



TURNING SAP INTO CHOCOLATE GOLD

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Abstract:

This study aims to assess the processing of palm sap into a more economically valuable processed product, namely “brown gold” (palm sugar) in Betek Taman Village, Tomangan Hamlet, Probolinggo Regency, East Java. This process involves several stages, starting from harvesting the sap, cooking, to drying which produces a product with optimal quality. Forests as a renewable natural resource have an important role in people's lives, especially in the economic and welfare aspects. The aren palm plant, which is known to be multipurpose, not only contributes to land and water conservation, but also produces high economic value products such as sap water and kolang kaling. Through an Asset Based Community Development (ABCD) approach, this research identifies the contribution of sap water to local income, employment generation, as well as economic diversification of the community. With the increasing demand for natural and organic products, chocolate gold is a promising alternative option in both domestic and international markets. The survey results show that the production and sale of sap water provides significant additional income for farmers, as well as supporting the development of small and micro enterprises. In addition, these products have the potential to be exported to international markets, which can increase local revenue. The research also highlights the importance of preserving local culture associated with the use of sap water in local community traditions. With sustainable management, the utilization of this natural resource is expected to have a positive impact on the economy and environment of the community in the future. This research shows that processing sap water into palm sugar not only provides added value for palm farmers, but can also be a solution for agricultural waste reduction. The findings provide valuable insights for sustainable economic development and optimal management of natural resources in the area.

Keywords: *Palm sugar, ABCD, Tomangan Hamlet.*

INTRODUCTION

Natural resources in the form of forests have enormous potential to be utilized for the benefit of living things. Forests as a renewable natural resource, are one of Indonesia's natural resources that play a very important role in the life of the Indonesian people, both in terms of economic, socio-cultural and scientific aspects. Forest resources are one of the basic capital in development, therefore utilization must be done wisely and consider the needs of future generations with an orientation towards forest sustainability, so that the results obtained from the forest can also be sustainable.

Forest products can be grouped into two, namely forest products in the form of wood and non-timber forest products. One of the non-timber potentials that has significant economic value to increase the income and welfare of the community is the aren palm plant (*arenga pinnata merr*). This type of plant is multipurpose, because starting from the roots to the leaves of this plant can be utilized.

The aren palm plant has many benefits, including its role in land and water conservation, palm fiber production, building materials, and food ingredients. One of the two foodstuffs that can be produced by the aren palm is sap. Sap water and

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kolang kaling, a natural liquid and fruit obtained from the palm tree plant, have long been recognized as one of the natural resources that has the potential to support the economic development of communities in various regions. Amid global challenges related to resource sustainability and food security, the utilization of sap water and kolang kaling as economic alternatives has attracted attention as a way to increase income and sustainability in rural communities. Betek Taman village in Tomangan hamlet is one example of an area that has great potential in the utilization of sap water and kolang kaling. The lush coconut and palm trees in this area provide an abundant natural resource that, if managed wisely, can be an economic engine for the local community. The collection, processing, and utilization of sap water and kolang kaling have become an integral part of the daily lives of residents, and have become a hereditary tradition that contributes to income and sustainability.

Aren palm trees can produce at the age of 5-10 years if they are well cared for. A sign that the aren palm plant has been able to produce is the presence of mayang flowers on the fronds or former leaf fronds. Through this mayang, water is produced which is later taken by farmers to be cooked into sugar. The growth of the mayang on the trunk of the palm tree always decreases as the palm tree ages. In addition, the growth of this mayang will get closer to the ground, a sign that the production period is almost over (Fatriani, Sunardi, and NS 2012). The best tapping conditions are at the age of 8 - 9 years when the flowers have come out. Plants that are more than 20 years old have decreased production ability (Tulalo and Mawardi 2018). Aren is a type of palm plant that has a high fructose and sucrose content. Aren palm trees can be tapped twice a day and produce 5 - 10 liters of sap and 300 - 400 liters of sap per season or 900 - 1600 liters of sap per year. Palm sugar has higher benefits than granulated sugar due to its higher nutritional content, such as minerals, vitamins, and fiber. It is also more natural and free from chemical preservatives or bleach, making it increasingly popular among health-conscious consumers. In addition, the utilization of sap into palm sugar can increase the income of palm farmers and reduce wastage of agricultural products.

With the growing demand for natural and organic products in the global market, palm sugar or often called "brown gold" is gaining attention as a healthy alternative to artificial sweeteners. The product not only offers a distinctive sweet taste, but also contains essential nutrients such as vitamins and minerals. In addition, the environmentally-friendly processing of coconut sugar makes it an attractive option for consumers concerned about sustainability. Therefore, local farmers and producers have a great opportunity to market their palm sugar, both in the domestic and international markets, thereby increasing the competitiveness of local products.

