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ARTICLE

OPTIMIZATION AND DEVELOPMENT OF PACKAGING IN THE PRODUCTION OF AREN SUGAR (ARENGA PINNATA MERR.) AS A SUPERIOR PRODUCT OF KEMANG VILLAGE

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Abstract

Kemang village in the Bojongpicung District, Cianjur Regency, has natural potential in the form of aren trees that produce sap with a sugar content of 10–15%, which is then processed into ant sugar in the form of yellowish-brown powder. However, the ant sugar products from this village still face challenges in packaging due to the limited knowledge and technology among local producers. This research aims to optimize the production process up to packaging and develop packaging innovations to enhance product quality. With a descriptive qualitative field research approach, direct observations were made of the production process at BUMDesa Kemang. The result is a new packaging that is more informative, visually appealing, and uses aluminum foil in accordance with SNI 0957:2017, which can protect the product from light, air, and moisture, thereby maintaining quality and extending the product's shelf life.

Keywords: Arenga Palm Sugar, Packaging, Product Innovation

A. INTRODUCTION

Palm sugar is one of Indonesia's leading products derived from the sap of the sugar palm tree (Arenga pinnata), and has become an essential part of rural life, especially in tropical regions like Indonesia (Wahyuni, Wibowo, & Rosyidah, 2021). This commodity not only has high economic value but also reflects local wisdom practices in the sustainable use of natural resources (Aliputty, Leiwakabessy, & Pattipeilohy, 2023). In the context of village development, palm sugar's potential is significant because it can stimulate local economies based on renewable natural resources (Ariani & Sutrisno, 2021).

Figure 1. Sugar Palm Tree (*Easter pinata*)

According to the Forestry Research Institute (2025), the sugar palm tree is highly adaptable to various geographical conditions and can grow without intensive care, making it a strategic crop for agricultural communities. In many villages in Indonesia, including Kemang Village in Bojong Picung District, Cianjur Regency, palm sugar production has become a

primary livelihood. However, challenges remain in production and marketing. Classical issues such as limited processing technology, unattractive packaging, and limited market access are major obstacles to increasing the competitiveness of palm sugar products in both local and global markets (Fauzi, Sari, & Fitri, 2021; Hanifah, 2023).

Global trends show increasing consumer interest in natural, low-glycemic products, making palm sugar a potential alternative to granulated sugar (Purba, Putri, & Sari, 2022; Riyanto & Hidayah, 2023). As health awareness increases, export markets are also beginning to look to products like palm sugar as a more practical and valuable variant of palm sugar. This is where innovation is crucial, not only in the production process but also in packaging aspects that comply with food safety standards and modern market aesthetics (Eli, 2021; Maryani & Sukmawati, 2022).

Several studies have been conducted on palm sugar production. Wahyuni et al. (2021) highlighted the local wisdom aspect of the traditional palm sugar production process in West Java. This study emphasized the importance of cultural preservation while optimizing product added value through traditional approaches. Meanwhile, Dharmayani, Syahrul, and Annisa (2023) emphasized the effectiveness of the sap tapping and processing processes that influence the final quality of palm sugar, while Fauzi et al. (2021) focused on consumer trends toward natural products, including palm sugar, as a healthy alternative.

However, there is little research specifically addressing the development and optimization of palm sugar packaging, despite its crucial role in determining product competitiveness in the market. Eli's (2021) study on the SNI 3743:2021 standard remains the only reference regarding palm sugar packaging, but remains limited within the regulatory framework. Previous studies have focused more on general production and marketing aspects, with limited focus on integrating innovative packaging based on modern market needs, particularly for export (Yuliana & Fitria, 2023; IAIN Kediri, 2023). Therefore, a more applicable and innovative approach is needed to address current challenges in the field, particularly in the context of palm sugar-producing villages like Kemang Village.

The urgency of this research lies in the need to increase the added value of palm sugar products through optimization of the production process through to packaging, so that the product can compete in both local and international markets. Kemang Village has great potential to become a model for developing superior products based on local wisdom integrated with modern industrial standards (BSI Maslahat, n.d.; Azzahra & Hermawan, 2023). In the context of the local economy and community empowerment, strengthening the palm sugar product value chain is a crucial strategy that needs to be supported by packaging innovation and overall product quality improvement. Based on the above background, the objective of this research is to optimize the palm sugar production process until the final stage, namely the packaging process, as well as to create innovation and development of palm sugar packaging to produce a quality and competitive product.

