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Enhancing Farmers' Knowledge and Sustainable Agriculture through Coconut Husk Utilization in Kalikur Village

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Abstract

Purpose: This program aimed to enhance farmers' knowledge of coconut husk waste management by transforming it into cocopeat, an eco-friendly planting medium. The initiative sought to promote sustainable agriculture and provide economic benefits for the community.

Method: A participatory approach was used, involving community engagement through observation, socialization, training, and hands-on practice. The process included theoretical discussions, practical demonstrations, and knowledge assessments through pre- and post-tests.

Practical Applications: Farmers learned to convert coconut husks into cocopeat using simple tools. The training increased awareness of waste management and provided an alternative planting medium with high water retention and nutrient content, benefiting agricultural productivity.

Conclusion: The program successfully increased participants' knowledge by 57%, demonstrating the effectiveness of agricultural extension in improving local resource utilization. Future efforts should focus on continued training and mentorship to ensure sustainable implementation and long-term benefits.

Introduction

Kalikur Village is one of the villages located in Buyasuri District, Lembata Regency, East Nusa Tenggara Province, characterized by rocky topography. This terrain limits conventional agricultural activities, leading most of the population to work as fishermen, farmers, or laborers. Despite these challenges, natural resources such as coconut serve as the primary source of income for the local community. Coconut is the main commodity in Kalikur Village, but its utilization remains limited—primarily for copra production, while coconut husks are often discarded as waste, accumulating without proper management (BPS 2022).

The increasing complexity of environmental issues, particularly concerning organic waste, highlights the need for innovative and sustainable resource management. Coconut husks, a byproduct of coconut processing, have significant potential for utilization. However, they are often considered waste with no economic value, leading to indiscriminate disposal or burning, which contributes to environmental pollution (Yuliah et al. 2022). Coconut husks can be processed into value-added products such as cocopeat, which serves as a growing medium in agriculture.

According to Efrita et al. (2020), cocopeat, a fine powder derived from coconut fiber processing, is recognized as an environmentally friendly growing medium with several advantages. It has high water retention capacity, good aeration, and nutrient content that supports plant growth while being free from harmful pathogens, making it ideal for organic vegetable cultivation. Cocopeat is highly effective in retaining and storing water and is rich in essential nutrients such as calcium (Ca), magnesium (Mg), potassium (K), sodium (Na), and phosphorus (P) (Abdillah et al. 2023).

Processing coconut husks into cocopeat can be done using simple tools, such as graters made from recycled cans, which are easy to make and use. The adoption of such simple tools can encourage community participation in agricultural waste management. The development of simple tools for cocopeat production is essential, as they can facilitate the process, making it more affordable and widely accessible, particularly in coconut-producing areas (Zaky Yahya et al. 2024). Community empowerment programs that include training and awareness campaigns can serve as a solution to enhance public understanding of coconut husk waste utilization (Sulistyani et al. 2024). Utilizing coconut husk waste for cocopeat production aligns with sustainable agriculture principles, emphasizing efficient and environmentally friendly resource management (Salim 2021).

A major challenge in this initiative is the community's limited awareness of coconut husk waste management. The lack of facilitators and agricultural extension workers in Kalikur Village has resulted in a lack of knowledge about the potential of coconut husks as a growing medium. Effective agricultural extension programs can improve farmers' knowledge and skills in utilizing local resources, thereby enhancing agricultural productivity. Coconut husks can be processed into cocopeat, a sustainable and eco-friendly growing medium suitable for modern agriculture.

One effective approach for agricultural extension is the Participatory Rural Appraisal (PRA) method, which emphasizes community participation in analyzing and addressing local issues (Sulaeman et al. 2023). This method fosters collaborative discussions, allowing the community to identify priority problems, explore local potentials, and develop action plans along with evaluation strategies (Anindita 2023; Iftinani et al. 2023).

