

The Mantou Bread Innovation

Abstract

This Study to explore the use of sorghum flour as an alternative ingredient to wheat flour in Mantou bread and to evaluate the final characteristics of the resulting product to determine the extent to which sorghum flour can replicate the characteristics of the original Mantou bread. The methodology applied in this study was qualitative research. Data collection was conducted through an interview process with informant who were divided into two namely, expert informants and common informants categorized as rarely, often, dan alwasys. In this study, the preparation techniques tested include; the use of pure sorghum flour, sorghum flour sludge and Sorghum milik – to assess how each method affects the organoleptic and functional characteristics of the final product. The experimental design applied was designed to compare the effectiveness of each technique in producing bread with texture, color, taste and aroma characteristics that resemble the original Mantou Bread. The results showed that sorghum flour is an alternative ingredient that can replace wheat flour in making Mantou Bread. Two recipe trials with different techniques produced breads with characteristics close to the original Mantou Bread, suggesting that sorghum flour can be effective in replicating the sensory and structural qualities of the product. In conclusion, the use of sorghum flour as a substitute for wheat flour in Mantou Bread recipes can be effective, especially under certain preparation conditions that have been identified during the research process. This finding could be a significant potential for gluten-free product development in the culinary industry, expanding the diversity of Bread options in traditional markets and providing a solution for consumers who reduce gluten. This study makes an important contribution to food ingredient innovation and the development of more inclusive and diverse products.

Keywords; *Innovation, Bread, Mantou*

Hasmawati Mansyur Mustamin

Politeknik Pariwisata Makassar – Indonesia

Abd. Mansyur

Sekolah Tinggi Ilmu Ekonomi Makassar – Indonesia

Muhammad Nabil Azhar

Politeknik Pariwisata Makassar – Indonesia

Email; Hasmawati_MM@poltekparmakassar.ac.id



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Introduction

Bread is a food product made from wheat flour dough mixed with yeast and baked without the addition of other food ingredients. The process involves fermentation using yeast, which aims to produce a soft and fluffy texture. Various variations of bread with different shapes and flavors can be found in traditional markets. Bread can be divided based on its processing method into three types, namely; baking method, this method involves

using an oven to bake the bread dough. Examples of bread produced from the baking method include baguettes, toast bread, and sweet bread and sweet bread. Frying method involves heating a large amount of oil. Examples include donuts and panada's. Steaming method, this method uses water vapor at the boiling point of water, this process involves efficient heat transfer heat conduction. Examples include bakpao and matau (Standar Nasional, 1995; Wahyuda, 2021).

Mantou is a variation of Chinese steamed bun that has been consumed by the Chinese people for over 1,500 years, one of the most significant fermented products in Chinese cuisine. Chinese steamed bun is a traditional Chinese product recognized by its characteristic white color, round shape, and soft texture ((Keeratipibul & Luangsakul, 2012). In South Sulawesi, especially in the city of Pare-Pare, mantou has become a very famous souvenir. In 2007, mantou began to gain popularity and became a culinary specialty that could previously only be found in the city. Mantou is made from wheat flour, which is a processed product of wheat, one of the most important plant-based ingredients. Wheat flour has the ability to form gluten which can make the dough elastic and not easily crushed, but wheat is an imported food that cannot be grown in Indonesia (Mae, 2014; Arif dkk, 2018). With the increasing demand for wheat flour in Indonesia, there is a need to utilize local food ingredients as substitutes to reduce dependence on wheat flour imports. One local alternative that has the potential to replace wheat flour is sorghum flour.

On the island of Sulawesi, the crop that is commonly used as a substitute for rice is sorghum. Sorghum is one of the main choices as an alternative food that ranks fifth after rice, corn, and wheat in the Asia-Africa continent, this crop is very important for more than 500 million people in more than 30 countries, because it has gluten-free properties with a nutritional composition that includes gluten, corn, and wheat. 80, 42% starch, 3, 65% fat, 10, 11% proteins, 2, 24% ash, and 2, 74% coarse fiber. Sorghum flour also has a lower glycemic index than wheat flour, making it suitable for regulating blood sugar levels and providing health benefits for people with heart disease, cancer, and HIV-1, as its phenolic compounds have antioxidant activity, antitumor, and virus inhibitory properties. In addition to health benefits, sorghum has great potential to be developed in Indonesia, sorghum is known as an environmentally friendly crop because it is able to grow well in extreme environmental conditions, including dry and flooded areas. This makes sorghum a sustainable choice in agriculture, because it is able to utilize resources efficiently and produce optimal harvests even on non-optimal land (Sari, 2023; Dinas Pertanian dan Ketahanan Pangan, 2023). Sorghum flour is currently trending to increase the nutritional value of food products as well as being used in the manufacture of gluten-free food products. Although it has been widely applied, the use of sorghum in traditional category bread products still requires further exploration, which is listed in "Roti Mantou Innovation".

