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Kasgot Fertilizer Production Training to Boost Agricultural Productivity and Economic Sustainability in Suwayuwo Village

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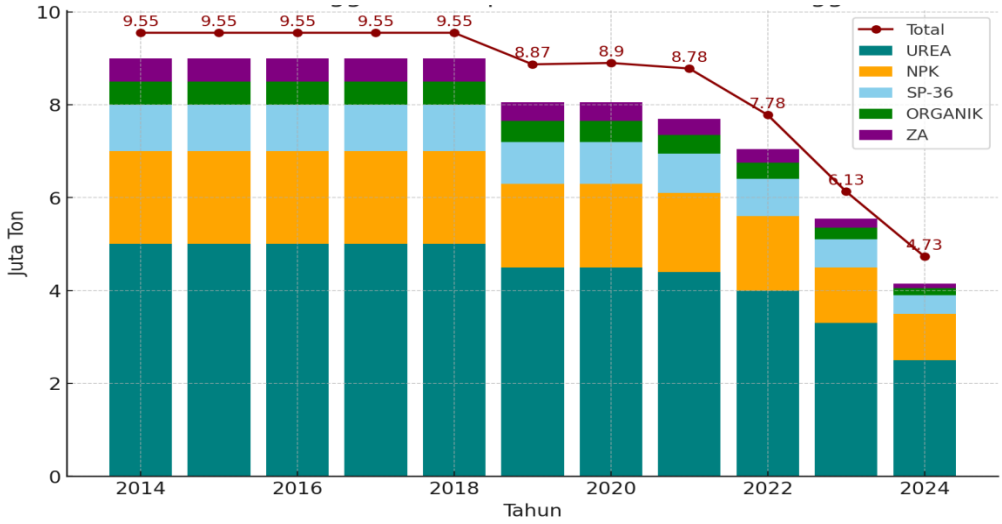
Abstract

The Banana Chip and Peel Community Micro Business in Bandung needs help in marketing promotion and financial management despite the high nutritional potential of banana peels. This initiative aims to enhance local micro-businesses marketing strategies and financial practices by empowering community members with the necessary skills and knowledge. Utilizing a community-based research (CBR) method, the project involved focus group discussions, interviews, and marketing training seminars to identify obstacles and promote product innovation. Participants were taught effective marketing techniques and financial accounting practices, including cash flow management and profit-loss reporting. The results demonstrated a significant improvement in business stability and sales performance, with participants adopting diverse product offerings such as cheese and chocolate-flavored chips. Community engagement played a crucial role, ensuring strategies were culturally relevant and fostering a sense of ownership among participants. In conclusion, this initiative successfully applied theoretical frameworks to enhance the economic viability of local micro-businesses. By integrating effective marketing, sound financial management, and community participation, the program empowered entrepreneurs to innovate and sustain their enterprises, ultimately contributing to the region's economic development. Future efforts should build on these principles to support local businesses further.

Keywords Kasgot Fertilizer Training; Organic Fertilizer Production Management, Organic Waste Management, Sustainable Agriculture Strategy.