On the other hand, the development of the coconut sugar industry also opens up opportunities for product innovation. For example, producers can create various preparations from palm sugar such as candies, cakes, or health drinks that take advantage of the unique flavor and nutritional benefits of this brown gold. With support from the government and non-governmental organizations in the form of training and access to modern technology, farmers can improve the quality of their products as well as expand distribution networks. This will not only help increase their income but also contribute to more sustainable economic development in the area.

Palm sap is the sweet liquid produced from palm flowers and is the main ingredient in the manufacture of palm sugar, also known as "brown gold". The moisture content of fresh resin ranges from 80 to 85% and sucrose is about 15% (Yeni and Hidayat 2008). Aren is one of the palm plants that can grow well in Aceh. This plant is an annual plant with stem diameter ranging from 122,4 - 129 cm and height ranging from 14,23 - 13,8 m (Ferita, Tawarati, and Syarif 2015). The old palm trees produce fruit, and the palm fruit obtained can be made into kolang-kaling. The right palm fruit to be made into kolang-kaling is half ripe with the characteristics of the seed coat of the fruit thin, mushy and yellow, the seed core (endosperm) is white rather clear and chewy, this seed core is processed into kolang-kaling. To get the seed kernel, special treatment is needed, namely burning or boiling the fruit to remove the sap (Berta, Koapaha, and Mandey 2017). Kolang kaling is a processed product derived from the Aren or Enao tree (*Arenga pinnata* Merr). All parts of the Enao plant can be taken advantage of, starting from the physical parts of the plant as well as from its production products (Yulendra, Gede, and Idrus 2018). The palm fruit has a hard shell. The palm fruit needs to be boiled or burned to make the peeling process easier and reduce the sap in the palm fruit. Palm fruits have almost uniform dimensions, with an average diameter of 4,1 cm and an average height of 4,6 cm (Ramdani et al. 2023). In 100 grams of kolang-kaling there are 27 kcal calories, 0.4 grams of protein, 0.2 grams of fat, 6 grams of carbohydrates, 91 mg of calcium, 243 mg of phosphorus, 1.6 g of fiber, and 0.5 mg of iron. The nutritional content of kolang-kaling is beneficial for health such as restoring body stamina, refreshing the body, and accelerating the body's metabolism (Novayanti 2017). It is good that it benefits and can then be consumed as a food product despite its unattractive appearance in color and aroma, and tasteless, but processed into candy, jelly beans and others most commonly used by the general public for fruit ice cream and other mixed drinks (Muchtadi 2001). This case provides this information with a lot of nutrients and the benefits are lost, it always seems like a little variation because of what the food is used for. So it is necessary to innovate new food products from kolang-kaling. On the other hand, the characteristic of no color and fragrance is unattractive and tasteless, causing to combine the product with other fruits to add flavor, aroma and favorite color.

Processing palm sap into brown gold not only involves proper cooking techniques, but also requires attention to sustainability and product quality. In the processing stage, farmers should pay attention to selecting the optimal sap harvesting time to ensure high sugar content. In addition, the use of efficient and environmentally friendly processing tools can increase production yields while minimizing negative impacts on the environment. By implementing good agricultural practices, producers can produce high-quality palm sugar that is not only tasty but also healthy, attracting consumers who are increasingly concerned about health and sustainability.

Research into the potential and productivity of sap water and kolang kaling in Betek Taman Village, Tomangan Hamlet aims to explore how these natural resources can support community economic development. The main focus of this research is to uncover the contribution of sap water to income diversification, local economic growth, and barriers to the development of sap water-based industries. By

understanding the role of palm trees, measures can be designed to improve the welfare of local residents.

Although many palm farmers in Indonesia produce coconut sugar, many still use traditional methods that result in variable quality. This research also aims to develop more effective methods in the production of consistent quality palm sugar. In addition, this research is expected to provide guidance for sustainable and innovative natural resource management policies, expanding the economic and environmental potential of sap water. The findings of this study are expected to provide valuable insights for sustainable economic development and optimal utilization of natural resources in the area.

RESEARCH METHODS

This research was conducted in Betek Taman Village, Tomangan Hamlet, Gading District, Probolinggo Regency, East Java Province. The time required in carrying out this research is estimated to be approximately 1 month (starting from January 2025 to February 2025) starting from the preparation stage, implementation in the field, data processing to the preparation of research reports. The method applied to the Betek Taman Village Service Program is ABCD using experimental methods with a quantitative approach.

