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Utilization of Rice-Washing Water as Liquid Organic Fertilizer (LOF) in Sidomekar Village, Katibung Subdistrict, South Lampung Regency

Teli Hosana Marpaung[1*], Akbar Ramadhani[2], Tiara Safitri[3], Omar Liandro Aryo Setyaki[4], Rintan Roro Mufidah[5], Raden Ayu Utami[6], Ibnu Amjahmudin[6]

[1]Chemistry Study Program, University of Lampung, Lampung, Indonesia
[2]Agrotechnology Study Program, University of Lampung, Lampung, Indonesia
[3]Marine Sciences Study Program, University of Lampung, Lampung, Indonesia
[4]Geophysics Engineering Study Program, University of Lampung, Lampung, Indonesia
[5]Civil Engineering Study Program, University of Lampung, Lampung, Indonesia
[6]Law Study Program, University of Lampung, Lampung, Indonesia

*Correspondence E-mail: telimarpaung81@gmail.com

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ABSTRACT

This community services activity aims to increase the knowledge and understanding of the community in Sidomekar Village, Katibung Subdistrict, South Lampung Regency regarding the utilization of rice-washing water as liquid organic fertilizer (LOF). This activity took place at Sidomekar Village Hall, Katibung Subdistrict, South Lampung Regency on February 2025 by involving 25 women of Family Welfare Empowerment (*PKK*) in this village as participants. The methods comprised tool and material preparation, material presentation, training (hands-on practice) of LOF production using rice-washing water, and evaluation via question-and-answer (Q&A) method between the community services team and participants. The evaluation results show that the community of Sidomekar Village, particularly the women of *PKK*, showed high enthusiasm and curiosity in participating in the material presentation and training sessions, revealed by their attendance rate of 100% and active participation during the discussion. The evaluation results also reveal that they showed high practice's success and knowledge improvement throughout this activity.

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1. Introduction

Sidomekar Village, Katibung Subdistrict, South Lampung Regency, is one of the villages with potential for organic farming development. This village has a well-structured administrative system with 10 hamlets, facilitating good coordination and program dissemination throughout the village. The availability of natural resources and organic waste in Sidomekar Village serves as a significant asset for the development of organic waste utilization programs, particularly in efforts to improve community well-being and preserve environmental sustainability.

One type of organic waste commonly found in the environment to be utilized as organic fertilizer is rice-washing water. According to Gulo *et al.* (2024), rice-washing water has the potential as a beneficial nutrient source for plant growth owing to its content of carbohydrates, vitamins, and minerals that help maintain soil quality. As a household waste, rice-washing water is often disposed without further utilization. However, this water contains various nutrients, such as carbohydrates, protein, vitamin B, and minerals, playing a role in supporting the growth of soil microorganisms and enhancing soil fertility (Hidayat *et al.,* 2020). However, public are still largely unaware about the potential of rice-washing water to reduce the excessive use of chemical fertilizers, leading to its disposal without further utilization. Whereas, processing rice-washing water into liquid organic fertilizer (LOF) is a relatively simple effort to support food security at the household level, implying that this measure is actually achievable, both technically and economically (Hadiyanti *et al.,* 2021). Moreover, through proper management, the community can also earn additional income from the sale of LOF, while playing a role in environmental preservation by reducing household waste.

The processing method of rice-washing water to be used as LOF can be conducted by comparing fermentation for 1 day and 15 days with compositions of 50 and 100%, showing that fermentation of rice-washing water for 15 days with a composition of 100% bring a more significant effect on plant growth (Fadilah *et al.,* 2020). One method that has begun to be widely developed for processing rice-washing water is fermentation using molasses and Effective Microorganisms (EM4). This fermentation aims to increase the content of probiotic microorganisms and produce organic compounds that can be used as LOF or as a bioactivator in waste processing (Setiawan & Rahayu, 2021). The application of LOF made from rice-washing water fermented with molasses and EM4 has been proven to enhance plant growth and soil fertility. Prasetyo *et al.* (2023) stated that the application of LOF made from fermented rice-washing water can increase nitrogen, phosphorus, and potassium content in the soil, thereby supporting more optimal plant growth. Additionally, the application of this type of LOF can improve soil structure and increase the activities of soil microorganisms, further contributing to the sustainability of organic farming systems.