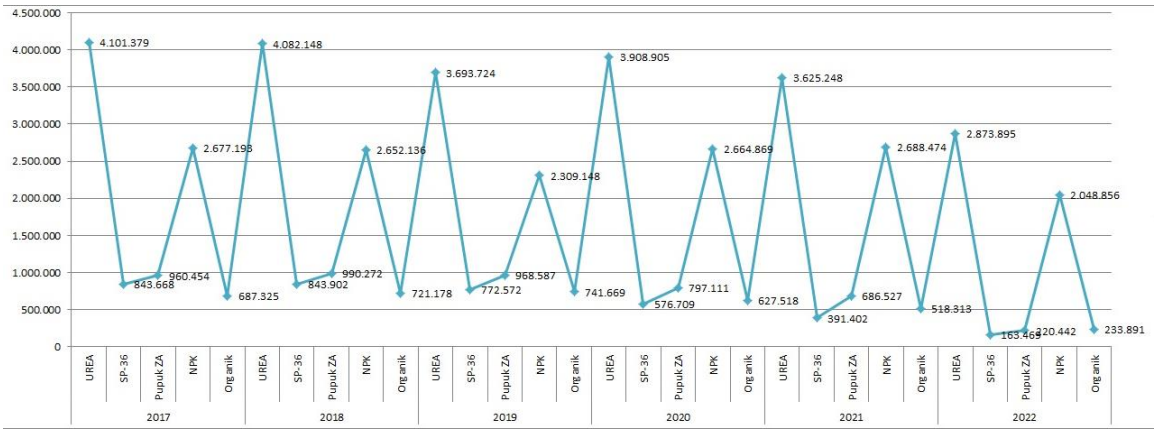
1. INTRODUCTION

The limited subsidy for fertilizers in Indonesia has led to various issues in the agricultural sector, such as increased production costs that reduce farmers' profit margins and affect product selling prices. This has also resulted in decreased soil productivity due to difficult access to fertilizers, dependence on chemical fertilizers that harm soil health and the environment, and economic instability among farmers that impacts investment in equipment or technology (Rajpar et al., 2019). Additionally, limited subsidies complicate the implementation of agricultural programs and worsen the inequality of access to fertilizers in remote areas. To address these problems, policy reforms, additional support for farmers, and promotion of sustainable agricultural practices are needed. This is evidenced by Indonesia's decreasing value of fertilizer subsidies (Hendriyo, 2024).



Source: (Hendriyo, 2024)

Figure 1. Allocation of Subsidized Fertilizer Distribution 2014-2024



Source: BPS, 2023

Figure 2. Realization of Subsidized Fertilizer Distribution 2017-2024

The graph of subsidized fertilizer distribution from 2017 to 2022 shows a decrease in the total amount distributed, which may indicate changes in policy or fertilizer demand. Some fertilizers have experienced fluctuations in their distribution; for instance, the distribution of UREA and SP-36 fertilizers shows a consistent decline, while the distribution of NPK and organic fertilizers has also changed (Prabowo et al., 2021). Although distributed relatively small amounts compared to other types, organic fertilizers experienced a significant decline in 2022. Increasing fertilizer prices and reducing government subsidies will decrease farmer productivity and increase agricultural costs (Sembiring et al., 2020; Zein & Sari, 2022). Therefore, improving farmer productivity through the independent production of organic fertilizers is crucial.

Kasgot fertilizer is one type of organic fertilizer made from natural materials and has many benefits, such as improving soil structure, enhancing soil nutrient content, and reducing dependence on chemical fertilizers (Novia et al., 2023; Rahayu, 2023). By utilizing Kasgot fertilizer, farmers in Suwayuwo Village can enhance their crop productivity while maintaining environmental sustainability. To achieve this goal, training on Kasgot fertilizer production is essential so that farmers can understand the techniques for effectively making and applying this fertilizer (Hasanah, 2021).

Previous research has shown significant benefits from using organic fertilizers, including Kasgot, in increasing agricultural productivity. For example, Sidiq, (2021) Using organic fertilizers increased rice yields by up to 25% compared to chemical fertilizers (Boroumand et al., 2018). Showed that Kasgot fertilizer can improve soil quality and reduce the need for chemical fertilizers by up to 30%. Roidah, (2013)Reported that regular application of organic fertilizers can enhance soil health and reduce soil erosion on agricultural land. Additionally, (Lukitaningsih et al., 2020) Noted that applying Kasgot fertilizer in vegetable gardens reduced production costs and increased farmers' profits by 20%. Agustin et al., (2023) It also confirmed that Kasgot fertilizer can significantly improve soil nutrient content. Lastly, Rini & Wahidah, (2024) Emphasized that using organic fertilizers, including Kasgot, contributes to sustainable and environmentally friendly agricultural practices. This empirical data supports training in Kasgot fertilizer production to improve productivity and sustainability in Suwayuwo Village.

This article will discuss the importance of Kasgot fertilizer production training as a strategic step to enhance agricultural productivity and support sustainability in Suwayuwo Village. The training aims to provide practical knowledge and skills to

farmers so they can produce and use Kasgot fertilizer efficiently and beneficially for their agriculture. Through this training, farmers can optimize their agricultural yields and contribute to environmental conservation efforts, ultimately leading to positive impacts on the well-being of the village community.

This community service aims to empower farmers in Suwayuwo Village with practical skills in producing Kasgot fertilizer, leveraging locally sourced materials for sustainable agriculture. This initiative aims to enhance farmers' knowledge of organic fertilizer production, promoting productivity and environmental conservation. The training is anticipated to improve soil fertility, boost crop yields, and reduce dependency on chemical fertilizers, fostering long-term economic sustainability for farmers. Additionally, by adopting organic practices, the community can contribute to healthier ecosystems and a more resilient agricultural landscape.

