

PROCESSING PALM FRONDS INTO CHARCOAL BRICKETS AS AN ALTERNATIVE FUEL IN TONDUHAN VILLAGE – SIMALUNGUN

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Abstract

Oil palm frond waste is often ignored in Tonduhan Village, Simalungun Regency. These oil palm fronds are often left to dry by village communities without optimal use. So, through this community service, students and ITSU lecturers provide education regarding handling palm oil waste in an environmentally friendly manner and even with high economic value, namely processing palm fronds into charcoal briquettes that can be used for themselves and sold to increase the village community's income. The activity began by introducing the potential of palm oil and its waste which provide benefits and economic value. Then the community was invited to take part in making charcoal briquettes from palm frond waste. The village community was very enthusiastic in this activity. Their knowledge increases in processing frond waste and is very active in this activity.

Keywords: *waste, palm oil, briquettes, charcoal, economics*

1. INTRODUCTION

Indonesia has great potential in developing alternative renewable energy sources, especially through the use of biomass or organic waste materials. Biomass, such as wood waste, rice husks, straw, and others, has become a focus as an environmentally friendly alternative fuel. Currently, conventional energy sources such as oil, coal and gas face challenges in terms of availability and increasing prices, encouraging research and development of alternative energy. One form of biomass that attracts attention is oil palm fronds, which are abundant in many areas in Indonesia, including Tonduhan Village, Hatonduhan District, Simalungun Regency. In general, palm oil frond waste is ignored and left to dry without optimal utilization. However, through the initiatives taken, palm fronds were chosen as the main raw material for making charcoal briquettes. It is hoped that this step will not only reduce dependence on fossil fuels such as LPG and BBM, but also overcome the problem of agricultural solid waste which has not been managed well.

The process of making charcoal briquettes involves several stages, starting from drying the raw material to printing using a simple printing tool. Through a community service approach, the aim of this service is to provide education about the potential for utilizing palm oil frond waste into charcoal briquettes. Apart from that, this effort also aims to increase the community's knowledge and skills in utilizing the process of making charcoal briquettes as a source of additional income. The expected benefits of this service include educational and economic aspects, emphasizing the importance of using waste as a sustainable alternative energy source. The aim of this service is to provide information and training to the community about managing palm oil frond waste, as well as creating new business opportunities that can improve economic welfare of local communities while maintaining environmental sustainability.

Thus, the use of palm oil frond waste into charcoal briquettes is not only a solution in overcoming energy and environmental problems, but also a concrete step in building local energy security and improving the welfare of village communities in a sustainable manner.

2. IMPLEMENTATION METHOD

In facing the challenges of the availability and price of conventional energy sources, such as oil, coal and gas, research and development of alternative energy is becoming increasingly important. As a first step, the introduction explained the potential of biomass, especially palm frond waste, as a sustainable solution. This time we will discuss methods for utilizing palm frond waste into useful and environmentally friendly briquettes. The tools and materials for making briquettes from oil palm fronds are, Tools: 1). Matches, 2). mortar and pestle, 3). bucket, 4). strainer/sieve, 5). mold ($\frac{3}{4}$ inch PVC pipe), 6). frying pan, 7). hacksaw, 8). cutter knife, 9). machete and, 10). Shoela. Ingredients: 1).palm fronds, 2).tapioca flour and, 3).water.

How to make charcoal briquettes from coconut shell waste as follows: 1). Preparation of Raw Materials, The main ingredient used is palm fronds. Palm fronds are first dried in the sun for 1-3 days to reduce the water content. 2). Burning Coconut Fronds, Palm Oil Palm fronds are burned until all parts are burned, in order to burn them to facilitate the process of destroying the palm fronds themselves. 3). Destruction of palm fronds. Burned palm fronds are then placed in a mortar and ground until smooth. The fronds that have been pounded are then sieved using a sieve. 4). Making Adhesives, the process of making adhesives using starch mixed with water and then cooked over low heat so that all parts of the flour are mixed evenly. 5). Mixing the palm fronds with the adhesive. After the adhesive has finished cooking, put the adhesive into a container. The palm fronds have been ground and sifted beforehand. Then stir by hand until the two ingredients are perfectly combined. 6). Briquette molding process, the mixture that has been mixed perfectly is then put into a tube-shaped mold. Press the dough into the mold. Then press one of the mold holes until the briquette mixture comes out. 7). Dry the briquettes. The briquettes that have been printed are then arranged in a container which is then continued with the drying process by drying them directly under the hot sun.

3. RESULTS AND DISCUSSION

After discussing the potential for utilizing Biomass, especially palm frond waste, and explaining the methods used in this research, then explore the results and discussion that we have obtained. Through this preliminary stage, we realize the urgency in finding sustainable alternative energy solutions. The next step is to describe the results of our research, as well as conduct an in-depth discussion of the implications of these findings for waste management and energy utilization at the local level.

