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THE UTILIZATION OF CORNCOB CHARCOAL BRIQUETTES AS A FUEL SOURCE FOR HOUSEHOLD NEEDS

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Abstract

This initiative aimed to address the issue of post-harvest corncob waste and the community's dependence on fossil fuels in Bibiosi Village, Keerom Regency. Through training on the production and utilization of charcoal briquettes from corncob waste, this community service program focused on improving energy efficiency, reducing household expenses, and fostering biomass-based entrepreneurship. The methods employed included socialization, technical training on briquette production (drying, carbonization, molding), and application testing in cooking. The test results indicated that the charcoal briquettes were capable of boiling 1 liter of water in 15 minutes and 10 seconds at an average temperature of 442°C, grilling 20 chicken skewers in 18 minutes and 12 seconds (438°C), and roasting 8 fish in 24 minutes and 35 seconds (429°C). These briquettes produced minimal smoke, left no soot, and were more economical than conventional fuels. In conclusion, corncob charcoal briquettes have the potential to serve as a sustainable solution for household energy and agricultural waste management.

Keywords: Charcoal Briquettes, Corncob Waste, Alternative Energy, Community Service, Keerom Regency

INTRODUCTION

Keerom Regency has been designated as a National Food Barn, with corn as its primary crop. However, post-harvest corncob waste (Fig. 1) has not been optimally utilized and is often either burned or discarded, leading to environmental pollution (Khumaini et al., 2020). Meanwhile, the community's reliance on petroleum-based fuels and firewood has contributed to deforestation and increased living costs (Tarigan et al., 2019).

To process corncobs into derivative products, farmers and local communities often prefer to dispose of this waste by burning it (Tarigan et al., 2019). Therefore, it is necessary to conduct socialization and training programs for farmers on processing corncob biomass waste into charcoal briquettes. These briquettes can serve as an environmentally friendly alternative fuel, capable of reducing carbon emissions and organic waste (Irmawati, 2020).

This community service initiative aims to: (1) Train the community in converting

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corncobs into charcoal briquettes, (2) Demonstrate the use of briquettes as household fuel, and (3) Promote biomass-based entrepreneurship.

Figure 1. Corncob Waste

IMPLEMENTATION METHOD

This community service program was conducted in Bibiosi Village, Arso District, Keerom Regency, involving local farmer groups. It serves as a continuation of the corncob charcoal briquette production initiative introduced to the Bibiosi Village community in 2023.

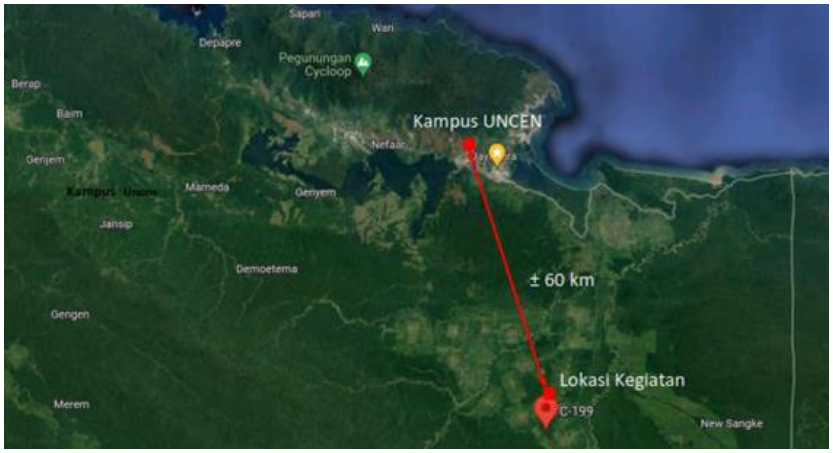

Figure 2. Map of the Community Service Program Location

In the 2024 program, the focus shifted to utilizing biomass charcoal briquettes derived from corncob waste as an alternative fuel for various cooking and other domestic applications. The methods employed in this program included:

1. Charcoal Briquette Production Training: Community members were trained in processing corncobs into charcoal briquettes through drying, carbonization, grinding, mixing with a binder, molding, and drying.
2. Briquette Utilization Testing: The produced briquettes were tested for boiling water, grilling fish, and roasting chicken skewers. The burning time and temperature were recorded to

evaluate the briquettes' efficiency.

3. Impact Evaluation: The economic and environmental impact of briquette usage was assessed through interviews and direct observation.