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Product innovation is the process of transforming or modifying existing products by adding interesting new variations, which aim to meet consumer needs and preferences, which in turn will increase buying interest. An innovation is considered successful if it is able to provide added value and significant advantages compared to the previous version, thus providing a useful new solution (Thabroni, 2022; Sowarno, 2008; Sunarto, 2020).

There are several discussions related to sorghum flour in previous studies, namely;

1. In 2019, Yogyakarta State University students named Arif Sorya Wicaksana and Sutriyati Purwati raised research with the title of sorghum flour substitution in making red velvet cookies. This study aims to find the right recipe and determine the public acceptance of red velvet cookies. The results of the study obtained good results for color, texture, taste, and aroma using a 60% sorghum flour substitution to get the right recipe and concluded that sorghum flour red velvet cookies were acceptable to the public.
2. In 2021, students of the Faculty of Engineering, Yogyakarta State University, Muhammad Falah Haqiqi and Kokom Komariah raised research with the title utilization of sorghum flour in making shorghum dumpling. This research aims to see the characteristics of making dumplings from sorghum flour. The results of the study said that the use of sorghum flour in making dumplings produced good taste, color, texture, and aroma and was accepted by the society.
3. In 2021, students of Muhadi Setiabudi University, Nutrition Science Study Program named Yuniarti Dewi Rahmawati and Anggaray Duvita Wahyadi raised research with the title of chemical properties of cookies with sorghum flour substitution. This study aims to determine the chemical properties of the cookies produced. The method used was experimental. From the results it was concluded that water content, protein and carbohydrates decreased with increasing sorghum flour content. From some of these studies, substitutions were applied using presentations of 60%, 80% and 100% which although in our study only 100% was planned, the presentations in the study might be applied.

The assessment in this study was based on the characteristics of the original Mantou bread, which included a dense yet soft texture when consumed and felt as well as a distinctive sweet taste and aroma associated with the steaming process. However, the color aspect was not assessed because sorghum flour can change the color, which is said to be a new innovation for Mantou bread made from sorghum flour. However, the aspect of color is not an assessment because sorghum flour can change color, this is what is said to be considered a new innovation for mantou bread made from sorghum flour. In this study using a qualitative approach, which means qualitative research is descriptive and analytical research, the data collected is presented in the form of words and pictures, qualitative research is defined as a strategy for searching for meaning, understanding, concepts, characteristics, symptoms, symbols and descriptions of a phenomenon, focus and multimethod, which is natural and holistic, prioritizes quality, using several ways presented in a narrative (Sidiq & Choiri, 2019; Marinu, 2023). The reason for using a qualitative

approach is because a qualitative approach can explain phenomena thoroughly and deeply related to the focus of research including product development, to be able to find out more deeply how the characteristics resulting from the processed product of mantou bread made from sorghum flour.

With the application of data analysis is thematic analysis, one of these analysis techniques is understood as analyzing data which aims to identify patterns and find themes through the data collected by researchers from interviews (Heriyanto, 2018). And sensory evaluation, using the senses to assess a product, by examining the appearance, smelling the food to determine the aroma, feeling the food to determine the texture and taste. This sensory analysis aims to obtain a more in-depth reaction to the character of ingredients and food products according to what is received by the senses of smell and taste (Kemp, Sarah dkk, 2009).

Methodology

This study is based on experimental research conducted over six months and located at the Practical Kitchen Laboratory, Culinary Arts Study Program - Makassar Tourism Polytechnic. Experimental research is a method used in food sensory analysis or consumer testing that involves direct interaction between researchers and informants to observe and measure the final characteristics of the product. The use of this method aims to gain a deeper understanding of the evaluation of food products and the perceptions felt by consumers, focusing on assessments related to texture, color, taste, and aroma in the product (O'Mahony, 1986). This type of research is commonly applied - especially - in culinary arts studies. The reason for the application of experimental research in this study is none other than its general applicability, in addition to the fact that mantou bread is made from wheat flour while the current study uses sorghum flour as a substitute, which thus requires experimentation.

As mentioned earlier, this study was held at the Practical Kitchen Laboratory, Culinary Arts Study Program - Makassar Tourism Polytechnic. Because the Practical Kitchen Laboratory, Culinary Arts Study Program has facilities that support the research process.. The initial step in the research was to conduct an in-depth study of the existence of mantou bread in Makassar City. The existence that we mean is about food ingredients, utensils and equipment, and methods and/or techniques used in making mantou bread. The results of the study showed the importance of testing the use of sorghum flour as a substitute for wheat flour in making mantou bread.

