forestry UGM