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INCREASING THE VALUE OF WALNUT SHELL (*Canarium ovale*. L.) WASTE BECOME AROMATHERAPY BRIQUETTES AND ANTI MOSQUITO ON TERNATE ISLAND

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Abstract: The purpose of this activity is to introduce the technology of making briquettes to the women of dasawisma, Tarau Village, on the Ternate Island by utilizing walnut shell waste. Community partnership program is college results implementation of Flagship Research 2018 about biobriquette design from walnut shell waste based research studies the value of heat and variations of the adhesive. Output to be achieved was community can entrepreneurship in alternative energy and anti-mosquito so family welfare can be improved. The results of the community dedication program that have been done are as follows: from the aspect of applying science and technology, the briquette product produced is very effective for building community independence based on local potential namely the use of walnut shell as a local fuel and mosquito repellent with the equivalent SNI quality of coconut shell briquettes. Variation with addition of lavender leaves, dry clove stalk and nutmeg skin increases the use value of walnut shell briquettes to become one of the aromatherapy briquettes and anti-mosquito ingredients which increased people's preference for walnut shell briquettes. Walnut shell briquettes are popular and have economic potential to be marketed as alternative fuels.

Keyword: *briquettes, mosquito repellent, Ternate Islands, walnut shells*

Abstrak: Tujuan kegiatan ini adalah untuk memperkenalkan teknologi pembuatan briket kepada ibu-ibu dasawisma, Kelurahan Tarau, di pulau Ternate, dengan memanfaatkan limbah tempurung kenari. Program kemitraan masyarakat ini merupakan implementasi dari hasil penelitian Unggulan perguruan Tinggi (PKUPT) tahun 2018 tentang Pradesain Biobriket dari limbah tempurung kenari berbasis riset kajian nilai kalor dan variasi perekat. Target luasan yang diharapkan antara lain masyarakat dapat berwirausaha bidang energi alternatif dan antinyamuk sehingga kesejahteraan keluarga dapat ditingkatkan. Hasil dari program pengabdian masyarakat yang telah dilakukan ini adalah sebagai berikut: dari aspek penerapan iptek produk briket yang dihasilkan sangat efektif untuk membangun kemandirian masyarakat yang berbasis potensi lokal yakni pemanfaatan tempurung kenari sebagai bahan bakar lokal dan antinyamuk dengan kualitas setara standar SNI briket tempurung kelapa. Variasi penambahan daun lavender, gagang cengkeh kering dan kulit pala meningkatkan nilai guna briket tempurung kenari menjadi salah satu briket aroma terapi dan bahan antinyamuk yang meningkatkan preferensi masyarakat terhadap briket tempurung kenari. Briket tempurung kenari diminati masyarakat dan memiliki potensi ekonomi untuk dipasarkan sebagai bahan bakar alternative.

Kata Kunci: *anti nyamuk, briket, pulau Ternate, tempurung kenari*

Introduction

Energy scarcity is a trend in recent times besides global warming. Reduced reserves of fuel oil derived from fossils, provides opportunities for the development and utilization of alternative energy sources (green energy). One of the main ingredients of alternative energy sources is plant biomass that is renewable. Biomass is a natural material that is considered waste and is often destroyed by burning. Walnut shell is a biomass from post-harvest canary seed products on the island of Makian, North Maluku. One of the uses of biomass as an alternative fuel is to make it into a bioarang briquette.

North Maluku is one of the centers of walnut plants (*Canarium indicum*. L) in Indonesia. On the island of Makian, these plants are abundantly distributed as forest plants. Walnut plants are native to Indonesia and have the potential to be developed as food and medicinal products. Utilization of walnut plants by the local community to date has only been on the walnut seeds part that are used as food, cake spices and cooking ingredients. Meanwhile, walnut skin waste and shells are not utilized. Walnut skin and shell are the main sources of lignocellulose which have the potential to produce renewable energy based on biomass utilization.

Meanwhile the energy needs of fuel oil have increased along with the rate of human population growth and the world economy. In Indonesia, based on the Blue Print of National Energy Management 2006-2025 released by the Ministry of Energy and Mineral Resources (ESDM), Indonesia's energy policy has a target that by 2025 it will achieve a reduction in the role of petroleum to 26.2%, natural gas increased

to 30.6%, coal increased to 32.7% (including coal briquettes), geothermal energy increased to 3.8%, and renewable energy increased to 15% (Anonymous, 2007). The government also targets that in 2016 the use of biofuel can reach 5%. One example of biofuels is biobriquette.