2. METHODS

The Kasgot fertilizer production training in Suwayuwo Village uses a Participatory Action Research (PAR) approach, which involves active participation from farmers throughout all stages of the activities, from planning to evaluation (Adawiyah, 2022; Yulian et al., 2022; Miliyanti et al., 2022). The preparation phase includes an initial survey to understand the farmers' needs, developing a relevant training plan, procuring necessary resources, and coordinating with relevant parties such as the village government and farmer groups. We selected these two farmer groups because they represent the two main agricultural sectors in Suwayuwo Village: horticultural and rice farmers. These groups were chosen due to their distinct agricultural practices, allowing us to demonstrate the application of Kasgot fertilizer production across different farming practices. They are also known for their high participation in previous training programs, ensuring the sustainability of this program in the village.

The training will start on July 1, 2024, at the Suwayuwo Village Hall, Sukorejo, Pasuruan Regency. The target audience for this training is horticultural farmers in Suwayuwo Village, with participation from farmer groups in the village. There will be 20 representatives from all farmer groups in Suwayuwo Village, specifically from 2 farmer groups participating in this training. Discussion and Q&A sessions will follow the material presentation to address participants' doubts or difficulties during practice. Discussions will also include the application of Kasgot fertilizer on each participant's agricultural land. In addition to the observational method, a

questionnaire will be used to evaluate participants' understanding of the materials presented during the training.

The theoretical material includes an introduction to Kasgot, its benefits for soil and crops, and its role in sustainable agriculture. Additionally, the process of Kasgot fertilizer production will be explained, including the correct steps and composting techniques, as well as organic waste management for Kasgot raw materials. In the practical field sessions, facilitators will demonstrate the Kasgot fertilizer production process from start to finish through live demonstrations (Anh Khoa et al., 2020). Participants will also practice making Kasgot fertilizer independently with facilitator guidance. Subsequently, participants' results of the Kasgot fertilizer production will be evaluated, and facilitators will provide feedback for improvement.

Further evaluation will be conducted after a 1-month curing period for the fertilizer. The evaluation tools to be implemented will include quizzes and simple tests designed to measure participants' understanding of the Kasgot fertilizer production process and organic waste management. The quizzes will include multiple-choice questions focusing on the Kasgot production stages. At the same time, the simple tests will take the form of practical exercises where participants will be asked to demonstrate one of the Kasgot production steps they have learned.

The training evaluation will involve assessing the knowledge and skills acquired by participants. Participants will also provide feedback on the training implementation and the materials presented. After the training, monitoring, and follow-up evaluation will take place. This includes field visits to agricultural lands from August 1-5, 2024, to monitor the application and effectiveness of Kasgot fertilizer, as well as evaluating the impact of the training on agricultural productivity and environmental sustainability (Faisal & Kisman, 2020). Technical assistance will be provided to participants who need further help with Kasgot fertilizer production and use. A communication network among participants will also be established to share experiences and solutions.

3. FINDINGS AND DISCUSSION

The Kasgot fertilizer production training in Suwayuwo Village was attended by 20 representatives from two local farmer groups. The training occurred over two days at the Suwayuwo Village Hall, Sukorejo, Pasuruan Regency. The event was opened with a welcome speech from the Village Head, followed by an introduction to the goals and benefits of the training, as well as introductions of the facilitators and participants. The training began with an introduction to Kasgot, an organic

fertilizer produced from earthworms' bioconversion of organic materials. The material covered included the benefits of Kasgot in enhancing soil fertility, improving soil structure, and supporting beneficial microorganism activity for plants. Additionally, the role of Kasgot in reducing dependency on chemical fertilizers and utilizing organic waste to minimize environmental pollution was explained. The Kasgot production process was taught from material preparation, collection, and chopping of organic materials, creation of composting media, the addition of worms, composting process, to harvesting Kasgot.

Further, the material covered organic waste management techniques, including sorting and storing waste to maintain Kasgot quality. The use of Kasgot in agricultural fields was explained through its application as a base and supplementary fertilizer, along with guidance on proper dosages. The benefits of using Kasgot, such as accelerating plant growth and increasing crop yields, were also discussed. Evaluation and maintenance of Kasgot involved monitoring the quality and population of worms to ensure optimal conditions. With this material, participants are expected to understand the theory and practice of Kasgot production and its application to enhance productivity and sustainability in Suwayuwo Village.

Source: Primary Data of Community Service, 2024

Figure 3. Process of Delivering Material Related to the Benefits and Production Methods of Kasgot Fertilizer

The material covers organic management techniques, including sorting and storing waste to maintain Kasgot quality. The use of Kasgot in agricultural fields was explained through its application as both a base and supplementary fertilizer, with guidance on proper dosages. The benefits of using Kasgot, such as accelerating

plant growth and increasing crop yields, were also discussed. Evaluation and maintenance of Kasgot involve monitoring the quality and population of worms to ensure optimal conditions. With this material, participants are expected to understand the theory and practice of Kasgot production and its application to enhance productivity and sustainability in Suwayuwo Village.

