

## ABSTRAK

### PENGEMBANGAN BRIKET BIOMASSA BERBAHAN BAKU CAMPURAN LIMBAH BATANG SINGKONG, LIMBAH TEMPURUNG KELAPA DAN LIMBAH BAMBU

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Meningkatnya populasi manusia dan perindustrian mengakibatkan kebutuhan energi yang tinggi, dimana selama ini dipenuhi oleh bakar fosil. Bahan bakar tersebut bersifat terbatas, tidak dapat didaur ulang dan memiliki dampak negatif bagi lingkungan, sehingga diperlukan alternatif pengganti bahan bakar fosil berupa biobriket. Tujuan dilakukannya penelitian ini adalah untuk menghasilkan produk bahan bakar berupa biobriket dari limbah pertanian yang ramah lingkungan, mengkaji dan mempelajari kandungan energi dan karakteristik biobriket serta menganalisis kelayakan ekonomi biobriket yang dihasilkan. Penelitian ini disusun secara faktorial dalam Rancangan Acak Lengkap (RAL) dengan dua faktor dan tiga ulangan. faktor pertama (P) ialah perbandingan komposisi bahan antara limbah batang singkong, limbah tempurung kelapa dan limbah batang bambu yang terdiri dari tiga taraf perlakuan yaitu perbandingan komposisi limbah batang singkong, tempurung kelapa dan batang bambu sebesar 60:20:20 (P1), perbandingan komposisi limbah batang singkong, tempurung kelapa dan batang bambu sebesar 20:60:20 (P2), perbandingan komposisi limbah batang singkong tempurung kelapa dan batang bambu sebesar 20:20:60 (P3) dan perbandingan komposisi limbah batang singkong, limbah tempurung kelapa dan batang bambu sebesar 30:35:35 (P4). Faktor kedua adalah faktor perekat tapioka (T) dengan konsentrasi perekat tapioka sebesar 5% (T1) dan konsentrasi perekat campuran tapioka dan *clay* sebesar 5% (T2). Parameter yang diamati terdiri dari kerapatan, kadar air, kekuatan tekan, *shatter resistance index*, nilai kalor, laju pembakaran, dan suhu pembakaran biobriket. Kelayakan ekonomi biobriket ditentukan berdasarkan besarnya nilai *Revenue Cost Ratio (R/C Ratio)* dan *Pay Back Period (PBP)*. Karakteristik biobriket yang dihasilkan pada kerapatan berkisar 0,5-0,71 g/cm<sup>3</sup>, kadar air berkisar 7,15-8,52%, kekuatan tekan briket berkisar 98,28%, nilai kalor berkisar 5738-6513 kal/g, laju pembakaran berkisar 1,085-2,38 g/menit, dan pembakaran rata-rata yang diperoleh adalah berkisar 118-288°C. Biobriket yang

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telah dibuat, pada seluruh perlakuan dinyatakan layak secara ekonomi karena memiliki nilai *R/C Ratio* berkisar antara 1,4-1,6. Nilai *payback period* yang diperoleh berkisar antara 1,4-2,5 tahun.

**Kata kunci:** Biobriket, energi, karakteristik, kelayakan ekonomi, limbah pertanian.

## **ABSTRACT**

### **DEVELOPMENT OF BIOBRIQUETTES MIXES WITH CASSAVA STEM WASTE, COCONUT SHELL WASTE AND BAMBOO WASTE**

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*The increase in human population and industry has resulted in a high demand for energy, which has so far been met by fossil fuels. This fuel is limited, cannot be recycled and has a negative impact on the environment, so an alternative to fossil fuels is needed in the form of biobriquettes. The purpose of this research is to produce fuel products in the form of biobriquettes from environmentally friendly agricultural waste, to study and study the energy content and characteristics of biobriquettes and to analyze the economic feasibility of the resulting biobriquettes. This study was arranged factorially in a completely randomized design (CRD) with two factors and three replications. The first factor (P) is the comparison of the material composition between cassava stem waste, coconut shell waste and bamboo stem waste which consists of three treatment levels, namely the ratio of the composition of waste cassava stems, coconut shell waste and bamboo stems of 60:20:20 (P1), the ratio composition of waste cassava stems, coconut shells and bamboo stems was 20:60:20 (P2), the ratio of the composition of waste coconut shell cassava stems and bamboo stems was 20:20:60 (P3) and the composition ratio of waste cassava stems, coconut shell waste and bamboo sticks of 30:35:35 (P4). The second factor was the tapioca adhesive factor (T) with a tapioca adhesive concentration of 5% (T1) and a mixture of tapioca and clay adhesive concentration of 5% (T2). Parameters observed consisted of density, moisture content, compressive strength, shatter resistance index, calorific value, burning rate, and bottom temperature of the pan when burning briquettes. The economic feasibility of biobriquettes is determined based on the value of the Revenue Cost Ratio (R/C Ratio) and the Pay Back Period (PBP). The characteristics of the biobriquettes produced at densities ranged from 0.5-0.71 g/cm<sup>3</sup>, moisture content ranged from 7.15-8.52%,*

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*compressive strength of the briquettes ranged from 98.28%, calorific value ranged from 5738-6513 cal/g, rate combustion ranges from 1.085-2.38 g/minute, and the average combustion obtained is around 118-288°C. The biobriquettes that have been made, in all treatments were declared economically viable because they had R/C ratio values ranging from 1.4 to 1.6. The payback period values obtained ranged from 1.4-2.5 years.*

**Keywords:** *Agricultural waste, biobriquettes, economic feasibility, energy characteristics, strategi.*