In this study, the research design used is the 4D development model, as for the 4D development model, namely; Discover is the process of designing new products based on the results of the analysis that has been done previously, with the aim of producing products that are in accordance with the specifications applied. Define is a stage of the research process where systematically identifying and formulating the problems to be studied. At this stage, an in-depth analysis of the needs is carried out which includes situation analysis and review of relevant literature to design the right approach. Develop is an advanced phase after the design stage, where the planned recipe or product design is implemented in the research. At this stage, it includes preparation, processing, and packaging, as well as validation tests to ensure product quality. And Deliver is the scope of the process of distributing developed products and sensory or organoleptic evaluation, where the evaluation is carried out by respondents to evaluate characteristics such as texture, color, taste, and aroma of the resulting product (Ningsih dkk, 2023; Dwiyani dkk, 2024).

Results

As explained in the previous sub-chapter, this study applies the 4D model research design. The results of our research are divided into four parts, namely; Discover, Define, Develop, and Deliver, which will be explained in each of the following sub-chapters;

Discover Stage

In the course of our research, after assessing Mantou bread and sorghum flour, we identified several differences between the main ingredients and the substitutes. The discover stage in the physical and functional characteristics of each ingredient, which can affect the quality of Mantou bread products. The main ingredient, wheat flour, has the characteristics of color, smooth and soft texture, and high absorption capacity. Wheat flour is also known for its ability to form a good gluten network, which can make the dough elastic. Meanwhile, the substitute ingredient, sorghum flour, has different characteristics. Sorghum flour generally has a slightly brownish color, a smooth texture, but lower water absorption than wheat flour. Sorghum, as an alternative food, contains different proteins and fibers, and does not contain gluten, which can affect the texture of the final product. After the first experiment with the use of sorghum flour as a 100% substitute for wheat flour, two characteristics of sorghum flour were found to have an effect on the making of Mantou bread, namely; it cannot blend or become crumble and gritty after becoming dough because sorghum flour is gluten-free so it cannot bind to the dough. Therefore, sorghum flour is considered unable to "stand alone" without mixing with wheat flour. This fact was then discussed with the First Supervisor with the result, namely, making sorghum milk as a water substitution option.

Definition Stage

To understand the substitute ingredients, five experiments were conducted, namely;

1. Experiment I, using sorghum flour and plain water,
2. Experiment II, using sorghum flour and sorghum milk,
3. Experiment III, with the use of wheat flour and sorghum milk,
4. Experiment IV, with the use of sorghum flour sludge and plain water, and;
5. Experiment V, with the use of sorghum flour sludge and sorghum milk.

In each experiment, there were differences in the percentage ratio of wheat flour and sorghum flour with a ratio of 50:50 and 70:30, except in experiment III.

Development Stage

The first research process took place with the application of the recipes in Experiment I; namely the use of sorghum flour and wheat flour with plain water in a ratio of 50:50, and Experiment III, namely; the use of wheat flour and sorghum milk. The research process took place in two stages, namely;

1. Preparing materials, and;
2. Processing materials.

In the first stage, the process takes place by preparing all the materials and equipment to be used, and weighing the materials.



Fig. 1. First Stage
(Source: Results of research data processing, 2024)

This stage resulted in the recipes for Experiment I and Experiment III. Furthermore, in the second stage, the process took place in a way;

1. Conduct the mixing process with the straight dough method, mix the dry ingredients into the mixer,
2. After the dry ingredients are mixed, liquid ingredients or water are added to the dry ingredients to form a dough,
3. After the dough becomes half smooth, white butter is added to the dough to form softness as well as moisture of the mantou bread, mixer until smooth.



Fig. 2. Straight dough method
(Source: Results of research data processing, 2024)

4. The next process is done by resting the dough for 15-25 minutes,



Fig 3. Resting
(Source: Results of research data processing, 2024)

5. After that, the modeling process is carried out, which includes; the dough is flattened and also smeared with water or sorghum milk which is the liquid in the research experiment, then formed according to the predetermined size, with a length of five centimeters and a width of two centimeters,



Fig. 4. Modelling
(Source: Results of research data processing, 2024)

6. After which the final proffing process is carried out



Fig. 5. Final proofing
(Source: Results of research data processing, 2024)

- The dough is steamed in a steamer that has released hot steam over medium heat for 8-10 minutes



Fig. 6. Steaming

(Source: Results of research data processing, 2024)

The research process then proceeded with the application of the recipes in Experiment I, Experiment II, Experiment IV, and Experiment V, namely; the use of wheat flour and sorghum milk. The process of Experiment I and Experiment II was carried out in the same way as Experiment III. While Experiment IV and V took place by soaking sorghum flour for approximately 1 hour, then separating the water and sediment, after which the remaining water from the sorghum flour sediment was absorbed using tissue (see Figure 7). After getting the sludge results, the process is carried out in the same stages as Experiment I, Experiment II, and Experiment III.



