

DIFFERENCES IN THE CHARACTERISTICS OF COOKIES USING ICING SUGAR AND PALM SUGAR IN TERMS OF TEXTURE, AROMA, AND TASTE

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Abstract

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Cookies are a type of cake that is widely liked by various groups. Cookies can be made with different types of sugar, and each type of sugar can produce a different flavor and appearance. This study aims to see the difference in the results of cookies made using icing sugar and palm sugar. The research was carried out by making two types of cookies, namely cookies with icing sugar and cookies with palm sugar, with other ingredients made the same. Assessments are made on texture, color, aroma and taste. The results showed that cookies with icing sugar had a softer texture and brighter colors. Meanwhile, cookies with palm sugar have a darker color, as well as a smoky flavor and have a caramel-like aroma. From the results of the assessment, the two types of cookies have different characteristics. In conclusion, the type of sugar used can affect the final result of cookies and can be a choice of variations in making cookies.

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INTRODUCTION

In Indonesia, cookies are one of the snacks that are in great demand by people ranging from children to adults, usually cookies are often used as a snack to accompany tea or coffee (Liman & Sudiarta, 2023). Cookies are easy to find in bakeries, supermarkets, and home businesses. In addition to their great taste, cookies are also preferred because they are practical and have a wide variety of shapes, flavors, and ingredients used.

In making cookies, sugar is one of the important ingredients that greatly affects the final result. In Indonesia, there are various types of sugar that are often used, such as



icing sugar and palm sugar. Icing sugar is typically used to produce a smoother texture and a bright appearance, while palm sugar is known to have a darker color and distinctive flavors such as caramel and smokey (Andragogi et al., 2018) (Aryani et al., 2023). These two types of sugar are quite easy to find and are often used in making traditional and modern foods and cakes.

Different types of sugar used can affect the taste, aroma, color, and texture of the cookies produced (Andragogi et al., 2018). However, not everyone knows how each type of sugar affects cookies. Therefore, this study was conducted to see the difference in the results of cookies made using icing sugar and palm sugar, with other ingredients made the same. It is hoped that the results of this study can provide a simple overview of the influence of sugar types and become a reference in choosing sugar variations in making cookies.

In recent years, there has been growing interest in ingredient substitution and variation in bakery products, particularly in relation to sugar types. This trend is driven not only by sensory considerations but also by cultural preferences, ingredient availability, and consumer awareness of natural and traditional food products. Sugar, as one of the main components in cookies, has attracted special attention because even small changes in sugar type can significantly alter the physical, chemical, and sensory properties of the final product.

Refined sugars such as icing sugar are widely used in modern bakery production due to their consistency, ease of use, and ability to produce uniform texture and appearance. Icing sugar is especially favored in products that require a smooth dough and soft crumb, as its fine particle size allows it to dissolve quickly and blend evenly with other ingredients. This characteristic often results in cookies with a lighter color, softer texture, and mild sweetness, which are generally preferred by a broad range of consumers.

On the other hand, palm sugar represents a traditional sweetener that has long been used in Indonesian cuisine. Derived from palm sap, palm sugar offers a distinctive flavor profile that includes caramel-like and smoky notes, as well as a darker natural color. Its use in bakery products reflects a growing appreciation for local ingredients and traditional flavors. However, due to its different chemical composition and physical form, palm sugar may influence cookie texture, moisture content, and browning behavior in ways that differ from refined sugar.

The chemical composition of sugar plays a critical role during the baking process. Sugars participate in caramelization and Maillard reactions, which are responsible for color formation, aroma development, and flavor complexity. Palm sugar, which contains a higher proportion of reducing sugars, tends to intensify these reactions, resulting in darker cookies with stronger aroma and flavor. In contrast, icing sugar, composed mainly of sucrose, contributes less to Maillard reactions and produces cookies with a lighter appearance and subtler flavor.

From a sensory perspective, consumer acceptance of cookies is influenced by the balance between sweetness, texture, aroma, and visual appeal. While some consumers prefer cookies that are soft, light-colored, and mildly sweet, others favor cookies with richer flavor, darker color, and a more pronounced caramel aroma. These differences highlight the importance of understanding how sugar type affects not only the technical quality of cookies but also consumer perception and preference.

In an educational context, especially in hospitality and culinary programs, experimental studies on basic ingredient variations provide valuable learning opportunities. Through hands-on experimentation, students can observe how theoretical concepts in food science such as sugar functionality, browning reactions, and texture formation are applied in real food products. Such studies also encourage critical thinking and problem-solving skills by linking ingredient selection to product quality and consumer acceptance.