Method

This extension program adopts a participatory approach that directly engages the community. To enhance farmers' knowledge on processing coconut husk waste into cocopeat as a planting medium, we implement an interactive and hands-on extension method. The program is designed to provide farmers with practical insights into the benefits and techniques of coconut husk processing, as well as the application of cocopeat as an environmentally friendly growing medium. Various stages of planning and preparation were carried out to

ensure the effectiveness of this program.

The first stage involved observation, where direct visits and interviews were conducted with the residents of Kalikur Village. This process aimed to assess the potential of natural resources, agricultural conditions, and the challenges faced by the community. The findings from this stage served as the foundation for designing solutions to help farmers address their problems.

Following the observation phase, activity planning was conducted based on the gathered data. The proposed activities were then presented during the *Musrenbang* (Development Planning Meeting) to align them with the village's development priorities. Afterward, coordination was carried out by obtaining necessary approvals from the village head, hamlet leader, and local mentors. This step ensured that all planned activities adhered to the decisions made during the *Musrenbang*.

The next stage was socialization, which aimed to educate the community on several key topics. These included an overview of the agricultural conditions in Kalikur Village, an introduction to organic planting media, the utilization of coconut husk waste for cocopeat production, and the step-by-step process of making cocopeat as a growing medium.

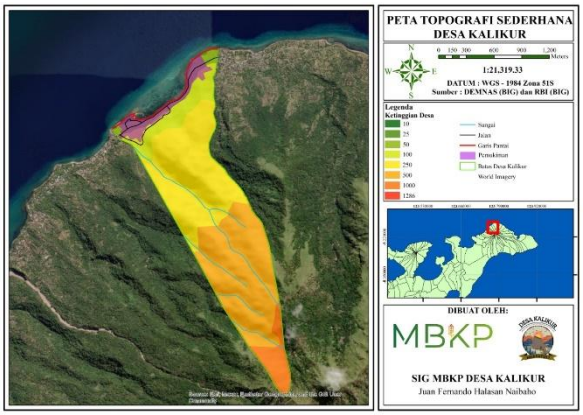
Following the socialization stage, cocopeat production training was conducted. During this session, participants were introduced to the required tools and materials, followed by a live demonstration of the production process. Instructional leaflets were also provided to support learning, and participants were given the opportunity to practice the technique themselves.

Lastly, the program included assistance and evaluation to ensure the successful adoption of cocopeat production techniques. Participants were monitored as they applied their new skills, and a discussion session was held to assess their understanding. The effectiveness of the program was measured using pre-test and post-test questionnaires, allowing for an analysis of knowledge improvement among farmers. Through this comprehensive approach, the extension program effectively empowered the community to manage agricultural waste sustainably.

Result

The socialization event titled "Independent Farmer Field School: Utilizing Coconut Husk into Cocopeat for Sustainable Agriculture" was held on Thursday, November 28, 2024, from 5:00 PM to 8:00 PM WITA. The event took place in Alang Hunaero, Dusun 1, Kalikur Village, Buyasuri District, Lembata Regency. The location of the event is depicted in the topographic map of Kalikur Village (Figure 1).

Figure 1. Map of Kalikur Village



Source: Author's work, 2025.

Implementation of the cocopeat growing media extension program

The cocopeat production extension program was attended by 16 female farmers, who coordinated with the head of Dusun 1 to select a strategic location for the event. The primary goal of this initiative was to provide the community of Kalikur Village with direct knowledge on how to utilize coconut husk waste, transforming it into value-added products such as cocopeat, which can be commercially beneficial.

The event began with opening remarks from the author, village officials, and local mentors. This was followed by a theoretical session on the benefits of coconut husk utilization and a practical demonstration, where participants were trained on the process of making cocopeat as an eco-friendly planting medium.

Figure 2. Presentation of The Training Materials

Source: Author's work, 2025.

The material was presented through a lecture method (Figure 2). The session began with an explanation of the topographical conditions of Kalikur Village, followed by a discussion on the village's natural potential, particularly coconut trees. The presentation then covered coconut husk waste and its various applications.