The practical session on Kasgot fertilizer production began with preparing materials, including cow dung, leachate, rice husk charcoal, and other organic materials such as plant residues and leaves. Cow dung was broken into smaller pieces to facilitate decomposition, while rice husk charcoal was added to improve aeration and reduce odor (Yunda Sari et al., 2020). The mixture of organic materials was then moistened with leachate, providing moisture and adding microbes and nutrients that accelerate the composting process (Memarzia et al., 2021). The mixture was layered in a composting container, maintaining adequate moisture.

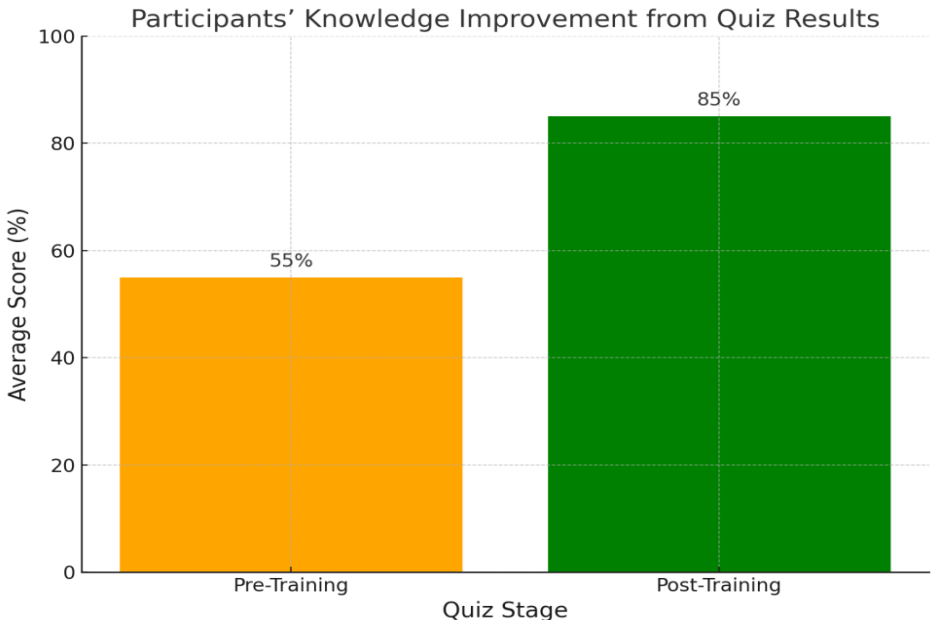
Once the composting medium was ready, participants added earthworms of Lumbricus rubellus or Eisenia foetida. Earthworms play a role in breaking down organic materials and converting them into Kasgot. Participants were taught the correct method for adding worms and the importance of keeping the composting medium moist and well-aerated to support worm activity (Mishra & Gandhi, 2017). During the composting process, participants were asked to monitor the condition of the medium periodically, turn the organic material every 2-3 weeks, and adjust moisture levels with additional leachate as needed.

Source: Primary Data of Community Service, 2024

Figure 4. Collage of Photos from Kasgot Fertilizer Production Practice

After one month, the Kasgot is ready for harvest. Participants separated the Kasgot from worms and any materials that had not fully decomposed, ensuring that the mature Kasgot had a dark brown color and a crumbly texture. The finished Kasgot was then properly stored to maintain its quality until it was used as fertilizer. The practical session concluded with a demonstration of Kasgot application in agricultural fields, where participants learned the appropriate dosage and application frequency for different types of plants. Discussions on the benefits of Kasgot for improving soil fertility and plant productivity and a Q&A session helped participants address any questions or issues they encountered.

Assessment was conducted through a quiz given before and after the training. The quiz results showed a significant improvement in participants' understanding. The average pre-training score was 55%, while the post-training average score increased to 85%. Thus, there was a 30% improvement in participants' knowledge of Kasgot production and application. Feedback from participants indicated high satisfaction with the training, particularly regarding the relevance of the material and practical teaching methods. The most successful aspect of the training was the field practice session, while some participants suggested improvements in providing more structured training materials.