In this mentoring-based research, the author uses the ABCD (Asset Based Community Development) approach. According to Munawar Ahmad (2007), Asset Based Community Development (ABCD) is an approach model in community development. This approach emphasizes the inventory of assets in the community that are considered to support community empowerment activities. The community as partners can absorb skills in the utilization and processing of sap into golden chocolate.

The object of the research is the palm trees (*Arenga pinnata* Merr) that are ready to be tapped as many as 5 trees. The research stages began with the collection of sap from palm trees that had been harvested in the morning, using a clean container to avoid contamination. After that, the sap obtained was processed through several stages, namely cooking to evaporate most of the water, until it reached a thicker consistency. At the next stage, the thickened juice is cooled and molded into solid sugar. Variations in cooking temperature and drying time were tested to see their effect on the final quality of the product.

The equipment used was a machete, sap container (bamboo), wood stove, large cauldron, stirrer, bamboo mold, sieve. Data collected included analysis of water content, sugar content, and texture and color of the final product. Sensory and laboratory tests were conducted to determine the physical and chemical characteristics of palm sugar products.

RESULTS AND DISCUSSION

The results showed that processing palm sap into palm sugar can produce a product with a moisture content that varies between 5-8% depending on the cooking temperature and length of drying time. Palm sugar with lower moisture content tends to have longer shelf life and better flavor quality. In addition, increasing the cooking temperature affects the final color of the product, where palm sugar processed at higher temperatures has a more attractive golden brown color.

However, excessive temperature increase can reduce the natural sweetness and deteriorate the texture of the sugar.

From an economic perspective, processing sap into brown gold provides significant added value compared to selling sap in liquid form. Palm sugar has a higher selling price and lasts longer, which supports increased income for palm farmers. The products produced from sap water have made diverse contributions to local income and economic growth. Here are some of the key findings related to the economic contribution of nira water including: First, farmers' and local producers' income, The production and sale of sap water has provided an additional source of income for farmers and local producers. Sap water has become a significant source of income for local communities. Second, employment generation, the sap water industry creates local employment. This includes jobs in planting, tree care, processing, and marketing these products. This can help reduce the unemployment rate in the region. Third, Economic diversification, Sap water has helped in the diversification of the community's economy. In addition to relying on other agricultural sectors, the production and sale of these products has provided a strong economic alternative. Fourth, improved Community welfare, The additional income earned from the nira water has helped in improving the community's welfare. It can enable them to fulfill basic needs such as education, healthcare, and better housing.

Fifth, small and micro enterprise development, The potential of sap water has supported the development of small and micro enterprises in local communities. Local producers can start small businesses to process these products, create added value and generate income. Sixth, Export and international markets, Sap products have the potential to be exported to international markets. This can increase local revenue and help introduce these products to the global market. Seventh, Preservation of local culture, Sap water has high cultural value in local communities and is often used in traditional ceremonies. The production and use of these products helps preserve local traditions. Eighth, Sustainable utilization of natural resources, Sustainable utilization of sap water can help protect and utilize natural resources wisely. This helps maintain the local environment and in the long run.

Steps in the process of collecting sap water from the tree into brown gold:



Figure 1. Collecting sap water from the tree

- a. The collection of sap water from the trees is done carefully to ensure the quality of the sap produced.



Figure 2. Sap water filtration

- b. Afterward, the sap water is filtered to remove impurities and unwanted particles, resulting in clean sap water ready for further processing.



Figure 3. Boiling sap water

- c. Next, boiling the juice is an important stage to evaporate some of the water and increase the sugar concentration.



Figure 4. Stirring the sap water

- d. This process is followed by continuous stirring of the sap to prevent clumping and ensure even heating.



Figure 5. Pressing of sap

- e. After reaching the desired consistency, molding the sap into the prepared molds is done.



Figure 6. Freezing process

- f. Then, a freezing process is carried out to crystallize the sugar, resulting in the desired shape.



Figure 7. Brown gold packaging

- g. Finally, the last stage is the packaging of the chocolate gold, where the product is ready to be marketed and distributed to consumers.

CONCLUSION

This study shows that palm sap can be processed into brown sugar through proper cooking and drying processes. This process not only increases the selling value of the product, but also contributes to the welfare of palm farmers. To meet the growing market demand, more efficient process development and quality

consistency are required. Therefore, training and implementation of better technology for farmers is essential to optimize the potential of palm sap.

The development of small and micro enterprises based on palm sap products is also a positive step in increasing added value and local income. The potential export of these products to international markets can further increase local revenue, while the preservation of local culture through the use of the products in traditional ceremonies strengthens community identity.

With sustainable management, the utilization of this natural resource can have a positive impact on the environment and the survival of the community. This research provides important insights for designing policies that support innovative and sustainable natural resource management, so that the economic potential of sap water can be maximized for the welfare of communities in the future.

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