Despite the widespread use of both icing sugar and palm sugar in food preparation, comparative studies focusing specifically on their effects in cookie production remain relatively limited, particularly at the small-scale or educational level. Many existing studies focus on bread, cakes, or traditional desserts, leaving a gap in research related to cookies, which have distinct formulation and baking characteristics. Therefore, systematic comparison of cookies made with icing sugar and palm sugar is necessary to provide clearer insights into their respective impacts.

This research seeks to address this gap by analyzing the differences in texture, color, aroma, and taste of cookies produced using icing sugar and palm sugar under controlled conditions. By keeping other ingredients and processing methods constant, the study isolates the effect of sugar type on cookie characteristics. Additionally, the inclusion of sensory evaluation through direct tasting provides practical insight into consumer preference.

The findings of this study are expected to contribute to both academic and practical fields. Academically, the research enriches literature on sugar functionality in baked products. Practically, it offers guidance for students, home bakers, and small-scale food producers in selecting appropriate sugar types based on desired cookie characteristics. Ultimately, this study emphasizes that sugar is not merely a sweetening agent but a key determinant of cookie quality and consumer satisfaction.

LITERATUR RIVIEW

1. Cookies as Bakery Products and Their Quality Characteristics

Cookies are widely consumed bakery products that are valued for their taste, texture, convenience, and long shelf life. They are typically made from a combination of flour, fat, sugar, leavening agents, and flavoring ingredients. The quality of cookies is determined by both physical and sensory characteristics, including texture, color, aroma, flavor, and overall acceptability. Among these attributes, texture plays a crucial role, as consumers often associate high-quality cookies with a pleasant balance between crispness and softness.

The texture of cookies is influenced by ingredient composition, processing methods, and baking conditions. Sugar, in particular, contributes significantly to cookie texture by affecting moisture retention, dough spread, and crumb structure. Fine sugars tend to dissolve more quickly, leading to smoother dough and softer baked products, while coarser sugars may create more open structures and firmer textures. In addition, the interaction between sugar and fat influences aeration during mixing, which affects the final mouthfeel of cookies.

Color is another important quality parameter that affects consumer perception. Cookies with a uniform golden or light-brown color are generally perceived as well-baked and appealing. Excessive browning, however, may be associated with overbaking or bitterness. Aroma and flavor further enhance sensory acceptance, as they contribute

to the overall eating experience. These attributes are strongly influenced by the type of sugar used due to its chemical behavior during baking.

Understanding the fundamental quality characteristics of cookies provides a basis for evaluating how ingredient variations, particularly sugar type, influence the final product. This knowledge is essential for developing cookie formulations that meet consumer preferences and quality expectations.

2. Functional Role of Sugar in Cookie Formulation

Sugar is a multifunctional ingredient in cookie production, serving not only as a sweetener but also as a key contributor to texture, color, aroma, and structural properties. In cookie dough, sugar dissolves in the aqueous phase and interacts with fat, influencing dough consistency and aeration during mixing. This interaction affects how the dough spreads and sets during baking.

One of the primary functions of sugar is moisture retention. Sugar is hygroscopic, meaning it attracts and retains water, which helps keep cookies soft after baking. Cookies with higher moisture retention tend to have a more tender texture and slower staling rate. Additionally, sugar delays starch gelatinization and protein coagulation, allowing cookies to spread before setting, which influences thickness and diameter.

Sugar also plays a critical role in browning reactions. During baking, sugar participates in caramelization and Maillard reactions, which produce characteristic brown colors and complex flavor compounds. The extent of these reactions depends on the type of sugar used, its chemical composition, and its interaction with other ingredients such as proteins.

Furthermore, sugar contributes to the flavor profile of cookies beyond sweetness. Different sugars impart distinct taste characteristics, ranging from clean and mild sweetness to complex caramel and smoky notes. Therefore, selecting the appropriate type of sugar is essential for achieving the desired sensory qualities. Research on sugar functionality highlights its central role in determining cookie quality and consumer acceptance.

3. Characteristics and Effects of Icing Sugar in Cookies

Icing sugar, also known as powdered or confectioners' sugar, is a finely ground form of refined sucrose that often contains a small amount of starch to prevent clumping. Due to its extremely fine particle size, icing sugar dissolves rapidly in dough, resulting in a smooth and homogeneous mixture. This property makes icing sugar particularly effective in producing cookies with a soft and tender texture.