Biobriquette is a type of solid fuel made from biomass raw material with mixture of little adhesive. Biomass in daily life is a biological material which is usually considered as garbage and is often destroyed by burning (Triono, 2006). According to Adam (1998) in Sari (2011) the benefits of using charcoal briquettes include, the cost is cheaper than oil or wood charcoal, charcoal briquettes have a much longer burning mass, the use of briquettes is relatively safer, briquettes are easy to store and move, no need to repeatedly fan or add to the new fuel. With these advantages, the role of charcoal briquettes as an alternative fuel has been recognized in various countries.

So far, the type of briquette from coconut shell charcoal is one of the favorite alternative energy sources and is in high demand by both domestic and export markets. Briquettes as an export commodity must have stable quality and be able to fulfill quality requirements of SNI 06-3730-95 (Anonymous, 1995). Biobriquette made from coconut shell and other similar materials is one form of renewable energy that is feasible to be developed in Indonesia. One type of coconut shell material that has potential to be developed into biobriquette in North Maluku is walnut shell waste.

Sundari's research results, et al (2018) showed that walnut shell waste has the potential to be used as raw material for making briquettes. The quality of the coconut shell briquettes and walnut shell has the same quality. Through the technology transfer program for making walnut shell briquettes with a variety of aromatherapy and anti-mosquito, aims to produce briquette products and build a model for briquette making technology based on Khairun University College Flagship Research. In addition, this program is expected to be able to produce competency outcomes for the people of Ternate to develop home-scale briquettes. Outputs of this program: 1) high-quality and innovative walnut shell briquette products with a variety of herbs aromatherapy and anti-mosquito; 2) the competence of the briquette craftsman community.

Materials and Method

The method used in the implementation of community dedication program is the Participatory Activity and Learning System (PALS). This method is one of the goal empowerment methods which is part of PLA (Participatory Learning And Action). With this method, the target community is treated as a subject as well as an object in this community dedication program. In the PALS method, community capacity building is carried out using various models, including education, training, counseling, as well as coaching and assisting in making walnut shell briquettes with a variety of aromatherapy and anti-mosquito (Wijayanti, 2011).

The steps of activities in the PALS method include the awareness stage, the capacity building stage, and the institutionalization stage. In applying the PALS method, this service integrates awareness, capacity building, and mentoring, for the stage of institutionalization to the community in the Tarau subdistrict of the island of Ternate has not been implemented. This program is carried out for 8 months, from March to October 2019.

Result and Discussion

A. Result of Briquette Making Training

The results of the briquette making training are part of the community awareness and capacity building stage to produce standard briquette making procedures and a variety of aromatherapy and anti-mosquito briquette products made from walnut shells. The training activities for making walnut shell briquettes and introducing technology to partner communities have been carried out with the following steps:

1. Production of walnut shell charcoal

The process of carbonizing a walnut shell using the following work techniques: clean walnut shell is arranged inside a metal drum and closed tightly then burned until the shell is black and becomes charcoal.



Figure 1. The process of making walnut shell charcoal

2. Making charcoal powder

Walnut shell charcoal is mashed by means of a pulverizer, then sifted with a mesh of 50 to get the charcoal powder.



Figure 2. Walnut shell charcoal powder

3. Mixing

Fine sifted charcoal powder by using 50 mesh sieves each weighed as much as 1 kg, mixed with as much as 100 grams of adhesive that has been dissolved in 100 ml of water. The adhesive used is starch or tapioca.



Figure 3. The process of mixing charcoal powder and adhesives

4. Biobriquette printing and drying

Printing is done after the mixture is well mixed, then printed with manual briquette printing equipment by inserting the briquette mixture into 8 print holes then pressed. once printing produces 8 pieces of cylindrical charcoal briquettes.



Figure 4. Printing and drying walnut shell briquettes

Briquette molds sun dried and free air for 1-2 days, followed by product packaging



Figure 5. Packaging of briquette products

5. Variation of briquette additives

Some variations of additives in aromatherapy and anti mosquito briquettes are dry clove stalk, dried nutmeg, leaves and lavender flowers.