B. LITERATURE REVIEW

Added Value

Value-added theory states that the production process must be able to increase the value of a product from its raw form to a higher-value product. In the context of the local economy, value-added is seen not only from an economic perspective (selling price), but also from a social and environmental perspective (Porter, 1985; Mulyadi & Handayani, 2016). Indicators:

- Changes in the physical form of a product to make it more valuable
- Increase in product selling price after processing/packaging
- Increased visual and functional appeal of the product due to packaging
- Increased market access (local and export) post-innovation

- Increased income of farmers/processors due to this process.

Product Innovation

According to Schumpeter (1934), product innovation is the introduction of new products or significant improvements to existing products, whether in terms of function, design, technology, or quality. In the case of palm sugar, innovation focuses on the processing method and the design and function of the packaging. Indicators:

- There are new features in the product
- There is product differentiation compared to competitors
- Packaging suitability to modern market needs
- The level of consumer acceptance of innovative products
- Increase in sales or demand after the innovation is implemented.

Packaging Quality

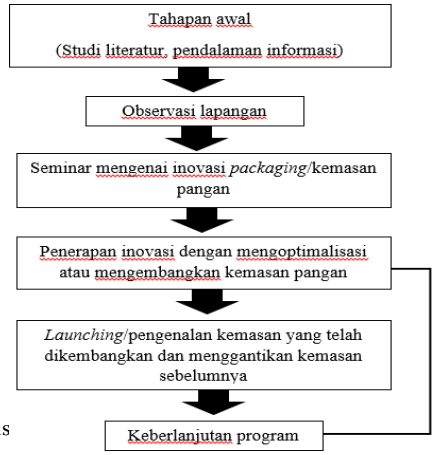
This theory states that packaging functions not only to protect the product but also as a marketing tool that determines consumer perception of product quality (Ampuero & Vila, 2006). In food products, aspects of food safety, aesthetics, and product information are crucial. Indicators:

- The durability of packaging in protecting the contents from damage and contamination.
- Clarity of information on packaging labels
- Visual aesthetics of packaging
- Compliance with national/international standards
- Use of environmentally friendly or easily recycled materials
- Convenience and practicality in use.

C. RESEARCH METHODOLOGY

The type of research used is empirical field research, namely by conducting field investigations of materials related to the production process of palm sugar at the Village-Owned Enterprise (BUMDesa) Kemang, Bojongpicung District, Cianjur Regency, until the final process, namely packaging and innovation and product development. The approach used in this study is a qualitative approach with a descriptive type. As explained by Sugiyono (2022), the descriptive qualitative method is a method based on the post-positivist view, which is used to study phenomena in natural situations, where the researcher acts as the main instrument in the process of data collection and analysis.

Figure 2. Activity Flow Diagram



The materials used in the production process of palm sugar are; palm sap (Arenga pinnata Merr.) and kawao/laru roots (Millettia sericea Sp.) obtained from palm farmers in Kemang village, Bojongpicung sub-district, Cianjur regency. The tools used in the production process are simple traditional tools, namely; lodong (tube made of bamboo), bamboo sieve/sifter, frying pan, bamboo container, spatula, and coconut shell. Production Process Flow Diagram, the output data obtained from field observations in the palm sugar production process by BUMDesa Kemang, namely the sequence of the palm sugar production process presented in the form of a flow diagram.

