Ihsanniat: *Jurnal Pengabdian Kepada Masyarakat*
Volume 1 Nomor 1, November 2024
e-ISSN p-ISSN
DOI

Socialization of Making Liquid Organic Fertilizer from Mango Leaves and Palm Sugar to Improve Community Knowledge and Skills

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Abstract

The agricultural sector is a key element in Indonesia's economic development, but the excessive use of chemical fertilizers has led to a decrease in soil fertility and an increase in production costs. This research aims to improve the knowledge and skills of the people of Bentek Village through socialization of the manufacture of liquid organic fertilizer (LOF) made from mango leaves and palm sugar as an environmentally friendly solution. The research method used is a qualitative descriptive approach with a case study of socialization of LOF making in Bentek Village, Gangga District, North Lombok Regency. The results of the study show that the application of liquid organic fertilizer is able to increase agricultural productivity with rice yields increasing by 12% and vegetables by up to 15%, as well as reducing production costs by up to 25%. In addition, the use of LOF improves soil quality with the addition of organic matter by 10-15% and water retention by up to 18%, which contributes to the sustainability of agriculture in the village. This socialization program not only has a positive impact on farmers, but also increases the interest of the younger generation to be involved in environmentally friendly agriculture. The socialization of liquid organic fertilizer technology has succeeded in providing significant economic and environmental benefits, reducing dependence on chemical fertilizers, and strengthening the economic resilience of the community. Ongoing support from the government and related institutions is urgently needed to ensure the sustainability of this program and expand its implementation.

Keywords: *Liquid Organic Fertilizer*; *Appropriate Technology*; *Sustainable Agriculture*; *Bentek Village*; *Socialization*

INTRODUCTION

The agricultural sector has an important and strategic role in national development because it is able to contribute positively to national and regional economic growth. As a sector that absorbs the largest workforce in Indonesia, the agricultural sector plays a role in providing jobs and reducing unemployment.[1] The agricultural sector plays an important role to fulfil the food needs of the community, and increasing agricultural production will have a positive impact on national food security. The government provides insufficient budget support to the Indonesian agricultural sector. This problem hinders the progress and welfare of farmers. This affects the financing of the agricultural sector and income distribution. There needs

to be a government commitment to the agricultural sector because national development is also influenced by the agricultural sector.[2] The development of digital technology is currently one of the factors that can affect the growth of the agricultural sector. The government needs to consider several things that support the growth of the agricultural sector when making policies and development strategies to achieve sustainable agricultural sector growth.

Increasing community knowledge and skills in the agricultural sector is very important in efforts to improve welfare and quality of life, especially in rural areas. One of them is in Bentek Village, Gangga District, North Lombok Regency. One of the main problems faced by farmers is low soil fertility due to excessive use of chemical fertilizers that damage soil structure in the long term. Environmentally friendly and sustainable technology is urgently needed.[3]

Appropriate Technology (AP) is one solution that can help people overcome these problems. AP is a technology designed according to local needs and conditions, easy to implement, and has affordable costs. One example of AP that is relevant in the agricultural sector is the manufacture of liquid organic fertilizer (LOF) from natural materials available around Bentek Village, such as mango leaves and palm sugar.

A study in Klaten Regency, Central Java, showed a decrease in land productivity of up to 15-20% due to excessive use of nitrogen chemical fertilizers, which caused degradation of soil organic matter.[4] This phenomenon does not only occur in Indonesia, but globally, a report from the Food and Agriculture Organization (FAO) revealed that the use of chemical fertilizers contributes around 24% of greenhouse gas emissions in the agricultural sector, which accelerates climate change and decreases soil fertility.