In cookie formulations, icing sugar promotes even distribution of sweetness and contributes to a lighter crumb structure. Its rapid solubility enhances fat-sugar creaming, improving aeration during mixing. This leads to cookies that are softer and less gritty compared to those made with coarser sugars. Additionally, icing sugar tends to produce cookies with a lighter color because sucrose is a non-reducing sugar, limiting the intensity of Maillard reactions during baking.

The flavor profile of cookies made with icing sugar is generally mild and clean, without strong caramel or roasted notes. This makes icing sugar suitable for cookies that emphasize delicate flavors or additional ingredients such as chocolate chips or vanilla. The presence of starch in commercial icing sugar may also contribute to texture stability by absorbing excess moisture during baking.

Overall, icing sugar is associated with cookies that have a smooth texture, light appearance, and subtle sweetness. These characteristics often align with consumer

preferences for soft and visually appealing cookies, particularly in modern bakery products.

4. Characteristics and Effects of Palm Sugar in Cookies

Palm sugar, commonly known as gula aren, is a traditional sweetener derived from the sap of palm trees. Unlike refined white sugar, palm sugar undergoes minimal processing, allowing it to retain natural components such as minerals, organic acids, and reducing sugars. These components significantly influence the sensory characteristics of baked products.

In cookie production, palm sugar contributes to darker color development due to its high content of reducing sugars, which intensify Maillard reactions during baking. As a result, cookies made with palm sugar often exhibit deep brown coloration and rich visual appearance. The flavor profile is also more complex, characterized by caramel-like, smoky, and slightly earthy notes that distinguish palm sugar cookies from those made with refined sugar.

Palm sugar has larger and less uniform particles compared to icing sugar, which affects its solubility in dough. This can result in less uniform texture and higher moisture retention, leading to cookies that are denser or slightly sticky. However, these characteristics may be desirable for consumers seeking richer and more traditional flavor experiences.

The use of palm sugar reflects an increasing interest in natural and local ingredients in food production. Its distinctive sensory properties make it a valuable alternative sweetener in cookies, particularly for products that aim to highlight traditional flavors and artisanal qualities.

5. Consumer Preference and Sensory Evaluation of Sugar Variations in Cookies

Consumer acceptance of cookies is strongly influenced by sensory attributes such as texture, color, aroma, and taste. Sensory evaluation methods, including hedonic testing and preference ranking, are commonly used to assess how ingredient variations affect consumer perception. Studies have shown that sugar type plays a critical role in shaping these sensory responses.

Cookies made with refined sugars such as icing sugar are often preferred for their soft texture, lighter color, and mild sweetness. These attributes are associated with perceptions of freshness and quality, particularly among young consumers. In contrast, cookies made with palm sugar may appeal to consumers who favor stronger flavors and darker appearance, although excessive stickiness or bitterness can reduce acceptance.

Preference differences highlight the importance of aligning formulation choices with target consumer expectations. Sensory evaluation provides valuable insights into how technical ingredient properties translate into consumer satisfaction. By comparing cookies made with icing sugar and palm sugar, researchers can identify formulation strategies that balance texture, flavor, and visual appeal.

Ultimately, understanding consumer preference supports product development decisions and helps producers create cookie products that are both technically sound and market-oriented. This approach ensures that ingredient selection enhances not only product quality but also consumer acceptance.

RESEARCH METHODS

The research methods used in this study are voting systems and direct observation. This research was carried out by making two types of cookies, namely

cookies that use icing sugar and cookies that use palm sugar, with other ingredients made the same.

After the cookies are finished, the cookies are tried directly by 13 people. They were asked to taste both types of cookies and give their opinions based on how they felt. The assessment is done simply, such as assessing texture, color, aroma, and taste. The opinions and impressions of people who tried cookies were then recorded and compared to see the difference between cookies with icing sugar and cookies with palm sugar. This method was chosen because it is easy to do and can provide a real picture of the difference in cookie results based on the direct experience of the tasters..