Fig.7. Sorghum flour settling process

(Source: Results of research data processing, 2024)

Deliver Stage

As explained earlier, there were nine experiments in this research, but after product research, there were two experiments with results that were considered ideal or close to the characteristics of the original mantou bread. The experiments in question

are Experiment 3, namely; the use of wheat flour and sorghum milk, and Experiment IV 70:30 ratio, namely; the use of sorghum flour sludge and plain water.

The product in Experiment III (see Figure 8. Experiment III Assessment) was judged to have a smooth and moist outer surface texture, with a hollow and moist interior. In terms of color, the product was bone white, which was an effect of the use of sorghum milk. The aroma produced was that of steamed bread and wheat flour, and the taste produced a sweet taste



Fig 8. Experiment III Assessment
(Source: Results of research data processing, 2024)

The product in Experiment IV Comparison 70:30 (see Figure 9. Assessment of Experiment IV Comparison 70:30), was judged to have a moist and slightly sandy texture on the outer surface, while on the inside when split or torn, it had a hollow texture but easily blended together when consumed and was also sandy-fine as an effect of the addition of sorghum sediment. In terms of color, the resulting product was off-white, which was also an effect of the addition of sorghum sludge. The aroma produced was that of steamed bread and sorghum flour, and the taste produced was sweet.



Fig .9. Assessment of Experiment IV Comparison 70:30
(Source: Results of research data processing, 2024)

Discussion

From the results of the research that has been carried out using the 4D research design model, at the Discover stage, there are characteristics in each ingredient that can affect the characteristics of the final product. At the Define stage, after analysing the characteristics of the ingredients, a recipe was found to get the ideal mantou bread. Then at the development stage, three steps were carried out, namely;

1. Pre-production steps

In this step, researchers pay attention to the quality of the materials to be used, starting from the feasibility of the material to be used, not expired, odourless, not discoloured, also the packaging is still intact. This aims to facilitate the research process. Also, the utensils and equipment used are clean and suitable for the research process.

2. Production steps

In this step there are several techniques used in processing ingredients using the experimental method. namely; straight dough method is a method of mixing ingredients, by mixing all the ingredients into one and then stirring until it becomes

dough. Steaming, is a cooking technique that uses water vapor to protect food from direct contact with water. And as for the recipe that became the standard in this study

3. Evaluation steps

At this stage, sensory testing is carried out using the senses of taste, smell, sight, and touch to assess the quality of a product produced. As well as the results of informant analysis through the interview process, to assess the research product can be considered ideal or not ideal.

And finally the Deliver stage, at this stage, of the nine experiments carried out with different techniques, there were two experiments that were ideal because their characteristics resembled the original Mantou bread, then an interview process was carried out consisting of 10 informants who were divided into 2, namely; expert informants and ordinary informants, with categories rarely, often, and always. Assessment in Experiment III, all expert informants and ordinary informants on Mantou bread in Experiment III were assessed as ideal mantou bread. And regarding the assessment of Experiment IV Comparison 70:30, all expert informants considered Mantou bread ideal and could be a new variation, and in the assessment of four ordinary informants also considered Mantou bread Experiment IV Comparison 70:30 to be ideal Mantou bread, while the other two ordinary informants said that it could not be considered ideal Mantou bread because they considered the texture was still far from the characteristics of Mantou bread.

So related to innovation in the previous sub chapter, from the results of the assessment of the two ideal Mantou breads, especially in Experiment IV, the 70:30 ratio is considered to be an innovation in Mantou bread because its characteristics are considered to resemble the original Mantou bread and can be a new variation on processed Mantou bread.

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Conclusion

The process of making mantou bread using sorghum flour proved to be much more complex than expected. This was evident from the nine experiments conducted, each of which had different recipe treatments and techniques. The results showed that sorghum flour cannot "stand alone" in making Mantou bread. The use of sorghum flour or sorghum flour sludge as a substitute for wheat flour resulted in a gritty texture of Mantou bread that was difficult to remove, a dull color change, and a astringent taste with a substitution ratio of 50:50. Although the substitution gave a strong sorghum aroma. The use of sorghum milk as a substitute for water in the Mantou bread recipe yielded better results. Sorghum milk successfully avoided the problem of gritty texture and did not cause significant changes in color or taste in the final product. However, the use of sorghum flour tended to produce less sorghum aroma. Thus, from the results of research that has carried out several techniques, starting with the use of sorghum flour, sorghum flour sludge, and sorghum milk, it is concluded that, Mantou bread can be made not only with one technique and can be used as an innovation.

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