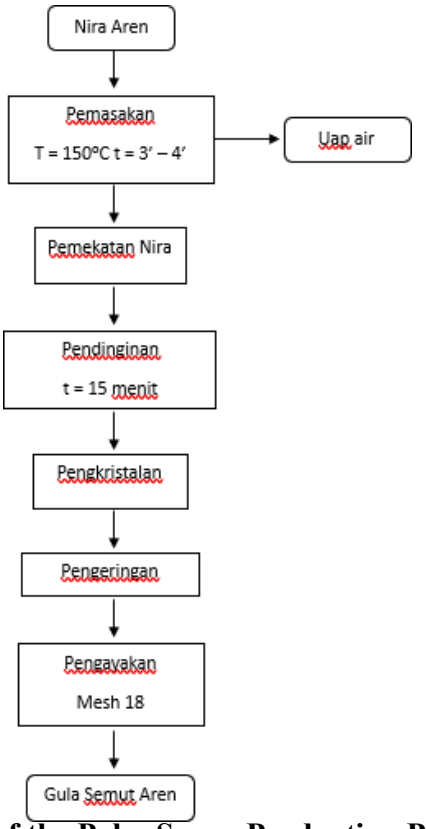


Figure 3. Flowchart of the Palm Sugar Production Process

D. RESULTS & DISCUSSION

Palm sugar is a high-value product made from fresh palm sap, crystalline, with a distinctive aroma, and a yellow-brown color, in accordance with SNI Palm Sugar 3743:2021. The sap is preserved with a solution made from kawao roots (Millettia sericea Sp.) to prevent fermentation. The cooking process is carried out at a temperature of 150^0C with continuous stirring and the addition of coconut oil to prevent overflow and burning. The end point is marked by the sap thickening and clumping in cold water (Musita N., 2019). After that, the sap is cooled, stirred for 15 minutes until crystals form (Roosmayanti et al., 2021), then crushed, sieved with an 18-mesh mesh, and the remaining sieve is ground again in a hot pan.

Figure 4. Palm Sugar Production Process

Packaging plays a crucial role in maintaining the quality, shelf life, and selling value of palm sugar. This product is hygroscopic due to its content of reducing sugars such as glucose and fructose, with hydroxyl groups (-OH) that readily bind water, especially in high humidity (Musita, 2019). Therefore, moisture-resistant packaging such as laminated aluminum foil or multilayer plastic is necessary to prevent caking, mold, and fermentation.

Figure 4. Packaging before development or innovation

The palm sugar packaging used is a plain, transparent plastic standing pouch without any label or product identification, making it unattractive and unprofessional. The lack of information such as brand, origin, and product benefits can undermine consumer confidence in the product's quality and safety. Furthermore, transparent plastic readily absorbs air and moisture, which can accelerate product deterioration. As a result, palm sugar struggles to compete in the market because it is less able to attract attention, build trust, and compete with similar products with more informative and attractive packaging.

Food Packaging Seminar

In response to the observations, a seminar was held to discuss innovations in food product packaging. The event involved speakers from the fields of packaging design, food processing, and MSMEs. The seminar discussed various topics, including the importance of packaging in enhancing product competitiveness, environmentally friendly packaging techniques, and modern packaging design trends. The knowledge gained from this seminar served as a reference in designing and implementing new, improved packaging for palm sugar products.

Figure 5. Implementation of the Innovation and Optimization Seminar in the Packaging of Semut Palm Sugar

Implementation of Innovation and Development of Palm Sugar Packaging

The next stage was implementing the seminar and discussion findings through packaging innovations that focused on functionality, aesthetics, food safety, and sustainability. The existing packaging was optimized to be more efficient and attractive. Together with the Village-Owned Enterprise (BUMDesa), the team designed strong, informative packaging that met marketing standards, including appropriate labeling, size, and materials.

Launching/Introduction of Palm Sugar Packaging Innovation

Following the development process, the new packaging was officially launched to the community and palm sugar farmer groups in Kemang village. The event showcased a comparison of the old and new packaging and highlighted the innovation's advantages. The Village-Owned Enterprise (BUMDesa) began implementing the new packaging for all palm sugar products, hoping to increase sales value, expand the market, and project a professional image for the village's local product.

Palm Sugar Packaging Innovation

The new packaging for palm sugar features an informative and attractive design, with a background of palm trees and an image of palm sugar in a traditional container surrounded by leaf ornaments, highlighting a natural and local impression. The back contains nutritional information, serving and storage suggestions, the identity of the producer (BUMDesa Wanamukti Kemang), and a halal certificate to increase consumer confidence. In addition to communicative and modern visuals, the packaging uses aluminum foil that is resistant to light, air, humidity, and microbes, in accordance with SNI 0957:2017. This material maintains the quality, taste, and shelf life of the product, and provides maximum protection during distribution. With this packaging, the product appears more professional and competitive in the market.