The practical session for making cocopeat started with preparing the necessary tools and materials. The required tools included a grater made from a used tin can, a paint bucket or basin, a sieve, gloves, and a tarp or sack. The materials consisted of coconut husks, EM4 (a microbial decomposer), water, and a brown sugar solution.

Once the tools and materials were ready, the women farmers participated in the hands-on practice by following these steps:

1. First, the selected coconut husks were grated using a homemade grater with a consistent motion according to individual preference. This process produced two types of materials: coarse fibers (cocofiber) and fine powder (cocopeat).
2. Next, the coarse fibers (cocofiber) were separated from the fine powder (cocopeat) using a sieve.
3. After sieving, the cocopeat was placed into a bucket or basin for fermentation. The fermentation mixture was prepared using a specific ratio: for every 1 kg of cocopeat, 5 ml of EM4, 5 ml of brown sugar solution, and 1 liter of water were added. In this session, 5 kg of cocopeat was used, requiring 25 ml of EM4, 25 ml of brown sugar solution, and 5 liters of water.
4. The fermentation process was essential to remove tannins, which can hinder plant growth. This process took three days, with the fermented mixture being stirred and replaced every 24 hours.
5. Once fermentation was complete, the final step involved drying the cocopeat until it was fully dried and ready for use.

The hands-on cocopeat-making activity was attended by women farmers who were part of a farming group (Figure 3). The session was supported by a presentation on the

process of making cocopeat as a planting medium.

Figure 3. Cocopeat training process

Source: Author's work, 2025.

Before the extension activity began, the facilitator conducted a brief knowledge assessment by distributing questionnaires to the farmers to gauge their understanding of cocopeat as a planting medium. Throughout the session, from the presentation and demonstration to the closing discussion, the facilitator encouraged open discussions and a Q&A session. Farmers were given the opportunity to ask questions about any aspects they did not fully understand and to share their experiences in utilizing coconut husk waste as a planting medium. The facilitator actively guided these discussions to ensure that all participants gained a clear and thorough understanding. Toward the end of the session, a short evaluation was conducted by administering the same questionnaire again to assess the farmers' understanding after the training. The scoring categories for the pretest and posttest were as follows: 0-50 (low), 51-70 (moderate), 71-80 (good), and 81-100 (excellent). Additionally, the percentage increase in knowledge was calculated by determining the difference between the posttest and pretest scores (Supardi, 2023).

Most of the residents of Dusun 1, Kalikur Village, who participated in this activity work as coconut farmers. This extension program has been highly beneficial in enhancing the community's understanding of utilizing all parts of the coconut plant, particularly coconut husks, which have long been considered waste and underutilized. It is hoped that this initiative will bring significant benefits to agricultural practices and generate economic advantages for the community. An analysis of the questionnaire results revealed that out of 16 participants, 9 showed an increase in knowledge classified as low, 6 fell into the moderate category, 1 participant reached the good category, and none were classified as very good (Table 1).

There was a noticeable increase in the community's knowledge level, particularly among female farmers, after participating in the training compared to before the program was conducted. Overall, the community's knowledge level increased by 57%, rising from 31% to 88% (Table 1). The low pretest scores were due to the community's limited awareness of the potential benefits of coconut husk waste as a planting medium (cocopeat). Most residents only utilized the coconut flesh for making copra. Additionally, there had never been any previous training on the utilization of coconut husk waste

Table 1. Enhancing Farmers' Knowledge Level in Utilizing Coconut Husk Waste into Cocopeat

No of Participant	Pretest	Posttest	Category
1	20	70	Low
2	30	80	Low
3	20	80	Moderate
4	40	90	Low
5	30	70	Low
6	50	100	Low
7	30	80	Low
8	30	100	Moderate
9	20	90	Moderate
10	40	90	Low
11	20	100	Good
12	20	80	Moderate
13	40	90	Low
14	50	100	Low
15	30	90	Moderate
16	20	90	Moderate
Average	30.6	87.5	

Source: Author's work, 2025

Discussion

The results of this community-based agricultural extension program in Kalikur Village demonstrate that targeted educational interventions can significantly improve farmers' knowledge and promote sustainable agricultural practices. The 57% increase in post-test scores among the 16 female farmer participants clearly illustrates the effectiveness of combining theoretical instruction with hands-on training in cocopeat production. This measurable improvement indicates that the participatory approach used—encompassing observation, socialization, practical demonstrations, and continuous evaluation—was well-suited to the local context and learning needs of the community.

