

PENGARUH KOMPOSISI BAHAN DAN TEKINAN KEMPA TERHADAP KUALITAS BRIKET BIOMASSA DARI CAMPURAN KULIT KOPI (*Coffea sp.*) DAN LIMBAH PENGOLAHAN GONDORUKEM

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INTISARI

Kulit kopi dan limbah pengolahan gondorukem merupakan hasil sampingan dari kegiatan produksi hasil hutan dan agroforestri. Jumlah kulit kopi dan limbah pengolahan gondorukem yang melimpah dan belum dimanfaatkan secara optimal mengakibatkan penumpukan limbah biomassa di sektor industri terkait. Dengan dilakukan penelitian ini harapannya dapat memanfaatkan dan mengolah kulit kopi dan limbah pengolahan gondorukem yang melimpah menjadi salah satu energi terbarukan dalam bentuk briket biomassa.

Penelitian ini menggunakan rancangan acak lengkap (*Completely Randomized Design*) dengan dua faktor penelitian, yaitu variasi komposisi bahan baku Kulit Kopi : Limbah pengolahan gondorukem yaitu 50% : 50%, 25% : 75%, dan 0% : 100% dan variasi tekanan kempa yaitu 2000 psi, 2500 psi, dan 3000 psi, masing-masing perlakuan dilakukan lima kali ulangan. Proses pembuatan briket dilakukan dengan melakukan pencampuran bahan baku sesuai dengan variasi komposisi yang telah ditentukan. Setelah tercampur menjadi homogen, kemudian dicetak menggunakan kempa hidraulik. Briket biomassa yang dihasilkan kemudian diuji kualitasnya berdasarkan 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 biomassa dari kulit kopi dan limbah pengolahan gondorukem memiliki parameter kualitas sebagai berikut : kadar air 7,90% - 11,65%; berat jenis 0,65 - 1,01; nilai kalor 4963,60 kal/g - 6172,40 kal/g; kadar abu 2,85% - 5,60%; kadar zat mudah menguap 79,70% - 86,33%; kadar karbon terikat 10,65% - 15,21%; serta nilai kehancuran *drop test* 1,22% - 4,84%. Kombinasi yang menghasilkan kualitas briket biomassa terbaik yaitu pada komposisi kulit kopi : limbah pengolahan gondorukem (25% : 75%) dan tekanan 3000 psi yang menghasilkan briket biomassa dengan kandungan kadar air 10,33%, nilai berat jenis 0,92, nilai kalor 5638,60 kal/g, kadar abu 3,28%, kadar zat mudah menguap 83,08%, karbon terikat 13,65%, dan nilai kehancuran *drop test* 1,61%.

Kata kunci : kulit kopi, limbah pengolahan gondorukem, tekanan kempa, briket, energi

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EFFECT OF MATERIAL COMPOSITION AND COMPRESSION PRESSURE ON QUALITY OF BIOMASS BRICKETS FROM COFFEE SHELL (*Coffea sp.*) AND GONDORUKEM WASTE MIXTURE

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ABSTRACT

Coffee shell and gondorukem waste are by products of forest product and agroforestry activities. The quantity of coffee shell and gondorukem waste, which have not yet been utilized, leads to the accumulation of biomass waste in the related industrial sector. This research aims to utilize and process the abundant coffee shell and gondorukem waste into a renewable energy source in the form of biomass briquettes.

The research were used a Completely Randomized Design (CRD) with two treatment factors : variations in the composition of raw materials (Coffee Shell : Gondorukem Waste) at ratios of 50% : 50%, 25% : 75%, and 0% : 100%, and variations in compression pressure at 2000 psi, 2500 psi, and 3000 psi, with each treatment being replicated five times. The briquette production process involves mixing the raw materials according to the specified composition variations. Once the mixture is homogeneous, it is then pressed using a hydraulic press. The resulting biomass briquettes are tested for quality based on physical parameters (moisture content, bulk density, and a heat value) and chemical properties (ash content, volatile matter content, and fixed carbon content).

The research finding indicate that the biomass briquettes made from coffee shell and gondorukem waste have the following quality parameters : moisture content of 7.90% - 11.65%; bulk density of 0.65 - 1.01; a heat value of 4963.60 cal/g - 6172.40 cal/g; ash content of 2.85% - 5.60%; volatile matter content of 79.70% - 86.33%; fixed carbon content of 10.65% - 15.21%; and drop test destruction value of 1.22% - 4.84%. The combination that has the best quality biomass briquette is a composition of coffee shell : gondorukem waste (25% : 75%) at a pressure of 3000 psi, resulting in biomass briquettes with a moisture content of 10.33%, bulk density of 0.92, a heat value of 5638.60 cal/g, ash content of 3.28%, volatile matter content of 83.08%, fixed carbon content of 13.65%, and a drop test destruction value of 1.61%.

Keywords : coffee shell, gondorukem waste, compression pressure, briquette, energy

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