RESULTS AND DISCUSSION

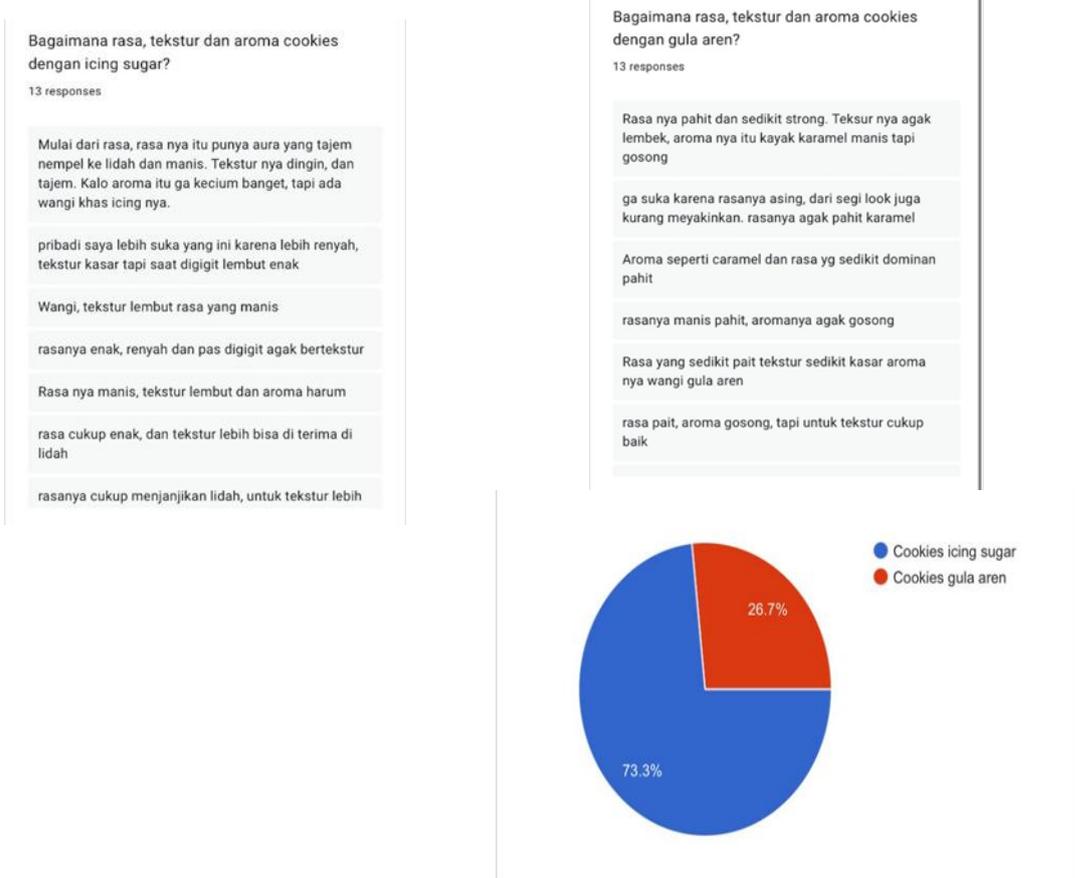
In the final result of making cookies, a difference was found between cookies made with icing sugar and palm sugar.



Cookies made using Icing Sugar produce a smoother and softer dough. When baked, the cookies look brighter and tend to be pale or light yellow in color. The texture of the cookies after cooking feels softer and lighter when bitten. The sweetness of icing sugar also tastes lighter and less strong, making it suitable for cookies with a simple flavor.

Meanwhile, cookies that use palm sugar show different results. The color of the dough before baking already looks darker, and after baking the color of the cookies becomes blackish-brown. The texture of cookies feels softer than cookies with icing sugar. In terms of flavor, palm sugar provides less sweetness with a distinctive caramel-like and slightly smokey aroma, so the cookies taste richer.

Thus, the difference in the use of icing sugar and palm sugar in making cookies, even though they use the same ingredients and techniques, affects the aroma, taste, and texture of the cookies produced.



Based on the voting results, it also shows that most of them prefer Cookies with Icing Sugar over Cookies with Palm Sugar, because Cookies with Icing Sugar have a softer and crispier texture and a more fragrant aroma. Meanwhile, Cookies with Palm Sugar have a mushy and sticky texture with a predominantly bitter taste and caramel-like aroma.

CONCLUSION

Based on the results of making and tasting cookies, it can be concluded that the type of sugar used affects the results of cookies. Cookies that use icing sugar produce brighter colors, softer textures, and mild sweetness. Meanwhile, cookies that use palm sugar have a darker color, denser texture, and a distinctive aroma and taste like caramel and slightly smokey.

This difference shows that icing sugar and palm sugar give different characters to cookies. Both are equally delicious, but have different characteristics according to the type of sugar used.

For those who want to make cookies with a mild flavor and soft texture, the use of icing sugar can be the right choice. Meanwhile, for those who want to try cookies that are stronger and have a distinctive aroma, palm sugar can be used as a variety. For further research, it is recommended to try other types of sugar or change the sugar dosage to see more diverse cookie results. In addition, the tasting process can be done with more people so that the assessment results become more diverse



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