Pati Janeng Adhesive Durian Shellbiobriquette (Durio dibethinus Murr)

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Abstract. Biobriket is an alternative energy substitute for fuel produced from organic materials or agricultural waste (biomass) that is underutilized, especially durian skin waste. This study aims to see the effect of differences in ash content, calorific value and briquette flame test. The making of this biobriquette uses 1: 2 starch from the biobriket weight, the biobriquette particle size is 80 mesh, the cylindrical biobriket form. The results showed that the biobriquette produced had met the fuel standards for households. Durian skin biobriket produces 1.8% water content with a burning rate of 1.3150 kg/minute. Based on the test of water content and combustion rate, the biobriquette obtained can be used as an environmentally friendly fuel.

1. Introduction
Energy is a major problem in the world today, due to increasing energy needs every year along with increasing human activity using fuel. The availability of increasingly scarce fossil fuels results in an increase in fuel, so it needs an alternative to reduce the use of fuel oil. Thus, it is necessary to seek other alternative energy sources derived from continuous and renewable raw materials such as biomass energy [1]. Biomass energy is a solid waste that can be used as an environmentally friendly fuel source, easily obtained, economically used by the community [2].

One type of biomass potential is waste of durian skin. Durian skin fiber is waste from durian fruit, around 60-75% is durian skin fiber from durian fruit. durian skin consists of ofignign (15.45%), hemicellulose (13.09%) and cellulose (60.45%) [3]. The use of the enzyme alpha-amilasi and gluko-amilas E can increase the production of bio e tanol the durian skin waste sebag a i alternative fuels that are environmentally friendly [4]. As the durian season arrives, durian skin waste is not utilized optimally, so the volume of durian skin waste increases. Therefore, the use of durian skin waste is used as biobriquette as an environmentally friendly alternative energy.

2. Methodology

2.1. Tools and materials
The equipment used is a knife, machete, mesh sieve, measuring cup, stirrer, hot plate, basin, biobriquette mold, oven, Bomb Calorimeter, Furnace, desiccator, Test Strength. The material for making briquettes is waste of durian skin, starch janeng as adhesive and hot water. The selection of
janeng starch as an adhesive because it contains about 20% amylose and 80% amylopectin, has the potential to be a good adhesive, high purity of solution, good gel strength and high adhesion.

2.2. Research procedure
Research procedures include preparation of raw materials, preparation of adhesive materials, and making briquettes.
Preparation of raw materials
In this process, the raw material is cut into small sizes, then dried in the sun until the water content is 12%, and then carbonized at 400°C.
Preparation of adhesive starch janeng
Umbi janeng was washed to remove cyanide poison, then diced and blended with the addition of 100 ml of aquadest. The janeng slurry is then heated to thicken.
Making briquettes
The filtered durian skin charcoal is mixed with starch janeng adhesive with a little water added while stirring until lumped. After the charcoal mixture is put into the mold to be dried in an oven at 600°C. The dried briquettes are then analyzed for the quality of the briquettes, namely calorific value, ash content and flame test.

3. Results and Discussion
3.1. Making Durian Skin Charcoal Briquettes
Durian skin is a potential organic waste and has the potential to be used as fuel. Durian skin is used as a basic ingredient in making briquettes, because of the high content of cellulose, hemicellulose and lignin [3]. In the durian season, the volume of durian coolers is abundant and not utilized, which keeps the occurrence of waste pollution. So, to increase its use, durian skin is made into briquettes as an alternative fuel.

The durian skin waste that will be used as briquettes is cleaned first and dried under the sun to be carbonized. The carbonization process is carried out using a kiln drum with limited air supply. Charcoal produced from carbonization of 100 kg of durian skin waste is 25 kg or 25%. Charcoal formed from the carbonization process is ground using a grinding machine to reduce the size of the charcoal particles. Charcoal powder is sieved with an 80 mesh sieve.

The adhesive used in this study is janeng flour. Tuber Janeng is a natural material that is easily obtained at low cost. Starch in janeng tubers is about 56-78% of dry weight [5]. The charcoal mixture with janeng adhesive is printed using a cylindrical mold (Figure 1). Drying is done in an oven at 600°C for 3 x 24 hours.

Figure 1. Briquette with a cylindrical shape.

3.2 Determination of Muta Durian Charcoal Briquettes with Adhesive of Janeng Starch.
3.2.1 The water content
Cylinder biobriquette moisture content (A1 and B1) has fulfilled specifications, namely 1.8% and 1.3% or less than 8%. Besides using particle size or 80 mesh looks biobriquette with lower water content compared to using a finer size (100 mesh)
This is because the biobriket of durian skin waste is in the form of silender without a shaft that has a smaller porosity or no shaft at all. So that evaporation of water from hollow briquettes is more than shape without shaft. Likewise with particle size, briquettes with 80 mesh particle size have greater porosity than 100 mesh particle sizes.

### 3.2.2 Burning Rate

The combustion rate is the amount of mass burning briquette time union. The combustion rate of briquettes is closely related to the rate of mass and temperature reduction.

Figure 3, shows the highest combustion rate of 1.3150 kg / min, while the lowest combustion rate is biobriquette at 0.625 kg / min. This is consistent with the results of study which states that one of the factors influencing the combustion process of solid fuels is the small size of solid fuel particles. With particles smaller in size, a fuel is said to burn faster [6]. The high calorific value in a biobriquette during the biobriquette combustion process will affect the achievement of high temperatures in the biobriquette, but the achievement of the optimum temperature is long enough. The fastest biobriquette combustion rate is in the composition of biomass which has a lot of volatile matter (volatile substances). The more volatile matter content of a biobriquette, the easier the biobriquette will burn, so the combustion rate will be faster. But in this study the levels of volatile substances were not measured.
4. Conclusion
The quality of charcoal briquettes with starch adhesive with an ice size of 80 m obtained water content smaller than 8% with the highest combustion rate of 1.3150 kg / min.

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