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Perfect Fruit Jam Formulation (*Dillenia Philippinensis*) on Consumer Acceptance and Nutritional Content

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Abstract
This study was conducted to analyze the effect of sugar addition formulation on physical quality, consumer acceptability, and nutritional content of Sempur fruit jam. This study was conducted at the Food Processing Laboratory of the Culinary Arts Education Study Program, Faculty of Engineering, Jakarta State University. The study period began in July 2024 to March 2025. The research method used was an experimental method. The research sample used was Sempur fruit jam with added sugar with a percentage of 10%, 12%, and 14% which was then assessed for acceptability through organoleptic (hedonic) tests to 30 semi-trained panelists with assessment aspects including color, aroma, taste, and texture. Data analysis for organoleptic tests used the Friedman test, while nutritional content including water content and vitamin C content was tested in the laboratory. Based on the results of the organoleptic test, there was no significant effect of differences in the percentage of added sugar (10%, 12%, and 14%) on consumer acceptability in the aspects of color, aroma, texture, sweetness, and sourness. However, descriptively, the addition of 14% sugar tended to be preferred by panelists in all aspects. The results of the nutritional content test showed a tendency for water content to decrease as sugar concentration increased, with the lowest average being at 14% (1.55%). In the vitamin C test, statistical results showed that the formulation did not have a significant effect. Researchers recommend utilizing sempur fruit as an innovative jam product to support local food diversification.

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1. INTRODUCTION

Indonesia, as a country with abundant biological resources, is blessed with a variety of local fruits that have great potential for development. However, the utilization of these native fruits, including the sempur fruit (*Dillenia philippinensis*), is still far from optimal. Sempur fruit, traditionally known in several regions of Indonesia and the Philippines, is often considered a shade or ornamental plant (Morton, 1987). However, behind its simple appearance, sempur fruit holds the potential as an alternative food source with high nutritional and economic value. The lack of information and innovation in sempur fruit processing is one of the main causes of this potential not being fully explored, resulting in much fruit being wasted or not utilized efficiently. This situation encourages the need for further exploration of the characteristics of sempur fruit and its development into processed food products with added value.

Nutritionally, sempur fruit exhibits a promising nutritional profile. Preliminary studies and empirical data indicate that this fruit is rich in vitamin C, a powerful antioxidant essential for maintaining immune system function and skin health (de Leon et al., 2021).

In addition to vitamin C, sempur fruit is also reported to contain other antioxidant compounds, such as flavonoids and polyphenols, which play an important role in neutralizing free radicals in the body and potentially reducing the risk of various degenerative diseases, including heart disease and cancer (Morton, 1987).

Furthermore, the significant fiber content of sempur fruit also makes it potentially beneficial for supporting digestive health, aiding blood sugar regulation, and providing a longer-lasting feeling of fullness (Anderson et al., 2009). Therefore, developing sempur fruit into processed food products could contribute to improving public nutritional intake and diversifying functional foods. However, further analysis is needed to confirm the specific nutritional content of Indonesian varieties of sempur fruit and how this nutritional profile is affected by processing.

The importance of food product innovation for food diversification and increasing the added value of local fruit cannot be ignored in the context of economic development and food security. Food diversification is a fundamental strategy to reduce dependence on a few staple food commodities and increase the diversity of the community's nutritional intake (Food Security Agency, 2022). By processing sempur fruit into jam, we can create an alternative food source that supports this diversification. Furthermore, this innovation also contributes to increasing the economic added value of local agricultural commodities.

This increased added value will positively impact the welfare of farmers and small businesses in Sempur fruit-producing areas, as well as create new job opportunities in the food processing sector. This aligns with the national agenda to encourage the down streaming of agricultural products and the development of a locally resource-based food industry.

