Open Access

memoirs c

Vol. 1, No. 2 (2025) | E-ISSN 3089-8137

Short Communication

Utilization of Rice Washing Water as Additional Nutrition and Environmentally Friendly Liquid Organic Fertilizer (POC) for Chili Plants in Green House Activities in Balongsari Village

Achmad Muchammad *, Kamila Zain Putri Alysia

Sekolah Tinggi Ilmu Tarbiyah Nahdlatul Ulama Al-Hikmah, Mojokerto, **Indonesia**

*Correspondence Author: Achmad Muchammad

Jl. Hayam Wuruk No.31, Prayon, Watesumpak, Kec. Trowulan, Kabupaten Mojokerto, Jawa Timur 61362.

achmadmuchammad2017@gmail.com

This article contributes to:

Abstract. This Community Service Program (KKN) aims to explore and implement the use of rice washing water as an additional nutrient and environmentally friendly liquid organic fertilizer (POC) for chili plants in a greenhouse located in Balongsari Village, Gedeg District, Mojokerto Regency. Rice washing water, which is often discarded, is rich in essential nutrients such as B vitamins and minerals that can support plant growth. Through this approach, the program seeks to reduce domestic waste and promote more sustainable and environmentally friendly agricultural practices. The expected outcomes of this program are increased knowledge and skills of local farmers in using environmentally friendly organic materials, as well as demonstrating that rice washing water can be effectively used as a nutrient supplement and liquid organic fertilizer. The program also aims to raise awareness of the importance of sustainable agricultural practices and improved waste management, with positive impacts on the environment and agricultural yields.

Keywords: Rice Washing Water, Liquid Organic Fertilizer, Chili Plants, Greenhouse.

1. Introduction

Balongsari Village, located in Gedeg District, is an ideal location for implementing this method [1]. The village has implemented a greenhouse, which allows for more effective and efficient control of the growing environment. With the greenhouse, the application of liquid organic fertilizer based on rice washing water can be carried out more measurably and sustainably [2]. Chili peppers (*Capsicum annuum*), one of the high-value horticultural crops, often face challenges related to fertilization and sustainability. To address this challenge, using environmentally friendly organic materials such as rice washing water as liquid organic fertilizer (POC) can be an innovative solution [3]. Liquid Organic Fertilizer (POC) is an organic-based fertilizer designed to provide nutrients effectively and environmentally friendly [4]. POC can improve soil quality, improve soil structure, and support the activity of beneficial microorganisms. The use of POC helps reduce dependence on synthetic chemical fertilizers, which can cause pollution and environmental damage. By utilizing rice washing water as POC, greenhouses provide a controlled environment for growing chili plants. Greenhouse systems can protect plants from extreme weather and pest attacks, allowing them to grow optimally [5].

The use of rice washing water as a fertilizer in greenhouses can maximize the growth of chili plants by providing essential nutrients sustainably [6]. It also helps improve waste management, reducing the environmental impact of chemical fertilizer use. Implementing this technology in Balongsari Village will not only increase chili yields but also support the environment. By reducing the use of chemical fertilizers and effectively utilizing waste, residents can lower production costs and improve soil health [7]. Furthermore, this practice can serve as a model for other villages in implementing environmentally friendly technologies in agriculture. By utilizing rice washing water as a liquid organic fertilizer in greenhouses, Balongsari Village is expected to create a more

Article info
Revised: 2025-5-22
Accepted: 2025-8-21
Publish: 2025-8-30

sustainable, efficient, and environmentally friendly agriculture, providing long-term benefits for farmers, the community, and the surrounding environment [8].

The program "Utilization of Rice Washing Water as Additional Nutrition and Environmentally Friendly Liquid Organic Fertilizer (POC) for Chili Plants in Green House Activities in Balongsari Village" aims to optimize locally available resources to improve chili growth while reducing chemical inputs. Rice washing water—rich in starch, micronutrients, and beneficial microorganisms—was collected from household kitchens, fermented with natural activators, and applied as a supplemental foliar and soil drench within a controlled greenhouse setting. Activities covered community training on hygienic collection, simple fermentation protocols, dosage calibration (frequency and concentration), and observational monitoring of vegetative growth, flowering, and initial fruit set. Preliminary observations indicated improved leaf vigor, more stable soil moisture retention, and reduced reliance on synthetic fertilizers, accompanied by cost savings for farmers. The initiative also strengthened environmental awareness by repurposing domestic wastewater, lowering nutrient runoff risks, and promoting circular-economy practices at the village level. In addition to agronomic benefits, the greenhouse setting provided consistent microclimate management and hands-on learning for farmer groups and youth cadres, supporting replication and scale-up across planting cycles in Balongsari Village.