Figure 6. Additional ingredients for briquette product variations

B. Results of Consumer Response to Briquette Products

The next stage is the development of walnut shell briquette products based on variations of consumer preferences. In this process, variety of walnut shell briquette products are developed, i.e. herbs aromatherapy, anti-mosquito and original briquettes. Product test based on the results of an analysis of consumer preferences in the city of Ternate as shown below:

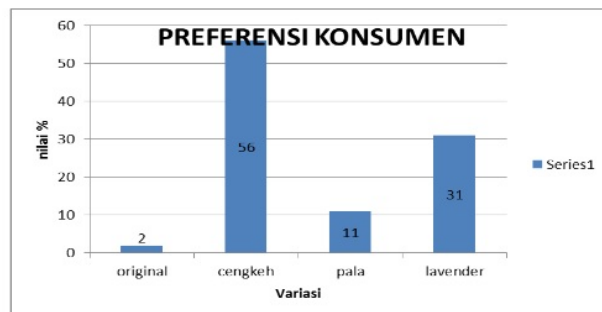


Figure 7. Consumer preferences for variations of walnut shell briquette products

Walnut shell briquette products that are varied have the highest value of consumer preferences is the variation of clove briquettes (aromatherapy). Furthermore, variations in lavender briquettes (anti-mosquito). Non-flavorful original walnut shell briquettes are less favored by consumers.

C. Program Evaluation Stage

Socialization phase with partners has been carried out through the collaboration of collecting walnut shells and making prototype models for procedure of making walnut shell briquettes. Furthermore, briquette product socialization was conducted to PKK women as prospective briquette craftsmen in the Tarau village which were held on August 20, 2019 to the target group of briquette craftsmen. The results of biobriquette making socialization to the target community indicate that the

transfer of biobriquette making technology from the walnut shell is a new information and new things that are easy and inexpensive to implement; Walnut shell briquettes have the potential to be developed with variety of products. The results of the feedback analysis of the target partner respondents in the Tarau village are shown in Figure 8.

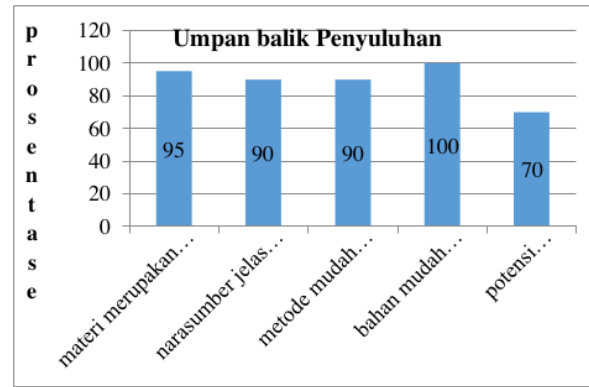


Figure 8: Respondent Feedback

Generally, socialization activities of making walnut shell briquettes can be accepted by the target partners, in this case women of PKK in the village of Tarau, North Ternate. Community partnership programs in making walnut shell briquettes that are varied with the addition of herbs aromatherapy and anti-mosquito can increase the economic value and added value of walnut shell waste. Technology of making briquettes from walnut shells can be applied by people on Ternate Island.

Analysis of respondent feedback found that people in the Tarau sub-district and in Ternate generally could accept the presence of walnut shell briquette products as an alternative fuel oil. Biobriquette has a lower ignition temperature and a shorter burn out time compared to coal briquettes.

When the briquette is heated the temperature rises, after reaching a certain temperature, volatile matter comes out and burns around the briquette. This temperature is called the flame temperature. The flame temperature drops if there is more biomass mixture (Naruse, 2001). According to Ketaran (1980), charcoal is a porous solid material and is the result of combustion from materials containing element Carbon. Most of the pores are still covered with hydrocarbons, and other organic compounds. Its components consist of "fixed carbon", ash, water, nitrogen and sulfur.

In the industrial field there are various types of charcoal that are related to their manufacture and use. charcoal is produced from burning raw materials that contain carbon. Furthermore it is known that the product development of walnut shell briquettes has market potential based on consumer preferences (Sundari, et al, 2019). Variations of walnut shell briquette products with aromatherapy of clove and nutmeg as well as anti-mosquito lavender extract have the highest consumer preference. One consideration of a product's business planning is a factor in the level of consumer preferences for a product. Level of consumer preference is one of the business opportunities in business planning.

Based on elaboration of partnership program's implementation result and research related to the development of walnut shell briquette products, it can be seen that the walnut shell briquette is an alternative development of bio energy that has quite promising economic potential for the people of Ternate island, especially the aromatherapy and anti mosquito variant products.

Conclusion

Based on the results and discussion in this partnership program, it can be concluded as follows: In general, partner communities can accept technology for making walnut shell briquettes and briquette products have the potential to be developed based on analysis of consumer preferences for briquette products. Walnut shell biobriquette products and their product variations have the economic potential

to be developed become business ventures based on the factors of easy technology level, availability of raw materials and the level of people's preference.

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