

**SOCIALIZATION OF THE APPLICATION OF WASP NEST
BRIQUETTE TECHNOLOGY FROM LOCAL SAGO WASTE IN
YAKONDE VILLAGE, WAIBU DISTRICT, JAYAPURA REGENCY**

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Abstract

Yakonde Village in Waibu District boasts abundant natural food resources, including sago palms (*Metroxylon sagu* Rottb), which grow wild throughout the lowlands. The potential for local raw materials, such as sago pulp waste, is enormous, but only a small portion is used for fuel briquettes. Therefore, empowerment and development strategies are needed for local communities, aiming to provide training in utilizing this waste. Through this outreach, local communities can create alternative fuels from this waste, thereby reducing dependence on fossil fuels and addressing fuel shortages. Sago pulp waste is a product that can increase local income by turning it into charcoal briquettes.

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

INTRODUCTION

Yakonde Village in Waibu District has abundant natural food resources, one of which is the sago palm (*Metroxylon sagu* Rottb), which grows wild throughout almost all of its lowlands. The potential for local raw materials in the form of agricultural, plantation, and agro-industrial waste is enormous, but only a small portion is used as fuel for briquettes.

One potential local food is sago, a rice substitute. Sago (*Metroxylon sagu* Rottb) is one of the most promising carbohydrate-producing crops to support Indonesia's food security program. This large amount of waste has not been utilized properly and is simply left to accumulate in sago flour processing facilities, causing environmental pollution. Therefore, empowerment and development strategies are needed, including the introduction of technology.

According to PT ANJAP, an average of 30 sago trees per hectare (ha) are ready for harvest each year. Therefore, with Papua's 5.2 million hectares of sago plantations, the potential for sago flour production could reach 15.6 million tons per year. By Joko Sugiarsono, ANJAP, the Pioneer of the Papuan Sago Industry.



Figure 1. Sago Trees in Yakonde Village, Waibu

According to Bintoro, sago starch can be processed into noodles, cakes, meatball mixes, and sausages. The vermicelli industry in Cirebon, West Java, has also long used sago. Meanwhile, in the global market, sago starch is in demand in Japan, which has been importing sago from Malaysia. "From a health perspective, sago flour is also gluten-free, making it suitable for consumers with special needs."

Sago is in demand in Japan, which has been importing it from Malaysia. "From a health perspective, sago flour is also gluten-free, making it suitable for consumers with special needs," he said. "The potential for local raw materials in the form of agricultural, plantation, and agro-industrial waste is enormous, but only a small portion is used as fuel for briquettes. This large amount of waste has not been utilized properly and has simply been left to pile up in sago flour processing facilities, causing environmental pollution. Therefore, an empowerment and development strategy is needed, including the introduction of technology." (Oswan Kurniawan 2008).

Purpose and Benefits of Community Service

1. The purpose of this community service is to provide training to the community, particularly the Yakonde village community in Waibu District, which lives on the shores of Lake Sentani. This community service is the largest producer of sago. Therefore, the abundant sago pulp waste can be utilized as an alternative energy source.
2. Reducing dependence on fossil fuels.
3. The benefits of this community service include reducing environmental pollution and reducing energy needs.

IMPLEMENTATION METHOD

Priority Problems

Several problems identified in the community, particularly in Yakonde Village, Waibu District, Jayapura Regency, are as follows:

1. The accumulation of sago pulp waste from sago processing, which they sell, around rivers and streams.
2. Sago processing waste is categorized as wet by-products because it still contains 70%–80% water content, which can quickly deteriorate if not processed immediately.
3. Environmental pollution, acidification of the soil, and unpleasant odors.
4. Lack of technical knowledge among rural sago farmers regarding the potential economic value of sago pulp waste.
5. Difficulty obtaining fuel oil and its relatively high price.
6. Most Yakonde villagers still use firewood from sago palms and other nearby trees for cooking.
7. This local potential can be used to convert wasp nest briquettes into alternative energy.



Figure 2. Sago Waste, Yakonde Village, Waibu District

Solutions

1. There is a need for public awareness and technology transfer to the community regarding the potential utilization of abundant sago pulp waste into energy with high economic value.
2. There is a need for training on the management of sago pulp waste processing businesses for fuel and ruminants.
3. Utilizing waste as an environmentally friendly alternative energy source can be processed into charcoal briquettes that can be used as fuel for cooking or other purposes.
4. There is a need for supervision and technology transfer on how to convert abundant sago pulp waste into energy with high economic value.
5. There is a need for training on the management of sago pulp waste processing businesses for fuel briquettes and ruminants.
6. Providing Alternative Energy: Sago pulp briquettes can be an alternative to fossil fuels such as kerosene, which is more environmentally friendly because it does not produce significant greenhouse gas emissions.
7. Waste Reduction: This activity helps reduce sago pulp waste, which is often discarded, thus addressing environmental issues.
8. Income Enhancement: Communities can sell sago pulp briquettes as a valuable product,

thereby increasing their income.

RESULTS AND DISCUSSION

Community Service Results

- a. Community service was conducted in Yakonde Village, Waibu District, Jayapura Regency, approximately 32 km from the Uncen campus. The activity was carried out from June to August 2025.
- b. Results: This community service was attended by 18 people, including the village head, village secretary, tribal chief, RW II/IV, RT II and IV, and the community, along with local students. The community was divided into four groups to foster collaboration in briquette production and to allocate tasks among members.
- c. During this community service, four briquette stoves, each measuring 5 inches, were distributed, according to the number of groups. An example of a stove is shown below.