1. Collection of Briquette Raw Materials

Taking raw materials is the initial process in making briquettes. Here we take palm fronds that have just been harvested after 1-2 days so that they are easy to chop and get a high charcoal yield.



Figure 4. 1 Collection of Briquette Raw Materials

2. Chopping Palm Fronds

After that, we move on to the second stage, namely the process of chopping the palm fronds into 10-20 cm pieces, the aim of which is to speed up the drying process.



Figure 4. 2 Chopping palm fronds

3. Drying Palm Fronds

After that, we enter the third stage, namely drying, we carry out the process of drying the palm fronds on zinc and drying them in the sun for approximately 4-5 days.

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Figure 4. 3 Drying of Palm Oil Fronds

4. Burning Palm Fronds

After drying, the next step is to carry out the burning process by covering it with aluminum zinc. After drying, the next step is to carry out the burning process by coating it with aluminum zinc. This burning has its own technique, when burning palm fronds, their shape must be maintained. Don't burn this until it turns into ash, because it won't be used as raw material for making briquettes. Burn enough until the palm fronds are black like charcoal.



Figure 4. 4 Burning of Palm Oil Midribs

5. Refinement of Palm Oil Frond Charcoal

The next stage is the stage of refining the burnt product. In refining, it is recommended that the collected charcoal be crushed using a blender or barn pestle.



Figure 4. 5 Refining Palm Oil Midrib Charcoal

6.Sifting Charcoal from Palm Palm Fronds

The next stage is the process of sieving palm frond charcoal. After the charcoal has been ground, it is sieved to get the charcoal powder to become a raw material for charcoal briquettes.



Figure 4. 6 Sifting of Palm Oil Midrib Charcoal

7.Making Adhesive From Tapioca Flour

The next stage is making adhesive from tapioca flour. In this process, tapioca flour is cooked on a stove over low heat until it thickens and becomes clear like glue. The function of cooked tapioca is as an adhesive for later molding briquettes.



Figure 4. 7 Making Adhesives from Tapioca Flour

8.Mixing Charcoal Powder With Adhesive

Mixing charcoal powder with adhesive is a very important process. Mixing charcoal powder with adhesive has a ratio of 15% adhesive and 85% charcoal powder. This comparison is carried out in order to produce a briquette mixture that is suitable and easy to print.



Figure 4. 8 Mixing Charcoal Powder with Adhesive

9. Briquette Printing

The next stage is the briquette printing process. After the charcoal powder and adhesive are mixed, the ingredients are stirred until evenly mixed, after which the molding is carried out by pressing until it is solid. Briquette molding is done manually using a PVC pipe that has been previously cut to the desired size. When printing, you must pay attention to the density level of the briquettes, this is because the denser the briquettes produced, the better the quality obtained.



Figure 4. 9 Briquette Printing

10. Briquette Drying

The next stage is the briquette printing process. After printing, the final stage in this process is drying. The thicker and denser the printed briquettes, the longer the drying process will take, but the burning quality will be better. Drying can take 3-4 days until the briquettes are completely dry.



Figure 4. 10 Briquette drying

11. Briquette Trial

The briquettes have been made and after drying, we carry out a burning test. It can be seen that the burning briquettes have a good color and do not emit smoke. The burning time for our briquettes is around 25 - 35 minutes without the help of a fan or something similar. If assisted by a fan or blower, combustion lasts 90 -120 minutes.



Figure 4. 11 Briquette Trials

12. Budget

Table 4. 1 Cost Budget

No	Component	Proposed fees
1	Machete	Rp. 120,000.00
2	Match	Rp. 5,000.00
3	Hacksaw	Rp. 40,000.00
4	3/4 inch PVC pipe	Rp. 50,000.00
5	Grinding tool (mortar)	Rp. 240,000.00
6	Sieve	Rp. 10,000.00
7	Cutter Knife	Rp. 20,000.00
8	Shoela	Rp. 10,000.00
9	Wok	Rp. 35,000.00

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10	Bucket	Rp. 30,000
11	Tapioca Flour 5 kg	Rp. 70,000.00
12	Banner	Rp. 70,000.00
13	Certificate and frame	Rp. 100,000.00
14	Snacks	Rp. 200,000.00
Total		Rp. 1,000,000.00

4. CONCLUSION

With the Community Service Program (PKM) activities, palm oil frond waste which is usually just thrown away and ground up can be used to make goods of economic value, providing education and knowledge to the community regarding the use of palm frond fronds into charcoal briquettes so that later it can help the economy. and community income in Tonduhan Village.

SUGGESTION

Making charcoal briquettes provides knowledge to all communities. And it is hoped that after this Community Service (PKM) will be sustainable and the community will increase their interest in utilizing and processing palm frond waste into charcoal briquettes, so that they can increase their income and economy.

THANK-YOU NOTE

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