Rice-washing water can be utilized as an alternative organic fertilizer for plants because it contains vitamin B and various other minerals. According to a study by Fitzpatrick & Chapman (2020) on the important role of thiamine (vitamin B1) in plant health from harvest to biofortification, thiamine in rice-washing water plays an essential function in plant cells. In practice, the production of organic fertilizer using rice-washing water could be conducted in local community via socialization. Safitri *et al.* (2023) proved that the utilization of rice-washing water as organic fertilizer is an innovation toward sustainable and environmentally friendly agriculture and sustainable waste management at the household level. Therefore, this community services activity aims to enhance the knowledge and understanding of the community of Sidomekar Village, Katibung Subdistrict, South Lampung Regency regarding the utilization of rice-washing water as LOF.

2. Methods

This community services activity took place on February 2025 in Sidomekar Village, Katibung Subdistrict, South Lampung Regency to educate the women of Family Welfare Empowerment (*PKK*) in Sidomekar Village about the production of liquid organic fertilizer (LOF) using rice-washing water. This activity targeted 25 of these women as participants.

The main material used in this LOF production was 500 ml of rice-washing water. The water used was the one obtained as a result when washing rice before cooking. Additional materials included four bottles of EM4 solution, 100 gr of brown sugar as an energy source for microorganisms, and ½ tablespoon of finely ground *tapai* yeast. This community services activity comprised three stages: preparation, implementation, and evaluation.

2.1 Preparation stage

During this stage, the community services team ensured that all necessary facility and equipment were available, such as Sidomekar Village Hall as the venue of material presentation and training of LOF production and laptop and projector as the tools for material presentation. For LOF production, the additional materials used were EM4 and molasses and the additional tools used were fermentation bottles. The location and time of the implementation and evaluation stages were determined carefully, ensuring that the majority of the targeted participants were able to attend this activity.

2.2 Implementation stage

This stage involved training the village community to produce LOF by preparing in advance approximately 12 liters of rice-washing water, which was then placed in a bucket and mixed with 24 bottles of EM4 and 24 bottles of molasses. The mixture was then stirred and transferred to 600 ml bottles, leaving approximately 30% of the bottle empty, and sealed. The LOF produced required approximately 10–14 days to ferment and needed to be opened briefly to release fermentation gases. If it had a characteristic fermentation odor, the LOF was deemed ready for use.

2.3 Evaluation stage

This stage, in the form of question-and-answer (Q&A) method concerning the material presentation and training of LOF production using rice-washing water, was conducted by gathering information directly from participants regarding their activeness, practice's success, enthusiasm, and knowledge improvement. Their activeness was assessed via questions related to their participation in the discussion, involvement in the training of LOF production, and willingness to share experiences they obtained in this activity. Their practice's success was assessed by asking how well they understood the material presented and whether they planned to apply LOF in their daily lives. Their enthusiasm was assessed based on their interest in asking further questions and willingness to share information they obtained in this activity. Finally, their knowledge improvement was assessed by comparing their understanding before and after this activity via reflective questions concerning the benefits and production methods of LOF and the effectiveness of LOF in improving soil fertility.

3. Results and Discussion

This community services activity in Sidomekar Village, Katibung Subdistrict, South Lampung Regency is a form of community empowerment in utilizing household waste. One type of household waste, that is rice-washing water, can be processed into liquid organic fertilizer (LOF) that has added value and high potential to improve the creative economy of the local community. This activity took place smoothly and received a positive responses from all participants.

The activity began with opening remarks from the village head and the community services team, followed by material presentation concerning the benefits and use of LOF. Participants then engaged in

training (hands-on practice) session with guidance from the community services team. The presentation and training sessions were attended by 25 women as the members of *PKK* in Sidomekar Village. After this, the activity continued with discussion, during which participants actively asked questions about the application of this type of fertilizer for various types of plants, and ended with evaluation via Q&A method to assess the level of participants' achievement throughout this activity.