Although the prospects for developing perfect fruit jam are bright, common issues in jam formulation require serious attention. Jam quality is greatly influenced by the balance of raw material proportions, namely fruit, sugar, pectin, and acid (Kusumawati et al., 2017). One crucial parameter is the texture of the jam, which includes viscosity, spread ability, and consistency. Jam that is too runny or too thick will reduce consumer acceptance and limit its application. Jam flavor is also a key determining factor; the combination of sweetness, sourness, and the characteristic flavors of the fruit must be harmonious to create a delicious and desirable product (Ong et al., 2011).

Sempur fruit itself is known for its sour and slightly astringent taste, requiring precise formulation to balance its flavor profile. Furthermore, the stability of the jam during storage is also a challenge. Changes in color, aroma, texture, and especially microbiological safety must be considered to ensure the jam has a long shelf life and is safe for consumption. Precise pH adjustment, the use of optimal sugar and pectin concentrations, and a controlled heating process all contribute to the stability of the final product (Fellows, 2017). Without careful formulation and proper process optimization, the resulting sempur fruit jam may not meet the quality standards expected by consumers and the industry, thus hampering its potential to compete in the market. Finally, evaluating the nutritional content of sempur fruit jam is crucial. It is expected that the jam retains most of the original fruit's nutrients. Nutritional analysis will include water content and vitamin C. This data will support the product's nutritional claims and health benefits, thereby increasing the market value of sempur jam.

Therefore, the research "Perfect Fruit Jam Formulation (*Dillenia philippinensis*) on Physical Quality, Acceptability and Nutritional Content" is very relevant. It is hoped that this study will provide comprehensive scientific information on the potential of sempur as a raw material for jam, optimize quality jam formulations, and contribute to the development of innovative local food products.

2. RESEARCH METHODS

2.1 Research methods

The research method used in this study is an experimental method to obtain the perfect fruit jam formula with the best sugar addition. The population in this study was perfect fruit jam with added sugar, with samples consisting of perfect fruit jam with added sugar at percentages of 10%, 12%, and 14%. The sampling technique was *random sampling*, where each sample was given a random three-digit code known only to the researcher.

2.2 Data Collection and Analysis Techniques

Data collection in this study was conducted in stages, beginning with product validation by five expert panelists, lecturers from the Culinary Arts Education Study Program at Jakarta State University. Next, samples were tested by 30 semi-trained panelists, students from the Culinary Arts Education Study Program at Jakarta State University, to assess consumer acceptability, including color, aroma, texture, sweetness, and sourness. using a scale *liked.* Then the samples were tested for water content using the gravimetric method and for vitamin C content by placing the samples in Erlenmeyer flasks.

Consumer acceptance data was analyzed using the Friedman test followed by the Duncan test. Data obtained on consumer acceptance were analyzed using the Friedman test to determine the effect of each treatment. If an effect was found, the Duncan test was continued.

2.3 Making Jam

The process of making jam consists of several stages, starting with the preparation stage, which includes preparing the tools, preparing the ingredients, and weighing the ingredients, then the implementation stage, which includes making the perfect fruit pulp or juice, cooking, and the final stage, namely the finishing stage, which includes cooling and packaging.

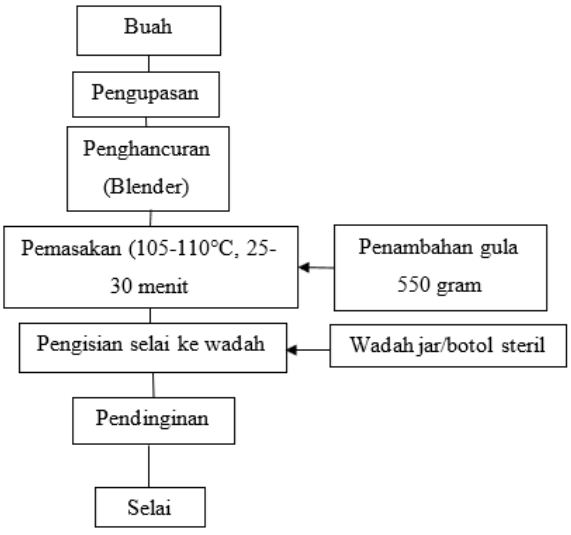

Figure 1 Jam Making Process

2.4 Making Jam by Adding Sugar

Table 1: Perfect Fruit Jam Formula with Different Sugar Additions

Material	Unit					
	Gram	10%	Gram	12%	Gram	14%

Perfect	250	100	250	100	250	100
Granulated sugar	25	10	30	12	35	14
Air	125	50	125	50	125	50
Red food coloring	0,15		0,15		0,15	