The target participants for the briquette fuel production training included youth groups, women's organizations (PKK), and the general public in Bibiosi Village. Bibiosi Village, Arso, Keerom Regency, is located approximately 60 km from the Uncen Waena campus, with an estimated travel time of about 1.5 hours by four-wheeled vehicle.

RESULTS AND DISCUSSION

The community service program "Utilization of Corncob Charcoal Briquettes as Fuel for Household Needs" was successfully conducted in Bibiosi Village. The event took place on August 13, 2024, in Bibiosi Village, Arso District, Keerom Regency, and was attended by village officials, farmer groups, housewives, and youth organizations (Figure 3).

Figure 3. Participants of the Community Service Program at the Bibiosi Village Head Office, Arso, Keerom Regency

This program was implemented through counseling and outreach activities to promote the utilization of corncob biomass briquettes as an alternative household fuel for the residents of Bibiosi Village, Arso. After receiving theoretical knowledge on corncob waste processing, participants observed a demonstration of briquette usage in cooking to ensure its sustainable application in daily household activities, as shown in Figure 4.

Figure 4. Training and Demonstration of Briquette Utilization for the Community in Bibiosi Village

The community service program in Bibiosi Village, Arso District, Keerom Regency, yielded highly satisfactory results. Several community groups successfully participated in both the theoretical presentations and practical cooking demonstrations, including boiling water, grilling fish, and roasting chicken skewers. The key achievements of this training are as follows:

1. Utilization of corncob charcoal briquettes for cooking: The briquettes were used for boiling water, grilling fish, and roasting chicken skewers. The briquettes reached an approximate temperature of ±432°C, enabling rapid cooking times while producing minimal smoke emissions during combustion.
2. Superior characteristics of the briquettes: The briquettes are cost-effective and economical, with a high calorific value of 5,933 Cal/g (based on proximate analysis conducted in 2022). Their continuous and stable burning properties make them ideal for extended cooking durations. Moreover, they pose no risk of explosion or fire hazards, unlike kerosene stoves or liquefied petroleum gas (LPG) stoves.
3. Abundant and eco-friendly raw materials: The briquettes are produced from widely available agricultural waste, making them a sustainable alternative. The production process involves no chemical additives, ensuring their safety for grilling fish and skewers.
4. Shifting community behavior towards sustainable energy sources: The initiative has encouraged local farmers and households to reduce their dependence on fossil fuels and transition to biomass-based briquettes. The agricultural potential in Bibiosi Village can be optimized to produce alternative fuels, replacing conventional energy sources.
5. Economic value and income generation: The conversion of agricultural biomass into charcoal briquettes presents a viable economic opportunity. This initiative can foster independent entrepreneurship or be developed as a village-based collective enterprise for commercial briquette production.
6. Reduction in household fuel expenses: The use of corncob charcoal briquettes significantly lowers household expenditures on fuel consumption.

7. Potential for academic dissemination: The findings from this community service program can be published in reputable journals and books to contribute to academic discourse and further research in renewable energy applications.
8. Policy recommendation: The outcomes of this initiative can be submitted as a formal recommendation to the Village Community Empowerment Office of Keerom Regency, advocating for broader adoption and institutional support for biomass-based energy solutions.

The data in Table 1 highlights the excellent performance of corncob charcoal briquettes in cooking applications. Boiling 1 kg of water required only 15 minutes and 10 seconds at an average temperature of 442°C. Roasting chicken skewers took 18 minutes and 12 seconds, while grilling fish required 24 minutes and 35 seconds. The briquettes maintained stable heat throughout the cooking process and emitted minimal smoke, making them an environmentally sustainable fuel alternative.

Table 1. Performance Data of Corncob Charcoal Briquettes

No	Type of Food	Weight of Food (kg)	Weight of Briquettes (kg)	Cooking Duration (minutes)	Briquette Temperature (°C)	Cooking Utensil
1	Boiling Water	1	0.5	15:10	442	Kettle
2	Grilling Fish	1	0.5	24:35	429	Grill
3	Roasting Chicken Skewers	1	0.5	18:12	438	Grill

CONCLUSION

This community service program successfully educated the local community on utilizing corncob waste as an alternative fuel in the form of charcoal briquettes. The corncob charcoal briquettes proved to be efficient for cooking, environmentally friendly, and economically promising. Additionally, this initiative reduced the community's dependence on petroleum-based fuels and firewood while creating new entrepreneurial opportunities in charcoal briquette production.

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