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Development of Biogas Plant and Mushrooms Grumpy in a Biomass Waste Utilization Facility at Tadukan Raga Village, STM Hilir District, Deli Serdang Regency

Rivaldi Sidabutar[*1], Bambang Trisakti[1], Farida Hanum[1], Maya Sarah[1], Mersi Suriani Sinaga[1], Yenny Natasya[1], Renata Ambarita[1], Gloria Clarita Sinamo[1]
[1]*Faculty of Engineering, Universitas Sumatera Utara, Medan, 20155, Indonesia*
[*]Corresponding Author: rivaldisidabutar16@gmail.com

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ABSTRACT
Community service is a form of movement in making a real contribution to society which aims to provide solutions to real problems that occur in society. Most of the Indonesian population still relies on the agriculture, plantation and livestock sectors to drive the economy. By-products in the form of waste are generally used as fertilizer which can actually be used as an alternative energy source. Biogas is a renewable energy produced through the process of anaerobic digestion of organic materials which is currently widely used by the community as an alternative energy to replace LPG for cooking and generator fuel to produce electricity. One of the utilization of non-hazardous biomass waste into energy in the form of biogas has been implemented in Tadukan Raga village in Sinembah Tanjung Muda (STM) Hilir District, Deli Serdang Regency which has been operated since 2018 and is equipped with a barn for mushroom cultivation. However, problems arise where the facility is abandoned where there is a lack of maintenance of biogas generation facilities and mushroom barns, lack of human resources and low understanding of the community, especially BUMDes in the management, development and business maintenance of this facility. Therefore, it is necessary to provide counseling and training to the community in the operation of biogas facilities, revitalize mushroom barns in biomass non-b3 waste utilization facilities and modify LPG stoves into biogas stoves and install stoves in residents' homes around Tungkusan hamlet. Tadukan Raga Village itself is a fostered village that has been used as a place for counseling and service from the University of North Sumatra to the community because there are still several things that need to be improved, so counseling is again carried out in this village.

Keyword: Biogas, Biomass, Merang Mushroom, Waste

1. Introduction

Taduka Raga Village is located in Sinembah Tanjung Muda (STM) Hilir District, Deli Serdang Regency, North Sumatra. This village has a very strategic rural location and easy access to raw materials (LCPKS and EPB). In addition, Tadukan Raga Village is a pilot village in waste management. Evidently, at the time of the construction of this biogas plant and mushroom barn facility, Tadukan Raga village also had a landfill which would later serve to accelerate the implementation of waste management and environmental policies in Deli Serdang Regency. Approaching the community is one way to overcome the waste problem. Some efforts to overcome the waste problem are to increase knowledge and practice of waste management and it is hoped that skills will emerge to manage the waste that can have a selling value.

The solution offered to solve the problems faced by this village is to empower the community of biogas observers and users. Therefore, counseling is needed for the community of Tadukan Raga village, Deli Serdang

Regency, about alternative organic waste processing with mushroom farming because it is environmentally friendly and provides various other benefits.

2. Merang Mushroom

Empty palm bunches (EPB) are the largest biomass waste generated from crude palm oil (CPO) processing at palm oil mills. Generally, empty palm bunches are used by the community as mulch on plantations, and in certain communities use them as a medium for growing mushrooms. Fungi function as decomposers of empty palm bunches, especially lignin decomposers. In the empty bunches used as mushroom growing media, the empty bunches have been partially decomposed by the activity of merang mushrooms into simpler compounds. This fungal activity can reduce the lignin content by up to 80%. The type of mushroom that will be used as a decomposer of empty bunches is merang mushroom (Volvariella volvaceae). Merang mushroom (Volvariella volvaceae) is an agricultural commodity that has good prospects for development. Merang mushroom is a food with good nutrition, the average mushroom contains 19.4% protein and 67.74% carbohydrate [1].

3. Mushroom Farm

The palm empty fruit bunch biomass non-hazardous waste decomposition facility uses a mushroom barn as the main equipment. A barn is a house where mushrooms grow and develop and then are picked. Mushroom barns are usually designed in the form of multi-storey shelves where the shelves and supporting poles are made of strong bamboo [2]. The purpose of building a barn is to protect the mushroom baglogs from rain, direct sunlight, and possible contamination of mushroom spores. In addition, the barn is also useful for engineering microclimatic conditions in the barn room, so that the mushroom cultivation carried out does not depend on seasonal and weather conditions in the surrounding area. With the building of a barn we can engineer the temperature and humidity conditions we want.