Making sempur fruit jam begins with preparing equipment and ingredients such as sempur fruit, granulated sugar, water, and red food coloring. All ingredients are weighed, then the sempur fruit is peeled and cleaned. After that, the sempur fruit is cut into small pieces to make it easier to crush. Then, the cleaned and cut sempur fruit is soaked in salt water for approximately 1 hour to remove the mucus on the sempur fruit. After soaking for 1 hour, wash the sempur fruit thoroughly and then crush or juice it using a blender. After the sempur fruit is crushed using a blender, the fruit juice is then filtered using a coconut sieve. Then, enter the cooking process where the fruit juice, water, sugar, and red coloring are cooked for approximately 30 minutes. After 30 minutes or after the jam texture is solid, cool the jam and then put it into a jar.

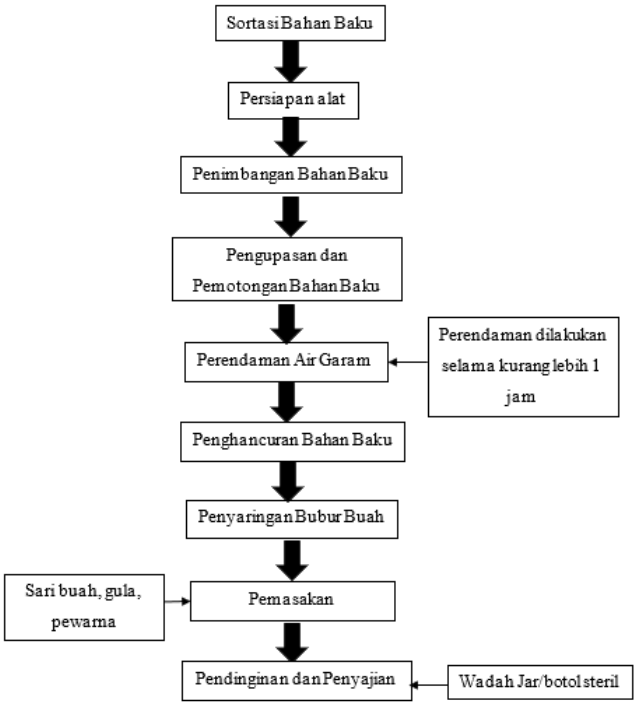

Figure 2 Process Chart for Making Sempur Fruit Jam

3. RESULTS AND DISCUSSION

3.1. Water Rate

Kategori Pengujian	x^2_{hitung}	x^2_{tabel}	Kesimpulan
Kadar Air	1,2	9,55	Fhitung < Ftabel Maka H_0 diterima dan H_1 ditolak

Figure 3 Results of the Hypothesis of Water Content of Sempur Jam

In the water content test on the perfect jam with added sugar, the F-count result was 1.2 with α = 0.05, the degree of freedom of treatment (df) 2, and the

degree of freedom of error (df) 3; the FTable was 9.55. The results of the ANOVA test showed that FCount < FTable, in other words, H0 was accepted and H1 was rejected. So, the results of the ANOVA test on the water content in the perfect jam with added sugar showed no effect.

In general, the higher the percentage of added sugar, the lower the water content in jam products. This is theoretically due to the hygroscopic nature of sugar, which binds to water molecules in food, thus reducing the free water detected as water content.

3.2. Vitamin C

Table 2 Average Results of Consumer Acceptance Test

Testing Criteria	Treatment		
	10%	12%	14%
Color	4,1[a]	4,3[a]	4,4[a]
Texture	3,83[a]	3,83[b]	3,93[c]
Jam Aroma	3,6[a]	3,90[a]	3,90[a]
Sweet Taste	3,83[a]	4,07[a]	4,24 [a]
Sour Taste	3,73[a]	4,07[a]	4[a]

Note: The same notation on the same line has no significantly different meaning.