2. Implementation Method

This program is implemented in several stages, in this activity KKN students and PKK mothers carry out community service:

2.1 Preparation

Before beginning the activity, the KKN students prepared by gathering the necessary materials, such as chili seedlings, polybags, liquid organic fertilizer (POC), solid organic fertilizer, and other supporting equipment. They also prepared compost in advance.

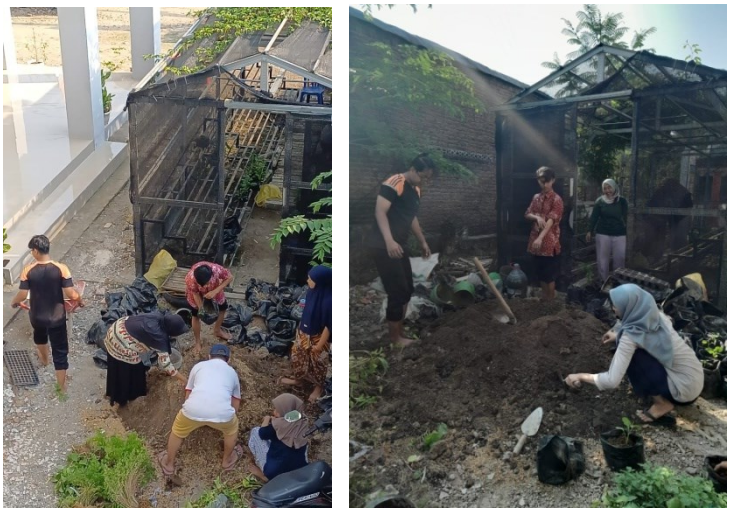

Figure 1. Preparing Compost

2.2 Introduction and training

Before starting the planting activity, the KKN students first made Liquid Organic Fertilizer (POC). The KKN students collected used rice water, mixed it with brown sugar or molasses, then covered it and let it sit for 5-7 days for the fermentation process. Store the POC in a cool place and avoid direct sunlight. The container must be tightly closed to prevent contamination and evaporation. After fermentation, the POC is ready to use and mixed with compost for maximum growth.

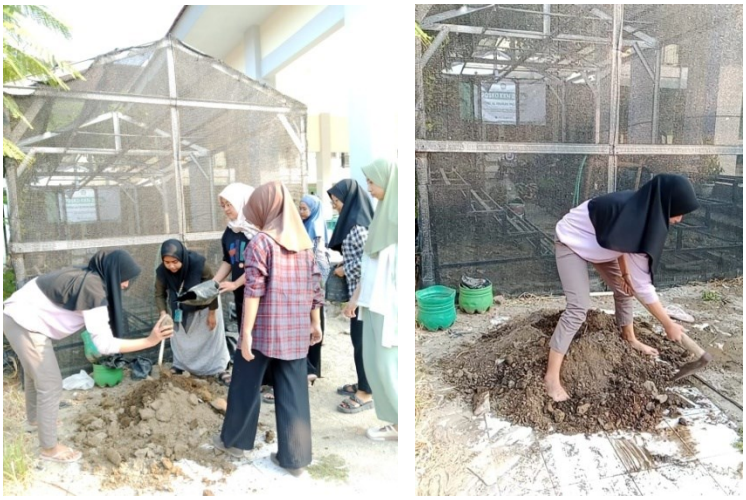

Figure 2. The process of mixing compost with POC

2.3 Planting activities

The KKN students then planted crops, including chili peppers. During this process, the students were assisted by PKK (Family Welfare Movement) women.

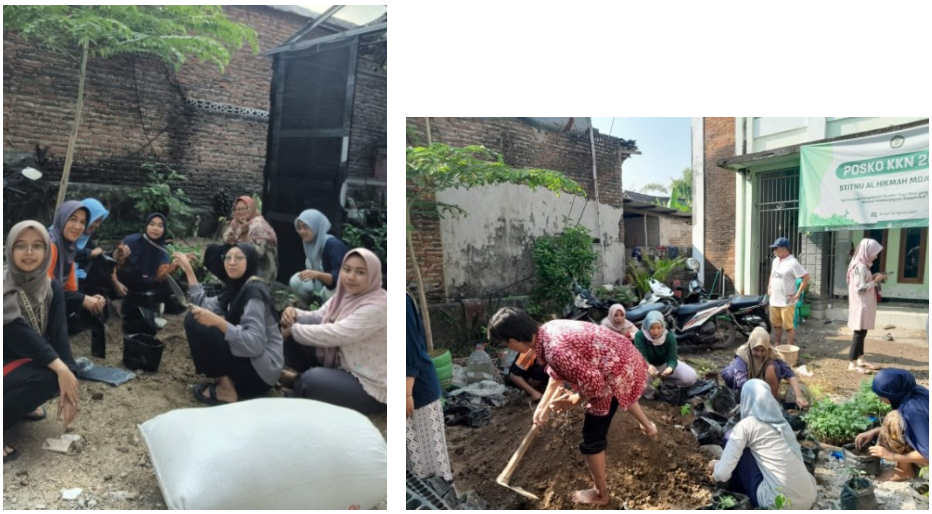

Figure 3. Joint seedling planting process

2.4 Evaluation of results

After finishing planting the seeds, one of which was chili seeds, the KKN students placed the plants in a cleaned greenhouse.