4. Implementation Method

The implementation of this service activity begins with conducting surveys and mapping of partners, socialization to repair and renovation of pilot plants. The method applied can be explained as follows:

1. Pre-activity preparation by conducting a survey. This field survey aims to find out important aspects in evaluating partner problems and needs. Survey is a primary data collection method by asking questions to individual respondents. So, it can be concluded that surveys are a method for collecting information from groups that represent a population.

2. Initial socialization related to the problems experienced by partners related to the lack of knowledge and information on the utilization of biogas, starting from installation repair, maintenance, and operation of biogas bioreactors either household scale or pilot scale.

5. Discussion Result

The community service activities began by conducting a Focus Group Discussion (FGD) attended by the LPPM USU team, the community and the manager of the Tadukan Raga biogas facility. At this meeting, the problems faced by the village and the solutions needed to overcome these problems were conveyed. The results of the FGDs that have been carried out, there are several problems that become obstacles to the operation of biogas facilities in this village, namely the lack of maintenance of biogas generation facilities and mushroom barns, lack of human resources and low understanding of the community, especially BUMDes in the management, development and business maintenance of this facility. The solution provided is revitalization, namely repair and rearrangement of biogas facilities and mushroom barns, as well as facility development in the form of developing biogas production technology and mushroom barn cultivation. After all the data was submitted, the next step was to prepare tools, materials and materials for socialization and training which can be seen in Figure 1.

Figure 1. Socialization of Biogas Plant Development Service

The LPPM team of the University of North Sumatra directly provided socialization and training to the people of Tadukan Raga village. Activities are carried out openly by directly seeing the entry of cow rumen raw materials into the bioreactor, the operation of biogas from the reactor to the modified stove until the biogas can be used and functions properly. From the socialization and training that has been carried out, partners get new insights in utilizing non-b3 waste as energy in the form of biogas. In addition, another benefit of this facility is the existence of a barn for the cultivation of merang mushrooms. Energy in the form of biogas produced from anaerobic composting of TKKS waste left over from mushroom media can be used by people who work as mushroom farmers as fuel for the mushroom sterilization process before packaging and marketing, while the compost produced can be used by the surrounding community as organic fertilizer. The socialization and training activities can be seen in Figure 2.

Figure 2. Photo with Partners and LPPM USU Team

Partners also participate in the program evaluation process to assess how well the program has been implemented, what impacts have occurred after completing various program activities, and what needs to be improved or developed in the coming year. The partners are expected to become a reference in implementing a self-sufficiency program that can help solve the problem of organic waste and become an alternative source of new fish feed.

6. Conclusion

The service program was carried out well starting from site surveys, FGD activities, to socialization and training activities. The service program was carried out with enthusiasm by the partners because the partners gained new insights in overcoming the problem of organic waste in Tadukan Raga Village in an environmentally friendly way and had many benefits such as utilizing non-B3 waste as energy in the form of biogas, the existence of a barn for cultivating merang mushrooms, and mushrooms can be used by people who work as mushroom farmers as fuel for the mushroom sterilization process before being packaged and marketed,

and the compost produced can be used by the surrounding community as organic fertilizer. It is hoped that this program will continue to grow and partners will make it a new and promising business opportunity that can boost the village economy while maintaining the environment in Tadukan Raga Village.

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REFERENCES

[1] Lestari, A., Azizah, E., Sulandjari, K., and Yasin, A. Growth of Mycelia of Merang Mushroom (Volvariella Volvaceae) Pacing Location with Type and Concentration of Pure Culture Media In Vitro. *Argo Journal*, 5(2), 114-126. 2018

[2] Rozanna, Dewi, and Novi, S. Organic Waste Management for Maggot Production as an Effort to Reduce Feed Costs for Freshwater Fish Farmers. *Malikussaleh Mengabdi Journalm* 1(1): 11-20. 2022