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Training on Making Mangrove-Based Beauty Soap Innovation Products in Sungsang IV Village, South Sumatra

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ABSTRACT

Background: In an effort to enhance the utilization of mangrove forests based on local coastal resources, a community service initiative was conducted in Sungsang Village, Banyuasin Regency, on 25-26 September 2024. The training focused on teaching 40 participants how to produce beauty liquid soap from *Sonneratia caseolaris* (mangrove) leaf extract.
Contribution: This activity Contributes to improve the technical skills of making beauty liquid soap from mangrove plants as an effort to optimize the utilization of mangrove forest vegetation in Sungsang Village.
Method: The method of this service activity is a training in making liquid soap through product prototype demonstration and direct assistance.
Results: In general, the participants' knowledge about making beauty liquid soap from mangroves has increased after undergoing training activities.
Conclusion: The pre-test and post-test evaluation of the 40 participants showed a significant improvement in their understanding, with the evaluation graph showing a shift from low to better levels of knowledge. While there were variations in the level of understanding about beauty liquid soap.

1. Introduction

Based on its geographical location, Sungsang Village, Banyuasin Regency, is situated at coordinates 104°52'59.5" to 104°55'6.6" East, in the Musi River Estuary, adjacent to the Bangka

Strait. The village covers an area of 178,369.20 km² and is home to 1,471 families, with most residents working as fishermen due to the abundant marine resources [1],[2]. The village also contains extensive mangrove forests, including *Sonneratia caseolaris* (pedada), a species commonly found along the coast [3]. While the fruits of *S. caseolaris* have traditionally been used for food and beverages, other parts of the plant, such as the leaves, remain underutilized despite their bioactive potential [4],[5].

A significant gap in the utilization of *S. caseolaris* lies in the community's limited knowledge and access to technology for processing it into higher-value products [6]–[8]. An initial survey revealed that the local population lacks awareness of the antioxidant properties found in *S. caseolaris* leaves, which contain compounds like flavonoids and phenolic acids known for their antioxidant activity [9]. Studies have demonstrated that the antioxidant activity of *S. caseolaris* leaves, measured through DPPH and FRAP assays, is comparable to that of well-known antioxidants such as green tea and vitamin C, indicating their potential to be harnessed for eco-friendly beauty products [10], [11].

Liquid soap, created through a saponification process between potassium hydroxide (KOH) and vegetable oil, offers several advantages, including ease of use, efficiency, and bacterial resistance [12],[13]. By leveraging the antioxidant properties of *S. caseolaris* leaves, this research addresses gaps in product development while aligning with the rising demand for sustainable and natural cosmetics in both local and international markets [14]. The eco-friendly beauty product market is projected to grow at a compound annual growth rate (CAGR) of 5.6% through 2026, presenting significant opportunities for *S. caseolaris*-based innovations.

This study contributes to local economic empowerment by offering alternative livelihoods through mangrove-based product innovations. To address the community's limited understanding of *S. caseolaris*, targeted educational programs, and workshops will be organized to teach sustainable harvesting techniques, the extraction of antioxidant compounds, and product development strategies. Collaborations with local organizations and educational institutions will facilitate knowledge transfer and provide ongoing support, enabling the community to transition into eco-friendly product manufacturing. This approach exemplifies how the development of eco-friendly beauty products can foster both economic resilience and environmental sustainability.

2. Method

The community service activities were carried out in Sungsang IV Village, Banyuasin Regency, South Sumatra, in September 2023. The target partners were community groups from Sungsang IV Village consisting of approximately 40 people. Participant selection criteria include socio-economic background, previous experience in craft activities or home production, and balanced gender representation. This community service activity was assisted by Sungsang IV Village officials, students, and a team of lecturers. The method of implementing this service includes training in liquid soap production through product prototype demonstrations and direct assistance [15].

The stages of community service activities include: 1) Site Monitoring and Preparation: An initial survey was conducted to identify the presence of mangrove plant resources in the surrounding environment, ensuring the availability of raw materials for liquid soap production. Licensing and coordination with local village officials are important for collecting community group data and administrative arrangements; 2) Gradual and Controlled Liquid Soap Making Training: The training session was organized into four sessions, each lasting approximately three hours. The sessions include an introduction to liquid soap production, detailed instructions on the production process, hands-on practice, and training review and evaluation; 3) Activity Monitoring and Evaluation: Monitoring was conducted throughout the training to ensure understanding and skill acquisition.