Source: Primary Data of Community Service, 2024

Figure 5: Participants' Knowledge Improvement from Quiz Results

The quiz given to participants consists of 50 questions divided into five main themes related to Kasgot fertilizer, each comprising ten questions. Each theme represents 20% of the total questions. The themes used are as follows: 1) Theme 1 is about the benefits of Kasgot fertilizer for soil and plants, covering questions on how this fertilizer enhances soil fertility, improves texture, and provides plant nutrients. 2) Theme 2 focuses on the techniques of Kasgot fertilizer production, including production steps, such as composting processes, worm separation, and handling of organic raw materials. 3) Theme 3 discusses the application of Kasgot fertilizer, focusing on dosage, methods, and frequency of application across different types of plants. 4) Theme 4 addresses the impact of Kasgot fertilizer use on sustainable agriculture, including reducing dependency on chemical fertilizers and managing organic waste. 5) Theme 5 covers the challenges and solutions in the production and application of Kasgot fertilizer, where participants encounter questions about the obstacles they face in the field and strategies to overcome them.

This thematic distribution ensures that the quiz covers all theoretical and practical aspects of Kasgot, providing participants with a comprehensive understanding of its production, benefits, application, and impact on their agricultural fields.

In the initial application phase, Kasgot fertilizer was applied to participants' agricultural fields using the method taught during the training. The fertilizer was mixed evenly into the soil at a dosage of 200-300 grams per square meter, depending on the type of plant. The application was made every 3 weeks to maintain optimal soil nutrition (Zakirova et al., 2019). As observed in the post-training field visits, Kasgot helped enhance soil quality by providing better nutrients and improving soil structure. Most participants' agricultural fields showed improved plant productivity and better soil texture, consistent with findings by (Che et al., 2021), demonstrating the effectiveness of organic fertilizer in improving soil fertility.

The communication network established among participants also served as a platform to share experiences in applying Kasgot in their respective fields, including strategies for overcoming technical challenges encountered in the field. Some participants who faced difficulties received technical assistance to ensure better implementation in the future (Malkisedek Taneo et al., 2019).

The Kasgot fertilizer production training in Suwayuwo Village has provided meaningful outcomes, equipping farmers with essential knowledge and techniques for creating organic fertilizer from readily available local materials like cow dung, eel

water, and rice husk charcoal. Compared to prior community service projects focused on organic fertilizer production, this training emphasized practical and hands-on approaches, allowing farmers to produce and apply Kasgot fertilizer on their crops independently. This aligns with previous findings, such as those of (Suparwata et al., 2022), who demonstrated that organic fertilizers could improve crop yields significantly, thus reducing farmers' dependence on chemical fertilizers. However, similar to challenges faced in other studies, issues regarding facility limitations and production scalability were encountered, underlining the need for better tools and ongoing support to maximize production quality and quantity.

The effectiveness of Kasgot fertilizer aligns with ecological theories on sustainable agriculture, particularly in promoting soil health through organic amendments. Organic fertilizers like Kasgot enhance soil structure, improve nutrient retention, and support microbial activity, which is crucial for long-term soil fertility and productivity. The study by (Ibrahim et al., 2020) Supports these benefits, showing that Kasgot fertilizer significantly enhances soil nutrient content, which is beneficial for crop growth. Similarly, (Çop, 2021) Emphasizes that organic fertilizers contribute to environmental sustainability by reducing the ecological impact associated with synthetic fertilizers. This theoretical foundation affirms that Kasgot fertilizer has direct agronomic benefits and fosters an eco-friendly agricultural system that aligns with sustainability goals (Ramlah et al., 2022).

The challenges experienced in the current training, such as issues with moisture control and aeration in composting, highlight technical aspects that could benefit from improved equipment and expertise. Prior projects have noted that the success of organic fertilizer production often depends on consistent technical support and access to adequate composting facilities. Periodic technical assistance could help farmers overcome these challenges and optimize the benefits of the Kasgot application. Drawing from (Boley et al., 2017), continuous improvement in organic fertilizer methods is essential to achieving sustainable results. Through future training and technical assistance, Suwayuwo farmers can potentially enhance Kasgot's effectiveness, improving the village's agricultural resilience and economic stability.

4. CONCLUSION

The Kasgot fertilizer production training in Suwayuwo Village effectively provided farmers with knowledge and skills in organic fertilizer production using local materials such as cow dung, eel water, and rice husk charcoal. Kasgot can

improve soil fertility, boost plant productivity, and support sustainable agricultural practices in the village. Despite the positive outcomes, the training faced challenges, including insufficient facilities and equipment for large-scale production and issues with maintaining optimal moisture and aeration during composting. A notable limitation of this community service project is the need for more sufficient facilities and equipment, which hampers the scalability of Kasgot fertilizer production. Additionally, the impact of the training may be constrained without ongoing technical support to help farmers overcome challenges in maintaining optimal composting conditions. To enhance future training, better facilities and tools are needed, along with the option to extend the composting period for improved quality. Periodic technical assistance also helps participants optimize Kasgot's use in their farming practices.

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