Color

The average of the panelists' assessment of the color aspect of the perfect jam with a different percentage of sugar addition, with a percentage of 10%, is 4.1, which means it is in the like category. The average assessment of the 12% treatment is 4.3, which means it is in the same category. The average assessment of the 14% treatment is 4.4, which means it is in the like category. The average value of the color aspect of the perfect jam with a different percentage of sugar addition in the table above shows that the formula with a presentation of 14% is the most preferred, with the highest value in the like category.

Texture

The average of the panelists' assessment of the texture aspect of the perfect jam with a different percentage of sugar addition, with a percentage of 10%, is 3.83, which means it is in the like category. The average assessment of the 12% treatment is 3.83, which means it is in the like category. The average assessment of the 14% treatment is 3.91, which means it is in the like category. The average value of the texture aspect of the perfect jam with a different percentage of sugar addition in the table above shows that the formula with a presentation of 14% is the most preferred, with the highest value in the like category.

Perfect Jam Aroma

The average of the panelists' assessment of the aroma aspect of the perfect jam with a different percentage of sugar, with a percentage of 10%, is 3.6, which means it is in the like category. The average assessment of the 12% treatment is 3.90, which means it is in the like category. The average assessment of the 14% treatment is 3.90, which means it is in the same category. The average value of the aroma aspect of the

perfect jam with a different percentage of sugar added in the table above shows that the formula with a presentation of 12% and 14% is the most preferred, with the highest value in the like category.

Sweet Taste

The average of the panelists' assessment of the color aspect of the perfect jam with a different percentage of sugar addition, with a percentage of 10%, is 3.83, which means it is in the like category. The average assessment of the 12% treatment is 4.07, which means it is in the same category. The average assessment of the 14% treatment is 4.24, which means it is in the same category. The average value of the sweetness aspect of the perfect jam with a different percentage of sugar addition in the table above shows that the formula with a presentation of 14% is the most preferred, with the highest value in the like category.

Sour Taste

The average of the panelists' assessment of the sour taste aspect of the perfect jam with a different percentage of sugar, with a percentage of 10%, is 3.73, which means it is in the like category. The average assessment of the 12% treatment is 4.07, which means it is in the same category. The average assessment of the 14% treatment is 4, which means it is in the like category. The average value of the sour taste aspect of the perfect jam with a different percentage of sugar added in the table above shows that the formula with a presentation of 14% is the most preferred, with the highest value in the like category.

4. CONCLUSION

Based on research conducted on perfect fruit jam with different sugar content percentages: 10%, 12%, and 14%. The 14% sugar formula was found to be the best. This formula yielded results close to the control product in all aspects, including color, aroma, taste, and texture.

In the sensory quality testing, data were collected from 30 semi-trained panelists to evaluate and analyze the sensory characteristics of Sempur jam with added sugar. Based on the analysis results using the Friedman test, it was found that the addition of different percentages of sugar did not significantly affect all sensory aspects tested. These aspects include color, aroma of Sempur fruit, texture, sweetness, and sourness.

Sensory quality results showed that adding 10% sugar produced the best color. Adding 12% sugar resulted in the highest average texture score for the perfect jam. Adding 14% sugar optimally produced both sweetness and sourness. The best results for the perfect fruit aroma were obtained with formulations containing 12% and 14% sugar.

Based on the results of the proximate test on the nutritional content of Sempur jam with different percentages of sugar added, which were analyzed using the ANOVA test, it was found that the addition of sugar did not have a significant effect on the water and vitamin C content.

The results of the proximate analysis showed that the addition of 10% and 12% sugar gave the highest average values for the water and vitamin C content parameters.

From the results of this study, it can be concluded that in terms of sensory quality, the addition of 14% sugar gave the best results and was closest to the control product without causing statistically significant differences.

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