A detailed flowchart of these stages is included to visualize the step-by-step process of the service activities and ensure clarity in the implementation plan. Figure 1 Flowchart of the Community Service Process. Various media aids such as slides, projectors, screens, and brochures were used to deliver the materials manner clearly and engagingly. Educational materials are provided in the form of slides and videos to help participants easily understand the technique of making liquid soap from mangrove leaves [15].

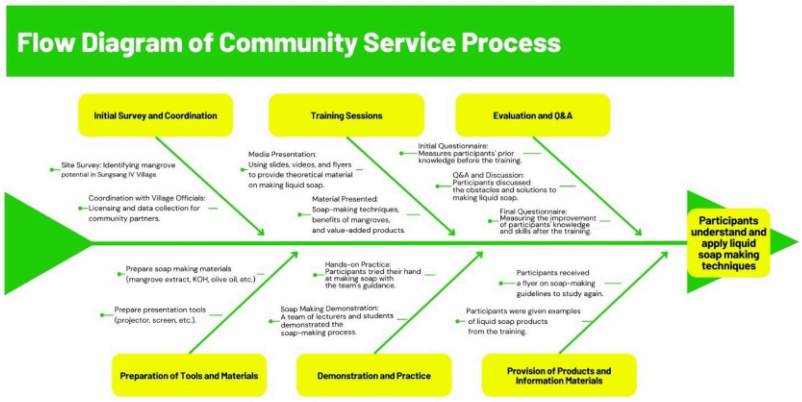

Figure 1. Flow Diagram of Community Service Process

Upon completion, participants received the liquid soap products they had made, along with an educational brochure to reinforce the information learned for relearning. Demonstrations were led by university students, who guided participants through each step in using the tools and materials. Tools and materials used in this activity included mangrove leaf extract, red ginger extract, KOH, distilled water, citric acid, olive oil, glycerin, aminone, food coloring, fragrance, stainless steel bowl, electric stove, and glass jar.

Before the demonstration, the participants filled out a pre-training questionnaire to assess their initial knowledge of liquid soap production [16], [17]. A questions and answer session

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followed, allowing participants to discuss problems and solutions related to liquid soap production and sustainable utilization of mangroves. Afterward, participants were given a post-training questionnaire to evaluate the increased knowledge and skills gained from the community service activity [15],[18].

3. Results and Discussion

Training in making liquid soap innovation products is crucial for improving the knowledge and skills of participants/community groups in Sungsang IV Village. The results of the pre-test and post-test evaluations show a significant increase in participants' understanding of the process of making beauty liquid soap from *Sonneratia caseolaris* mangrove leaf extract. As demonstrated in Figure 2, the training agenda involved 40 participants from Sungsang IV Village, providing a comprehensive learning experience. The evaluations reflect the effectiveness of the training, indicated by the shift in participants' knowledge from "don't know" to "know" in various aspects of liquid soap production.

To increase the rigor of the research results, graphs were added Figure 3 that quantitatively illustrate the improvement of participants' knowledge and skills post-training. For example, Figure 6 presents the results of the community service questionnaire showing the percentage increase in understanding of participants' skill attainment, liquid soap characteristics, packaging methods, pricing strategies, composition, and market conditions. This quantitative data underscores the effectiveness of the training program in fostering practical skills and theoretical knowledge.

Figure 2. Providing material for service activities

The findings of this study align with previous research that highlights the potential of mangrove extracts as natural antibacterial agents in cosmetic products. Similar studies have demonstrated the effectiveness of S. aseolaris in promoting health and reducing reliance on synthetic compounds such as triclosan [19]–[21], which are commonly used in commercial liquid soaps but pose health risks due to bacterial resistance and potential allergic reactions [22],[23]. The use of mangrove leaf extracts offers a safer, eco-friendly alternative, reflecting

growing trends in sustainable beauty product innovations. Previous works, such as those referenced in [8],[9], have shown that using ethanol in the maceration process, followed by rotary evaporation, results in a crude extract rich in beneficial secondary metabolites [24], [25].

The success of this training program has significant implications for the economic empowerment of coastal communities in Sungsang IV Village. By teaching participants how to utilize natural resources such as mangroves, this training contributes to the development of local industry while also raising awareness of the importance of sustainable resource management [26]. The practical skills acquired can be immediately applied to enhance the livelihood of the community, fostering a local business ecosystem centered around environmentally friendly products. Furthermore, the substitution of synthetic chemicals like triclosan with natural alternatives emphasizes the broader movement toward safer cosmetic products, as supported by the discussion in [11],[12].