Figure 5. Packaging that has undergone development or innovation

Discussion and Implications of Findings

The results of this study indicate that optimizing the palm sugar production process from palm sap, particularly through the use of natural preservatives such as kawao root solution (Millettia sericea Sp.), has yielded results that meet national quality standards (SNI Palm Sugar 3743:2021). This aligns with the findings of Musita (2019), who emphasized the importance of temperature control and stirring techniques in the crystallization process to achieve a stable texture and color. This procedure has also been reinforced by Roosmayanti et al. (2021), who highlighted the role of cooling and sieving techniques in optimal sugar crystal formation. Therefore, strengthening the technical capacity of farmers and MSMEs through practice-based training is a strategic step to ensure consistent product quality.

On the other hand, the finding that the initial packaging did not meet functional and aesthetic requirements indicates that a product's added value depends not only on the quality

of its contents but also on its presentation and external protection. A study by Kurniawati and Sari (2021) confirmed that packaging plays a crucial role in perceived quality, market appeal, and consumer purchasing decisions. The absence of labels and product information, and the use of moisture-sensitive packaging materials are serious weaknesses that hamper the competitiveness of local products. Through packaging seminars and the implementation of innovations based on the results of multidisciplinary discussions, palm sugar products in Kemang now use aluminum foil packaging with an attractive and informative design, in accordance with SNI 0957:2017. This has created a professional impression and increased market confidence.

Practical Recommendations and Follow-up Directions

First, ongoing training in modern packaging techniques needs to be a key foundation for improving the quality of palm sugar products. This training not only addresses technical aspects such as the types of packaging materials that comply with SNI standards and are environmentally friendly, but also teaches the importance of aesthetic packaging design, label information, and sealing techniques that maintain product durability. Village-owned enterprises (BUMDes) and farmer groups can collaborate with the Department of Industry, universities, or training institutions to develop a curriculum based on local needs. This training can create professional packaging personnel who are adaptable to market dynamics.

Second, branding must be strengthened through official labeling and certification, such as halal certification from the Indonesian Ulema Council (MUI) and PIRT (Perirot) permits from local health departments. This labeling not only strengthens consumer trust but also differentiates local products from similar products on the market. This process requires neat production documentation, a clean work environment, and consistent quality, which will encourage MSMEs or village producers to improve their production management. Strong branding can also leverage local narratives, such as the history of palm sap in the village, to provide resonant cultural added value for urban consumers and exporters.

Third, a dedicated digital-based village marketing unit is needed to manage the online promotion and distribution of palm sugar products. This unit could function as a village-scale e-commerce task force, managing online stores on platforms like Shopee, Tokopedia, or social media, and implementing digital marketing strategies like storytelling, short videos, and affiliate marketing. This unit could also utilize simple technologies like QR codes on packaging to link consumers to more comprehensive product information online. The existence of this unit would expand the market from local to national, and even potentially lead to exports.

Fourth, market testing of various packaging designs and materials is conducted in a measurable manner to directly capture consumer preferences. Market testing can be conducted through village exhibitions, collaborations with consumer cooperatives, or online surveys of the target market. The results of these trials will provide important insights into which colors, shapes, sizes, and information are most appealing and trusted by consumers. This feedback will be invaluable in formulating strategic decisions regarding packaging designs for mass use, as well as serving as a form of early market validation.

Fifth, sustainable collaboration between farmer groups or Village-Owned Enterprises (BUMDes) and universities and research institutions is needed to create innovative derivative products from palm sap. Examples include the development of new products based on liquid palm sugar, processed palm candy, or even research-based natural fermented drinks. This collaboration could take the form of applied research, thematic community service programs, or matching fund programs. This synergy will strengthen village innovation systems and create a downstream product ecosystem based not only on natural resources but also on science and technology. With this follow-up approach, packaging is not the end, but rather the

beginning of a transformation of village production systems to become sustainable and market-oriented.

E. CONCLUSION

Based on the implementation of the Field Study and Community Service (KKN) in Kemang Village, Bojongpicung, Cianjur, it can be concluded that the development of palm sugar product packaging has a positive impact on increasing sales value, local product image, and product durability to the environment. Innovation through the application of aluminum foil packaging according to SNI 0957: 2017, the addition of silica gel, and design training based on field studies and literature has resulted in more professional packaging and in accordance with market needs. To ensure sustainability, it is recommended that BUMDesa receive cross-sector support in the form of technical training in packaging, quality management, digital marketing, and licensing facilitation such as P-IRT and nutritional labeling, so that palm sugar products from Kemang Village can compete in a wider market sustainably.

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