One of the key outcomes of the program was the transformation of coconut husk waste, which was previously considered useless and often discarded or burned, into a valuable product: cocopeat. As an eco-friendly planting medium, cocopeat offers numerous benefits including high water retention, good aeration, and essential nutrient content such as calcium, magnesium, potassium, and phosphorus. These characteristics make it particularly suitable for small-scale farmers facing rocky topography and limited arable land, like those in Kalikur Village. By adopting cocopeat, farmers can enhance soil quality without relying heavily on chemical fertilizers, aligning with broader goals of sustainable agriculture.

The use of simple, locally available tools—such as graters made from recycled tin cans—ensured that the process remained accessible and replicable within the community. This low-cost, resource-efficient method encourages greater participation and ownership among villagers, especially women who play a significant role in coconut processing but are often underrepresented in formal agricultural training programs. Their active involvement in the cocopeat-making process not only improved their technical skills but also empowered them economically and socially.

Moreover, the integration of fermentation using EM4 and brown sugar solution demonstrated how basic scientific principles could be applied practically to improve product quality by removing tannins that inhibit plant growth. This stage was crucial in ensuring that the resulting cocopeat met agricultural standards and provided optimal conditions for plant development.

The program's success highlights the importance of ongoing mentorship and follow-up training to reinforce learning and ensure long-term adoption of these practices. Without continued support, there is a risk that initial enthusiasm may diminish over time. Therefore, institutionalizing the program through community-based organizations or cooperatives, and aligning it with local government development plans, could help sustain momentum and provide access to additional resources and market opportunities.

Additionally, the model developed in Kalikur Village offers a replicable framework for other rural areas facing similar challenges. Adapting the program to different socio-ecological contexts through collaborative stakeholder engagement, context-specific planning, and capacity-building initiatives can maximize its relevance and impact across regions. In conclusion, this initiative not only enhanced farmers' understanding of waste utilization and sustainable farming techniques but also laid the foundation for future community-driven development efforts. It serves as a testament to the power of collaboration between academia, local communities, and government institutions in addressing environmental and economic challenges through innovative, grassroots-level solutions.

Conclusion

This community-based agricultural extension program demonstrated a significant positive impact on the knowledge and understanding of local residents, particularly among the 16 female farmer respondents. The effectiveness of the program was clearly reflected in the 57% increase in post-test scores compared to pre-program assessments, indicating a substantial improvement in their comprehension of sustainable farming practices and resource utilization—especially in relation to coconut husk processing. Through structured training sessions, hands-on demonstrations, and interactive discussions, participants gained practical skills and confidence in applying innovative techniques that align with environmentally friendly agricultural practices. This measurable outcome not only highlights the importance of targeted educational interventions but also underscores the potential for such programs to empower marginalized groups within rural communities.

Looking ahead, the continuity of agricultural extension efforts is crucial to sustaining and deepening this progress. Future initiatives should include ongoing technical assistance, refresher training, and mentorship programs to reinforce learning and encourage long-term adoption of sustainable practices. To ensure institutional support and longevity, these programs can be integrated into local government development plans and formalized through community-based organizations or cooperatives. Supportive policies at the regional level will further help maintain momentum and provide necessary resources. Additionally, the success of this initiative provides a replicable model for other regions facing similar challenges. By adapting strategies such as stakeholder collaboration, context-specific planning, and community-led capacity building, similar programs can be effectively tailored to suit diverse socio-ecological environments across different locations. This approach not only enhances local resilience but also contributes to broader national goals in sustainable rural development.

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