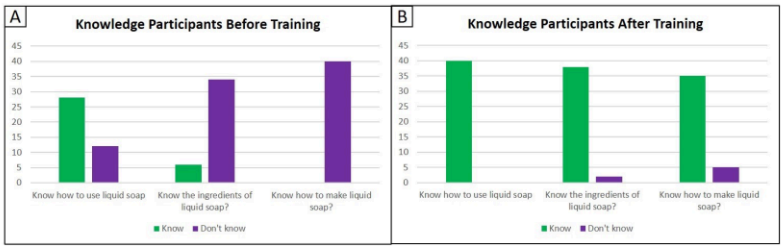

Figure 3. (A) Knowledge participants before training, (B) Knowledge participants after training.

A key strength of this study is the highly participatory approach adopted during the training, which included hands-on demonstrations and active engagement through Q&A sessions, as depicted in Figures 4, Figure 5. This method proved effective in increasing participant interest and knowledge retention. However, a limitation identified from the post-training evaluation, shown in Figure 4, is the variation in participants' understanding, which may be attributed to differences in educational background and prior experience. This finding suggests that future training programs should consider tailoring the material to accommodate participants' diverse backgrounds, thus improving overall comprehension.

Figure 4. Discussion and Q&A session of service activities

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Figure 5. Documentation at the closing of service activities

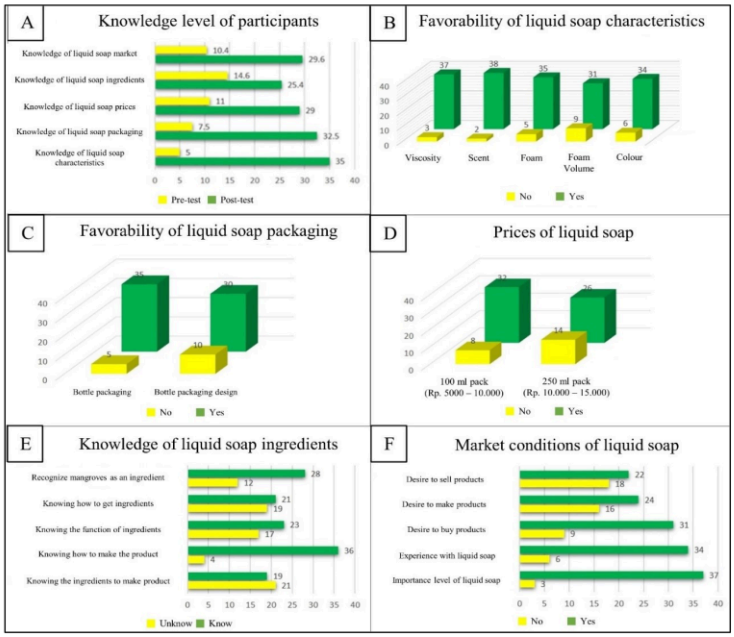

Figure 6. Results of the community service questionnaire, (A) Participants' ability achievements; (B) Characteristics of liquid soap; (C) Liquid soap packaging; (D) Liquid soap price; (E) Liquid soap composition; (F) Liquid soap market conditions

The results of this study highlight the positive impact of using mangrove leaf extracts in the creation of liquid soap, both in terms of practical application and community empowerment. This training program has proven to be a successful initiative for improving local economic opportunities. Moreover, it aligns with Sustainable Development Goals (SDGs) such as Goal 12

(Responsible Consumption and Production) and Goal 14 (Life Below Water), emphasizing the need for sustainable practices in coastal areas. The integration of local policy-making related to mangrove conservation and community development is also essential for the long-term success of such initiatives. Expanding this project to other coastal communities with similar resources could further enhance its impact, promoting sustainable practices and economic resilience in vulnerable regions.

While this training initiative has proven effective, further research and development are necessary to optimize the program's scalability and accessibility, ensuring that similar communities can also benefit from the knowledge and skills gained in sustainable liquid soap production.

4. Conclusion

The training on making beauty liquid soap from *Sonneratia caseolaris* mangrove leaf extracts, involving 40 participants in Sungsang IV Village, effectively improved their knowledge, as demonstrated by significant pre-and post-test results. Despite variations due to participants' diverse backgrounds, the participatory approach fostered strong engagement and practical skill transfer. This study highlights the economic potential of underutilized mangrove species, contributing to sustainable development goals. Limitations include the study's short duration and localized scope, suggesting future research on long-term impacts and scalability. Overall, it provides a model for sustainable community empowerment and eco-friendly product innovation.

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