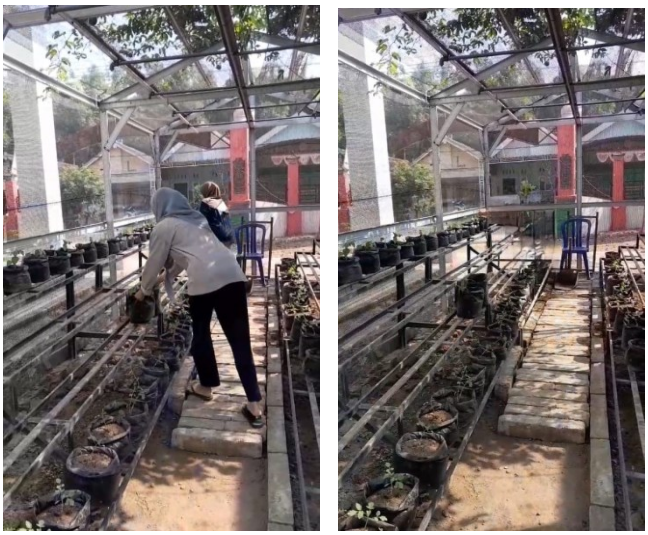

Figure 4. plant removal process

3. Result and Discussion

This Community Service Program (KKN) aims to utilize rice washing water as an additional nutrient and environmentally friendly liquid organic fertilizer (POC) for chili plants, in an initiative at the Green House in Balongsari Village, Gedeg District, Mojokerto Regency. This approach focuses on two important aspects. Rice washing water is liquid waste that is often discarded without being utilized [9]. However, this water contains several nutrients such as B vitamins, minerals, and amino acids that are beneficial for plant growth. This program utilizes rice washing water as an alternative source of additional nutrients that is economical and easily obtained [10]. The use of rice washing water as an additional nutrient is expected to improve the health and productivity of chili plants in the Green House [11].

Furthermore, this program also applies Liquid Organic Fertilizer (POC), made from organic materials, as an environmentally friendly fertilizer [12]. This POC not only provides essential nutrients for plants but also improves soil quality and overall ecosystem health. Integrating POC into agricultural processes is expected to reduce reliance on chemical fertilizers, which often have negative environmental impacts [13]. This program not only aims to increase chili yields but also educate farmers and the surrounding community about the benefits of using organic materials [14]. In this work program, the KKN students aim to create synergy in agricultural innovation and make a real contribution to improving the welfare of rural communities through simple yet effective agricultural technologies [15].

4. Conclusion

This program successfully demonstrated that utilizing rice washing water as a source of additional nutrients and the use of Liquid Organic Fertilizer (POC) can significantly improve the health and yield of chili plants. By utilizing household waste and local organic materials, this program not only reduces the environmental impact of chemical use but also provides a cost-effective solution for farmers. At the Balongsari Village Green House, this approach has proven effective in supporting better chili plants and improving overall soil quality. Furthermore, this program has successfully educated the local community about the benefits of used rice water as an environmentally friendly liquid organic fertilizer. This KKN program demonstrates the great potential in applying simple technologies for greener and more efficient agriculture.

5. Acknowledgements

Thank you are conveyed to LPPPM STITNU ALHIKMAH Mojokerto which organizes community service programs.

6. Declaration

Author contributions and responsibilities - The authors made substantial contributions to the conception and design of the study. The authors were responsible for the data analysis, interpretation, and discussion of the results. The authors read and approved the final manuscript.

Funding - This study received no external funding. Availability of data and materials - All data are available from the authors.

Conflict of interest - The authors declare no conflicts of interest.

Did you use generative AI to write this manuscript? - I did not use AI assistance in my manuscript.

Generative AI and AI-assisted technology statement in the writing process - During the preparation of this work, the authors did not use AI for writing, editing, or anything else related to the manuscript.

7. How to Quote

A. Muchammad, and K. Z. P. Alysia., Utilization of Rice Washing Water as Additional Nutrition and Environmentally Friendly Liquid Organic Fertilizer (POC) for Chili Plants in Green House Activities in Balongsari Village. Memoirs C 2025; 1 (2): esc-41 - https://doi.org/10.59535/vgej8j94.

