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POTENTIAL USE OF RICE HUSK WASTE IN CHARCOAL BRIQUETTE PRODUCTION IN KERTAMULYA VILLAGE

Fahrul Purnama[1]
[1]Universitas Singaperbangsa Karawang, Indonesia
fahrulpurnama15@gmail.com[1]

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Abstract

***Keywords**:*
rice husk, charcoal briquettes, alternative energy, sustainable environment.

Rice husk is an agricultural waste that is still not optimally utilized, even though it has great potential as a raw material for making charcoal briquettes. This service aims to assess the potential for utilizing rice husks as charcoal briquettes and educate the people of Kertamulya Village about the manufacturing techniques. The method used in this service is a descriptive method with a socialization approach and direct training to the local community. The process of making briquettes involves several stages, namely burning the husk using the pyrolysis method, mixing with natural adhesives, molding, and drying. The results of the experiment show that the composition of the material mixture and the right drying method greatly affect the quality of the briquettes produced. Briquettes with a ratio of 100 grams of aci, 1 kg of charcoal powder, and 400 ml of hot water gave the best results with stable combustion and long-lasting embers. In addition to contributing to the reduction of agricultural waste, this innovation also has economic value by opening business opportunities for the community. Therefore, the utilization of rice husk as charcoal briquettes can be an environmentally friendly and sustainable alternative solution in supporting energy security and the welfare of rural communities.

Abstrak

***Kata kunci**:*
sekam padi, briket arang, energi alternatif, lingkungan berkelanjutan.

Sekam padi merupakan limbah pertanian yang masih kurang dimanfaatkan secara optimal, padahal memiliki potensi besar sebagai bahan baku pembuatan briket arang. Pengabdian ini bertujuan untuk mengkaji potensi pemanfaatan sekam padi sebagai briket arang serta mengedukasi masyarakat Desa Kertamulya mengenai teknik pembuatannya. Metode yang digunakan dalam pengabdian ini adalah metode deskriptif dengan pendekatan sosialisasi dan pelatihan langsung kepada masyarakat setempat. Proses pembuatan briket melibatkan beberapa tahapan, yaitu pembakaran sekam dengan metode pirolisis, pencampuran dengan perekat alami, pencetakan, serta pengeringan. Hasil percobaan menunjukkan bahwa komposisi campuran bahan dan metode pengeringan yang tepat sangat mempengaruhi kualitas briket yang dihasilkan. Briket dengan perbandingan 100 gram aci, 1 kg serbuk arang, dan 400 ml air panas memberikan hasil terbaik dengan pembakaran stabil dan bara yang tahan lama. Selain berkontribusi dalam pengurangan limbah pertanian, inovasi ini juga memiliki nilai ekonomi dengan membuka peluang usaha bagi masyarakat. Oleh karena itu, pemanfaatan sekam padi sebagai briket arang dapat menjadi solusi alternatif yang ramah lingkungan dan berkelanjutan dalam mendukung ketahanan energi serta kesejahteraan masyarakat pedesaan.

INTRODUCTION

Rice husks are agricultural waste that is still underutilized. So far, this material has been used as fuel, livestock bedding, organic fertilizer, or simply discarded (Mastuti 2005). Students from the Community Service Program (KKN) at Singaperbangsa Karawang University (Unsika)

conducted community service in Kertamulya Village, Pedes District, Karawang Regency. One of the problems faced by Kertamulya Village is the large amount of rice husk waste, considering that the majority of the village's population works as farmers.

Rice husks are biomass that can be used as a material for making briquettes (Dahdah 2020). Briquettes are solid blocks that can be burned for use as alternative fuel or a substitute for fuel oil or wood derived from waste. According to Kinoshita (Siahaan et al., 2013), charcoal is a porous solid material formed through a high-temperature combustion process under carbonization conditions, which is incomplete combustion that causes the material to be carbonized without being oxidized. Most of the charcoal pores are still filled with hydrocarbons, tar, and other organic compounds. Charcoal briquettes can come in various shapes depending on the maker and the scale of production, namely squares, cylinders, hexagons, and perforated squares. When burned, these briquettes produce thin smoke (Wulandari et al. 2023). This is not much different from the statements of other researchers who state that charcoal briquettes are a form of solid obtained through a specific compression technique that is more environmentally friendly because it comes from biomass and does not produce toxic gas emissions that can damage the atmosphere (Wahid, Nurdin, and Amaliah 2021).

One of the community service programs in Kertamulya Village is making charcoal briquettes, utilizing abundant raw materials around the village, such as rice husks. These materials are processed simply and without the use of harmful chemicals, making them environmentally friendly and harmless to health. By utilizing local resources, this program not only helps reduce waste but also provides economic benefits for the villagers.