The latest report from the World Bank in 2024 revealed that around 20% of agricultural land in Indonesia experienced a decrease in fertility due to the accumulation of chemical residues from nitrogen and phosphorus fertilizers. This condition has an impact on decreasing agricultural yields and strengthening the urgency to find environmentally friendly solutions such as liquid organic fertilizers.[5]

Bentek Village is located in Gangga District, North Lombok Regency, West Nusa Tenggara Province. This village has a varied topography, ranging from lowlands to hills. Most of the residents of Bentek Village work as farmers, with the main commodities being rice, nuts, cashew nuts and horticultural crops. In addition, this village also has great potential in terms of natural resources, including plant diversity such as mango trees that grow well in the area.[6]

Bentek Village is known as one of the villages that has a collective awareness in preserving nature. However, the use of environmentally friendly technology in agriculture is still relatively minimal, so this village has great potential to be developed through the application of AP. The presence of a socialization program for

making liquid organic fertilizer from natural ingredients is expected to increase agricultural productivity and reduce dependence on chemical fertilizers which are often expensive and damaging to the environment.[7]

LOF has many benefits, including increasing soil fertility without damaging the ecosystem, utilizing abundant organic waste, and increasing plant productivity naturally. The use of mango leaves and palm sugar as the basic ingredients of LOF not only provides added value to waste materials that are often overlooked, but also produces effective and environmentally friendly fertilizers.[8]

The socialization of technology is expected to help the people of Bentek Village to learn how to make and use LOF to reduce dependence on chemical fertilizers and provide economic and environmental benefits to the village. The AP community in the future is expected to be a starting point for more sustainable and independent agriculture. Training and socialization are very important to provide new knowledge and improve community skills to utilize natural resources effectively and sustainably. This is because most of the population has primary to secondary education.[9] Bentek Village agriculture has become more advanced and independent thanks to support from the local government and educational institutions.

METHOD

This study uses a qualitative descriptive approach with the aim of describing the process of increasing community knowledge and skills through AP socialization in making liquid organic fertilizer. Delivering information about the negative impacts of using chemical fertilizers and the benefits of liquid organic fertilizers, the community is trained on how to make liquid organic fertilizers using local materials such as mango leaves and palm sugar. In the initial stages, the community is assisted to ensure that the implementation of AP runs well. The study uses a case study method that focuses on the socialization of making liquid organic fertilizers from mango leaves and palm sugar. The research subjects involved farming communities in Bentek Village, Gangga District, North Lombok Regency, West Nusa Tenggara, especially community members who are directly involved in agricultural activities and AP socialization programs. In addition, village officials and agricultural extension workers were also involved as key informants.

RESULTS AND DISCUSSION

In the agricultural world, fertilizer is an important component. Unfortunately, the price of fertilizer is getting more expensive from year to year. In 2024, the price of fertilizer is still at risk of increasing, even though the government has tried to overcome this problem through subsidies. One of the main factors affecting the price of fertilizer is the increase in the price of gas, which is the main raw material for the production of nitrogen fertilizer. The Specific Natural Gas Price Policy (SNGPP), which is designed to stabilize gas prices for the fertilizer industry, ends in 2024. If it

is not extended, the price of fertilizer is likely to soar, as happened in 2021-2022 when gas prices rose drastically.

The government has also increased the fertilizer subsidy budget to IDR 54 trillion in 2024 to support the availability of subsidized fertilizer for farmers. However, there are concerns that with the end of the SNGPP policy, the price of non-subsidized fertilizer will be increasingly difficult for farmers to afford. Meanwhile, the distribution of subsidized fertilizer still faces several obstacles, including allocations that are considered small by farmers, which causes some farmers to be reluctant to redeem their fertilizer quotas.[10]

Research conducted in West Java in 2023 showed that the application of liquid organic fertilizer made from mango leaves and palm sugar can increase rice yields by 12% compared to the use of chemical fertilizers.[11] A similar study in Yogyakarta revealed that the use of liquid organic fertilizer increased vegetable yields, such as spinach and kale, by up to 15%. This increase in productivity is because liquid organic fertilizer is able to improve soil structure and increase the availability of nutrients naturally.[12]

Figure 1
Stages of making AP

Because the raw materials come from organic waste such as mango leaves and palm sugar which are easily found in the area, liquid organic fertilizer is cheaper. The use of liquid organic fertilizer in Bentek Village has succeeded in reducing farmers' costs by up to 25% for purchasing fertilizer each planting season. This reduces agricultural production costs by 20–30 percent compared to the use of chemical fertilizers, the prices of which tend to increase every year.