8. References

[1] A. Gelaw, S. Abegaz, N. Mohammed, and M. Ahmed, "Farmer's traditional practices in milk and milk products handling in selected districts of North Wollo, Ethiopia," *Heliyon*, vol. 10, no. 23, Dec. 2024, doi: 10.1016/j.heliyon.2024.e40866.

[2] A. M. Motasim *et al.*, "Urea application in soil: processes, losses, and alternatives—a review," *Discov Agric*, vol. 2, no. 1, p. 42, Jul. 2024, doi: 10.1007/s44279-024-00060-z.

[3] S. Satyam and S. Patra, "Innovations and challenges in adsorption-based wastewater remediation: A comprehensive review," *Heliyon*, vol. 10, no. 9, May 2024, doi: 10.1016/j.heliyon.2024.e29573.

[4] C. Allará *et al.*, "Electronic Nanomaterials for Plants: A Review on Current Advances and Future Prospects," *Advanced Electronic Materials*, vol. n/a, no. n/a, p. 2500080, doi: 10.1002/aelm.202500080.

[5] R. H. E. Hassanien, M. M. Ibrahim, A. E. Ghaly, and E. N. Abdelrahman, "Effect of photovoltaics shading on the growth of chili pepper in controlled greenhouses," *Heliyon*, vol. 8, no. 2, Feb. 2022, doi: 10.1016/j.heliyon.2022.e08877.

[6] V. Choudhary and R. Machavaram, "A Comprehensive Review of Sustainable Soil Organic Growing Media for Mat-Type Paddy Seedling Nurseries Under Indian Agronomical Condition," *J Soil Sci Plant Nutr*, vol. 23, no. 2, pp. 1515–1534, Jun. 2023, doi: 10.1007/s42729-023-01153-2.

[7] X. Peng *et al.*, "Recycling municipal, agricultural and industrial waste into energy, fertilizers, food and construction materials, and economic feasibility: a review," *Environ Chem Lett*, vol. 21, no. 2, pp. 765–801, Apr. 2023, doi: 10.1007/s10311-022-01551-5.

[8] A. Parven, I. M. Meftaul, K. Venkateswarlu, and M. Megharaj, "Herbicides in modern sustainable agriculture: environmental fate, ecological implications, and human health concerns," *Int. J. Environ. Sci. Technol.*, vol. 22, no. 2, pp. 1181–1202, Jan. 2025, doi: 10.1007/s13762-024-05818-y.

[9] A. Nabayi, C. B. S. Teh, A. K. Z. Tan, N. P. Tan, and D. Beke, "Combined benefits of fermented washed rice water and NPK mineral fertilizer on plant growth and soil fertility over three field planting cycles," *Heliyon*, vol. 9, no. 9, Sep. 2023, doi: 10.1016/j.heliyon.2023.e20213.

[10] D. Dorairaj, N. Govender, S. Zakaria, and R. Wickneswari, "Green synthesis and characterization of UKMRC-8 rice husk-derived mesoporous silica nanoparticle for agricultural application," *Sci Rep*, vol. 12, no. 1, p. 20162, Nov. 2022, doi: 10.1038/s41598-022-24484-z.

[11] S. Nazeer *et al.*, "Effect of Circular-Economy-Derived Experimental Biostimulants on Growth and Development of Soilless Strawberry Plants in Greenhouse Conditions," *Journal of Sustainable Agriculture and Environment*, vol. 4, no. 4, p. e70101, 2025, doi: 10.1002/sae2.70101.

[12] S. Amelia, A. Saitri, A. Lupi, and A. Aktawan, "Making Liquid Organic Fertilizer from Household Vegetable Waste using Ananas comosus L. Merr Activator," *J. Phys.: Conf. Ser.*, vol. 2989, no. 1, p. 012024, Apr. 2025, doi: 10.1088/1742-6596/2989/1/012024.

[13] T. G. Abebe *et al.*, "Growing Use and Impacts of Chemical Fertilizers and Assessing Alternative Organic Fertilizer Sources in Ethiopia," *Applied and Environmental Soil Science*, vol. 2022, no. 1, p. 4738416, 2022, doi: 10.1155/2022/4738416.

[14] S. Tobing, T. Sipahutar, S. Simatupang, M. A. Girsang, and Nurfaida, "Improvement of the chili technology package for multiple production of red chili in Karo District," *IOP Conf. Ser.: Earth Environ. Sci.*, vol. 807, no. 4, p. 042028, Jul. 2021, doi: 10.1088/1755-1315/807/4/042028.

[15] M. G. Wordofa, J. Y. Hassen, G. S. Endris, C. S. Aweke, D. K. Moges, and D. T. Rorisa, "Adoption of improved agricultural technology and its impact on household income: a propensity score matching estimation in eastern Ethiopia," *Agric & Food Secur*, vol. 10, no. 1, p. 5, Feb. 2021, doi: 10.1186/s40066-020-00278-2.