The potential for farmers to generate income other than from selling grain is enormous. The potential lies in converting rice husks into charcoal briquettes, both on a small scale and on a larger scale of production (Padapi 2022). Briquetting is carried out by pressing at a pressure of 300 kg/cm2 with a holding time of 1 minute (Pujasakti and Widayat 2018). This process not only improves the quality of alternative fuels, but also extends the burning time and reduces pollutant emissions. With the right technology and support from various parties, the production of rice husk briquettes has the potential to become a promising source of income while supporting environmental sustainability.

Based on the above explanation, the management of rice husk waste in Kertamulya Village is very important to pay attention to. By utilizing abundant rice husks as raw material for charcoal, it is hoped that this can provide an effective solution for the local community. This service aims to help the community overcome the problem of rice husk waste that has not been optimally utilized. Rice husks, which have been considered agricultural waste, can be processed into charcoal that has economic value, thus providing dual benefits for both the environment and the village economy. In addition, the use of rice husks as charcoal can also be an environmentally friendly alternative resource, reducing pollution and improving the welfare of farmers in Kertamulya Village.

METHOD

In the implementation method section, a concise and clear explanation must be provided regarding the steps used to achieve the objectives of the community service activity. The author also needs to include how the program's success is measured, either through a descriptive or qualitative approach, so that the results of the community service can be evaluated in a measurable manner (Nugroho, et al., 2025). This community service activity uses a qualitative descriptive approach with a participatory-educational method, which was carried out directly in Kertamulya Village, Karawang Regency. The activity was carried out in three main stages, namely socialization, technical training, and testing the production of charcoal briquettes from rice husks. The socialization was delivered at the Minggon Desa activity, aiming to provide the community with an understanding of the potential use of rice husk waste as an environmentally friendly and economically valuable alternative fuel. The training was

conducted directly at the village hall, involving the community in every stage of production, from burning the husks (pyrolysis), mixing charcoal powder with natural glue (tapioca flour), manual molding, to the drying process. Trials were conducted with various combinations of ingredients to obtain the best briquette formulation, as shown in Table 1. The success of the activity was measured descriptively through direct observation of community response and participation, technical success in producing briquettes that burned well, and residents' interest in developing this activity independently. The level of achievement was assessed based on changes in community attitudes towards waste management, the emergence of initiatives to produce briquettes, and the potential for their use in increasing local economic value.

RESULTS AND DISCUSSION

Kertamulya Village, an agricultural area in Karawang, produces large amounts of rice husk waste every harvest season. Until now, rice husks have often been burned, which not only pollutes the air but also wastes their potential uses.

On January 22, 2025, students participating in the Community Service Program (KKN) at Singaperbangsa Karawang University (Unsika), represented by a number of students, held a socialization event on making charcoal briquettes from rice husks in Kertamulya Village. This activity was carried out in conjunction with the Minggon Desa event and aimed to provide the community with an understanding of how to process rice husk waste into an environmentally friendly alternative fuel with economic value.

The training began at the village hall, where students immediately practiced the process of making charcoal briquettes from rice husks. The steps involved burning rice husks into charcoal using a simple pyrolysis method, mixing the charcoal with natural binders such as tapioca flour, and molding the briquettes using manual tools. The participants, consisting of villagers, village officials, and farmers, appeared very enthusiastic as they followed each step of the training.

Figure 1: *How to make charcoal briquettes*

Figure 1 shows the stages of the process of making charcoal briquettes from rice husks using a simple pyrolysis method. The initial step begins with burning rice husks to produce charcoal. The charcoal produced is then mixed with a natural adhesive in the form of tapioca flour, with a specific ratio between water, charcoal, and adhesive. After that, the mixture is manually molded into cylindrical briquettes, then dried in the sun to maximize the quality of the briquettes. This process involves the village community, who are very enthusiastic in following each stage.