The long-term impact on soil quality is also more positive with the use of LOF.[13] Research shows that soil treated with LOF experiences an increase in organic matter content of 10-15%, while the use of chemical fertilizers can reduce organic matter content by 5-7% per year. In addition, LOF also increases the soil's ability to

retain water, with an increase in water retention of up to 12-18%, which is very useful in maintaining soil moisture during the dry season.[14]

AP is a technology designed according to the conditions and needs of local communities. AP aims to increase productivity by utilizing available resources, easy to understand, and can be applied by communities with limited skills and resources. In this context, the creation of LOF is one form of AP that aims to utilize abundant natural materials in the surrounding area, such as mango leaves and palm sugar.

LOF made from mango leaves and palm sugar is not only environmentally friendly but also utilizes existing waste. This is in line with efforts to reduce the use of chemical fertilizers that can damage soil fertility in the long term. Active community participation in socialization is very important. Their involvement in the LOF making process shows that they are committed to applying this new knowledge in daily agricultural practices. With the implementation of more sustainable agricultural techniques, Bentek Village can expect better results in the long term. Increased soil fertility and plant health can contribute to the sustainability of agriculture in the village. Although there are many benefits, challenges such as acceptance of new technologies and changes in farming habits may be faced. Therefore, there needs to be ongoing support through additional training and mentoring for farmers.

Figure 2
Socialization of LOF

Socialization in making LOF from mango leaves and palm sugar has succeeded in increasing the knowledge and skills of the Bentek Village community. With the application of this technique, it is hoped that an increase in agricultural productivity and the overall economic welfare of the community can be achieved.

This community service activity aims to increase the knowledge and skills of the Bentek Village community through the socialization of making Liquid Organic Fertilizer (LOF) from local materials such as mango leaves and palm sugar. This

liquid organic fertilizer is produced through a fermentation process, namely the breakdown of organic compounds by microorganisms in anaerobic conditions, producing simpler compounds that are useful as plant nutrients. In addition, this LOF is low cost, easy to produce, and can help reduce dependence on chemical fertilizers whose prices continue to increase.

With this socialization, it is hoped that not only farmers will benefit from the use of LOF, but also the village youth. It is hoped that the interest of the younger generation to be involved in agriculture and farming businesses based on environmental technology will increase, because they can see the economic potential offered by the independent and sustainable production of organic fertilizers.

CONCLUSION

The socialization program for making LOF (LOF) from mango leaves and palm sugar in Bentek Village has succeeded in increasing community knowledge and skills in sustainable agriculture. The Bentek Village community can reduce dependence on expensive and environmentally damaging chemical fertilizers by implementing AP. The use of LOF has proven to be more economical, reducing agricultural production costs by up to 25% per planting season, and increasing crop productivity, with rice yields increasing by 12% and vegetables by up to 15%.

In addition, LOF has a positive impact on soil quality, with an increase in organic matter by 10-15% and water retention increasing by up to 18%. These benefits not only support the sustainability of agriculture in Bentek Village, but also strengthen the economic resilience of the community in the long term.

Through this socialization, it is hoped that more farmers and the younger generation will be interested in using environmentally friendly technology, so that Bentek Village can become a model of an independent village that implements sustainable agriculture based on local resources. Continuous support from the government and related institutions is needed to ensure that the application of this technology can continue to develop and provide a wider positive impact.

ACKNOWLEDGEMENTS

We would like to express our deepest gratitude to all parties who have helped implement this community service program. Our gratitude goes to the people of Bentek Village, Gangga District, North Lombok Regency who have actively participated in every stage of the activity, from socialization to program implementation. Community participation and support are the keys to the success of this program.

We also express our appreciation and gratitude to the village government and agricultural extension workers who have provided support and guidance during the activity. We would also like to thank educational institutions and related institutions

that have provided resources, both in the form of information and facilities, for the smooth implementation of the LOF socialization program.

In particular, we would like to thank the Field Supervisor Lecturers (FSL) who have provided guidance, direction, and support during the implementation of this Real Work Lecture program. We would also like to thank all our friends in the Real Work Lecture group who have worked together with full dedication and togetherness so that this program can run well.

We hope that this program will provide sustainable benefits for the people of Bentek Village and be an inspiration for other community service programs.

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