The application of organic fertilizer, both in solid and liquid forms, continues to be highly promoted in today's agricultural practices to realize sustainable agriculture. Organic materials—as the main elements of organic fertilizer—are obtainable from various household waste easily found in the community. Rice-washing water is a potential household waste for LOF production because it contains useful nutrients, such as carbohydrates, protein, vitamin B, and important minerals like phosphorus, potassium, and magnesium, which are beneficial for plant growth (Wibowo *et al.,* 2022). Additionally, LOF made from rice-washing water can be utilized as an opportunity for micro, small, and medium enterprises (MSMEs), since its raw materials are inexpensive and easily accessible and its production process is simple, resulting in low production costs. Moreover, LOF made from rice-washing water has a broad market segment, since it is increasingly popular among farmers, plant enthusiasts, and organic farming communities seeking alternative fertilizers that are environmentally friendly.

Figure 1. Material presentation (left) and demonstration of LOF production (right).

This community services activity comprised several sessions: material presentation, demonstration and training (hands-on practice), discussion, and evaluation via Q&A. In the presentation, the team delivered materials concerning the benefits of organic fertilizer for plants, the nutrient content in rice-washing water, and prior studies' findings related to the utilization of rice-washing water as LOF on plants. This included information about the fermentation period of rice-washing water conducted by prior researchers and the composition involved in applying the LOF. During the training session, participants underwent hands-on practice by performing the actual steps to produce LOF using rice-washing water.

Table 1. Participants' initial and final conditions throughout this community services activity.

No.	Initial Conditions	Process	Final Conditions
1.	Participants did not know how to produce LOF using rice-washing water.	Demonstration and training (hands-on practice) of LOF production using rice-washing water.	Participants were able to learn how to produce LOF using rice-washing water and understand its benefits for plants.
2.	Participants still relied on chemical fertilizers without	Presentation of the potential of LOF made from rice-	Participants were interested in reducing the use of chemical

	considering the alternative organic ones and had low awareness about the importance of utilizing household waste to reduce environmental impacts.	washing water as an environmentally friendly alternative to chemical fertilizers.	fertilizers and switching to organic fertilizers by utilizing household waste as an effort to protect the environment and support sustainable agriculture.

Table 2 presents the evaluation results. Participants' activeness, practice's success, and enthusiasm were rated as good, showed by the scores of 80%. Meanwhile, their knowledge improvement after training session revealed a score of 70%.

Table 2. Evaluation results of participants' achievement thoughout this community services activity.

No.	Parameter	Score (%)	Description
1.	Activeness	80	Good
2.	Practice's Success	80	Good
3.	Knowledge Improvement	70	Good
4.	Enthusiasm	80	Good

Based on the evaluation results, this activity was deemed successful in increasing participants' understanding and knowledge to produce LOF using rice-washing water and has the potential to create broader opportunities for micro, small, and medium enterprises (MSMEs). During the training session, participants demonstrated high levels of enthusiasm and knowledge improvement. This was partially attributed to the material presentation session that displayed data from prior studies' findings about several trials in producing LOF and its application techniques. The display of these data aimed to further convince the participants regarding the benefits of applying and using LOF.

Overall, this type of community services activity needs to be expanded to other agricultural fields, such as the production of botanical pesticides, the utilization of natural enemies to control plant pests, and similar activities. This expansion possibility aligns with the expectations and messages conveyed by participants in the closing session of this community services activity in Sidomekar Village, Katibung Subdistrict, South Lampung Regency.

Figure 2. Photo session with the women of *PKK* in Sidomekar Village after the training session of LOF production using rice-washing water.

It was revealed from this community services activity that participants were able to produce LOF using rice-washing water, as shown in Table 1 and 2. After evaluation, it is hoped that the women of *PKK* will be able to independently produce LOF at home to reduce dependence on chemical fertilizers and implement more environmentally friendly farming practices. However, to maximize the benefits

when applying the LOF on plants at any given time, its production should considerate the sufficient amount of rice-washing water as well as the quantity and area of targeted plants (Pitaloka *et al.,* 2022).

4. Conclusions

Based on the evaluation results of this community services activity for the women of *PKK* in Sidomekar Village, Katibung Subdistrict, South Lampung Regency about the production of liquid organic fertilizer (LOF) using rice-washing water, it is concluded that participants showed high activeness, practice's success, and enthusiasm about the utilization of rice-washing water as LOF, with the scores of 80%. The training session of LOF production was deemed successful, with the score of knowledge improvement among participants reached 70%, despite challenges related to the measurement of the exact composition for applying the LOF on targeted plants.

5. Acknowledgement

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