Table 1. Results of Charcoal Briquette Production Trials

No	Experiment in making charcoal briquettes	Description
1.	A ratio of 10 cups of water to 100 grams of starch, a mixture of charcoal and adhesive in a ratio of 10:1.	The briquette is burning but not hot enough.
2.	A ratio of 10 cups of water to 200 grams of starch, a mixture of charcoal and adhesive in a ratio of 90:10.	The briquettes did not ignite because they were exposed to rain during drying.
3.	Ratio of 90 parts cement to 10 parts cold water, mixture of charcoal and adhesive 90:10	The briquette did not light at all.
4.	Mix 250 grams of starch with 5 cups of water, and a mixture of charcoal and adhesive in a ratio of 100:20.	The briquettes did not ignite because the adhesive was not mixed well and there was too little charcoal powder.
5.	Mix 500 grams of starch with 7 cups of cold water and charcoal.	The briquettes did not ignite because there was too much adhesive, causing them to turn gray.
6.	Comparison of 100 grams of starch with 1 kg of charcoal powder and a mixture of 400 ml of hot water	The briquette burns brightly with red embers and has a burning time of about 1 hour.
7.	A comparison of 300 grams of starch with 5 kg of charcoal powder and a mixture of 600 ml of hot water	Not yet tested, still in the drying process.

Table 1 shows the results of testing various mixtures of materials in the manufacture of charcoal briquettes. The experiment was conducted by mixing water, charcoal, and tapioca flour adhesive in different proportions. The results showed significant variations, where briquettes with a ratio of 10 cups of water, 100 grams of starch, and a 10:1 mixture of charcoal and adhesive could burn but produced less than optimal heat. In another experiment, mixtures with excessive amounts of adhesive or improper drying processes caused the briquettes to fail to ignite. Meanwhile, a mixture of 100 grams of starch, 1 kg of charcoal powder, and 400 ml of hot water produced briquettes with bright combustion and long-lasting embers, indicating that the ratio of ingredients and the drying method greatly affect the quality of the briquettes.

Making charcoal briquettes from rice husks is an environmentally friendly alternative for utilizing agricultural waste. The first step is to collect rice husks from the processing of grain. The rice husks used must be dry and clean in order to produce optimal briquettes. The rice husks are then burned in a special furnace to produce charcoal. The burning process must be carried out carefully so that the husks are not completely burned, but rather produce sufficiently dense charcoal.

After the rice husks are burned into charcoal, the next step is to crush the charcoal into powder. This charcoal refining process can be done using a grinding machine or manually. Fine charcoal powder makes it easier to mix with other ingredients. At this stage, the charcoal powder is mixed with natural binding agents such as tapioca flour or starch dissolved in water. The mixture becomes a dough that can be shaped into briquettes.

Briquettes are molded using cylindrical or block molds as needed. The mixture of charcoal and binding material is pressed into the mold with a certain amount of force to produce dense briquettes that do not crumble easily. After molding, the briquettes need to be dried for a long time to reduce their moisture content. Drying can be done by sun drying or using a special drying device.

Dried briquettes are ready for use in a variety of applications, such as alternative fuel for cooking, industrial combustion, or other activities that require renewable energy sources. Making charcoal briquettes from rice husks not only reduces agricultural waste, but also reduces dependence on fossil fuels, making it a more environmentally friendly and sustainable option.

In addition to teaching how to make briquettes, the students also explained the economic and environmental benefits that can be gained from using charcoal briquettes. Processing rice husk waste not only helps reduce pollution, but also opens up new business opportunities for villagers. The head of Kertamulya Village also expressed his appreciation for the initiative taken by the Unsika KKN students.

Figure 2: *Charcoal briquette socialization*

Through this outreach program, Unsika KKN students introduced a simple technology that allows rice husks to be processed into charcoal briquettes. These briquettes can be used as an alternative fuel for cooking or as a substitute for charcoal, providing an environmentally friendly solution while increasing economic value for the local community.

From the socialization that was carried out, processing rice husk waste into charcoal briquettes is an innovative solution that not only helps reduce pollution but also has great economic potential for the local community. The charcoal briquettes produced can be used as a more environmentally friendly alternative fuel while opening up new business opportunities in the energy sector. It is hoped that the results of this socialization can be applied sustainably to provide long-term benefits for the people of Kertamulya Village.

CONCLUSIONS

Based on the outreach and socialization efforts that have been carried out, the use of rice husk waste as raw material for charcoal briquette production in Kertamulya Village has enormous potential, both economically and environmentally. Rice husks, which were previously considered waste, can now be processed into an environmentally friendly and economically valuable alternative energy source. The results of the experiment show that the ratio of raw materials and the appropriate drying method greatly affect the quality of the briquettes produced.

In addition to providing solutions for agricultural waste management, this program also opens up business opportunities for the local community, especially farmers, to increase their income. Support from various parties, such as the government, academics, and the community, is essential for this innovation to develop sustainably. Thus, the use of rice husks as charcoal briquettes not only helps reduce environmental pollution but also supports energy security based on local resources and improves the welfare of the Kertamulya Village community.

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this program. Hopefully, the knowledge that has been shared will be useful to the community and assist in more productive and sustainable agricultural waste management.

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