Figure 3. Sago Waste, Yakonde Village, Waibu District

The stoves distributed were handed over to the village head. Preliminary research has been conducted on the heat output, height, and diameter of the briquettes, ensuring their use by the Yakonde community. The stoves can be fueled by the community, utilizing the available sago waste.

Introduction to Tools and Technology

Participants were introduced to the components of the tools needed or used to make wasp nest charcoal briquettes:

- a. Charcoaling reactor which is closely related to the biomass pyrolysis process to produce biochar and other products in a controlled environment, Charcoaling reactor functions as a tool to decompose biomass organic matter through thermal decomposition to produce carbon-rich, lightweight, and highly porous biochar.



Figure 4. Reactor, Authoring tool

- b. Hydraulic Press This tool is very simple to use to press carbon-rich organic materials, such as charcoal, sawdust, rice husks, or other agricultural waste, into dense and regular briquettes without the need for electricity. This tool operates with a lever or a pump system to press the briquette mixture into the mold, and is available in various designs, sizes, and capacities to suit the needs of individuals or small businesses.
- c. Honeycomb briquette molding tools and other mold shapes are used from iron with a size of 5 inches or according to the desired size. There are various forms of hexagonal, cylinder, box and honeycomb briquette molds

Stages of making wasp nest briquettes

- a. Drying sago waste
Drying sago waste is done using direct sunlight. Drying takes about 2 or 3 days, exposing the processed sago waste to direct sunlight. During drying, the waste is frequently turned over to ensure even drying. This drying process reduces the moisture content of the sago waste so that it can be sifted to separate long fibers and impurities from smaller fibers. Separate coarse and fine fibers and sort the sago waste to ensure no other materials are present.
- b. Authoring Process
Put the dried sago dregs into the reactor, then put small pieces of wood in the middle pipe of the reactor, pour in a little kerosene and light it on fire, wait until it burns and the embers spread throughout. Close the reactor so that there is not a lot of oxygen in the reactor, because it can affect the quality of the carbon. During the burning process, you can see if the smoke is no longer clumping or without the white smoke showing that black carbon has formed.
- c. Grinding
Crush the resulting carbon using a crusher, or grind it, then sieve it according to the sieve size.
- d. Mixing the carbon and adhesive
Weigh 1 kg of sifted carbon into a bowl, then weigh 1 liter of water, equivalent to 1 kg, and add it to a saucepan. Then weigh 100 grams of tapioca starch into the pan filled with water. Cook on the stovetop, stirring constantly throughout the adhesive process, until a clear gel forms.
Let it cool and clump together. Pour it into the bowl containing the carbon, and stir it by

hand until it combines with the adhesive.

e. Molding and Drying

Insert the carbon mixed with adhesive into the mold. Press to the desired pressure, then dry in the sun until dry and light. This reduces the water content in the briquettes.



Figure 5. Printing and Drying Results

Achievements

Achievements of this community service:

1. Through this outreach, the Yakonde Village community learned about the use of sago pulp as an alternative fuel, learned about large 5-inch wasp nest briquettes, and how to make charcoal briquettes.
2. They learned about the tools used in briquette making, which are readily available and very inexpensive. Used materials can be sourced from local sources.
3. Making wasp nest briquettes is very easy; you can use straight 5-inch PVC pipe joints or from plates shaped like a wasp nest.
4. Reduced accumulation of sago pulp waste, environmental pollution of soil and water, and unpleasant odors.
5. Using briquettes from sago pulp waste can save household expenses. Furthermore, if developed
6. Opening up opportunities for small, group-based industries to develop briquette production from sago pulp waste.
7. This community service is expected to be an initial initiative to encourage the Yakonde village community in Wabui District, Jayapura Regency, to process their sago pulp waste into charcoal briquettes for a useful and beneficial use.
8. Charcoal briquettes produced from sago pulp waste can be used as a learning resource (real teaching) for the educational sector, in order to realize research-based education.

CONCLUSION

The results of the community service conducted in Yakonde Village, Waibu District, Jayapura Regency can be summarized as follows:

1. Through this training, participants realized that sago waste can be used as an alternative fuel in the form of 5-inch charcoal briquettes for cooking, which can be used for 3 to 4 times. These charcoal briquettes are very safe to use because they produce less smoke.
2. During this community service, participants were introduced to and explained the components of the equipment used to make 5-inch wasp nest charcoal briquettes. The only materials required are a straight pipe connection and a hydraulic jack formed into a press.
3. These briquette stoves have been tested in research, so four briquette stoves were distributed to each group of participants so they can make 5-inch briquettes or other shapes and sizes, aiming to utilize local potential and reduce environmental pollution.

Recommendations

1. The potential of sago pulp waste in Yakonde Village, Waibu District, should be utilized and processed into alternative fuel, thereby reducing the use of petroleum.
2. The substantial potential of sago pulp waste produced in Yakonde Village, if processed into charcoal briquettes, could become a creative economic prospect, increasing the community's income.
3. The Jayapura Regency government should pay attention to villages with potential sago pulp waste by providing assistance with briquette-making equipment so that the community can be empowered to improve their economy and establish independent businesses.

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