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The Effect Of Jali Seed Flour (Coix Lacryma-Jobi L.) Substitution On The Quality Of Cat's Tongue Cake

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ABSTRACT

Cat's tongue cookies are a type of dry cookie known for their thin, flat shape and crisp texture. The use of jali seed flour as a substitute can be one way to incorporate local food ingredients into pastry products. This study aims to determine the effect of jali seed flour substitution on the quality of cat's tongue cookies. The study employed a quantitative approach using an experimental method with four treatment levels: 0%, 20%, 40%, and 60%. Product quality was assessed through organoleptic testing of shape, color, aroma, texture, and taste. Data were analyzed using analysis of variance (ANOVA) at a 5% significance level. The analysis results showed that differences in the substitution levels did not have a significant effect on the attributes tested. Although there were differences in the panelists' average ratings for each treatment, these differences did not indicate a statistically significant effect. The results of this study indicate that jali seed flour has the potential to be used as a partial substitute for wheat flour in the production of cat's tongue cookies up to a substitution level of 60% without showing any significant changes in quality regarding the evaluated aspects.

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Introduction

Cat's tongue cookies are a dry cookie product known for their thin, flat, elongated shape and crispy texture. The quality of this product can be observed through sensory attributes, including shape, color, aroma, texture, and taste. The composition of the ingredients and the baking process play a role in shaping the final characteristics of the cookie. Research into the development of cat's tongue cookies using alternative flours also shows that changes in ingredients can affect the product's organoleptic properties (Oktaviana et al., 2023; Wahyuni, 2022).

Wheat flour is widely used in bakery and pastry products because wheat proteins, particularly glutenin and gliadin, contribute to the viscoelastic properties of dough. These

properties influence the cohesion and structural characteristics of the resulting product (Shewry, 2023). Therefore, partial replacement of wheat flour with non-wheat flour needs to be assessed based on the characteristics of the product being developed, particularly for thin and fragile products such as cat's tongue.

Job's tears (Coix lacryma-jobi L.), also known as adlay, are cereals that can be processed into flour. Research on three varieties of job's tears flour reported protein, fat, dietary fiber, minerals, and starch content, with compositions varying by variety (Mayasti et al., 2021). Other research also found variations in the physicochemical composition between adlay accessions, including protein, fiber, oil, and mineral content (Ahmad et al., 2024). A recent study summarized the potential of adlay as a food source with diverse nutritional composition and bioactive components (Wu-Chen et al., 2026).

Job's tears flour has also been applied to food products. Marta et al. (2024) developed cookies based on fermented adlay flour and reported that several attributes, such as texture, mouthfeel, aftertaste, and overall acceptability, were not significantly different from those of wheat flour cookies. Hakim et al. (2023) studied the substitution of Job's tears flour in pukis cookies. Although this study demonstrated the potential application of Job's tears flour in cake products, specific studies on its use in cat's tongue cookies are still limited. This gap is important to investigate because cat's tongue cookies are thin and fragile, so changes in flour composition have the potential to affect their shape and crispiness.

In this study, barley seed flour was used to partially replace wheat flour at four levels: 0%, 20%, 40%, and 60%. The substitution level was chosen to compare product quality at different levels of barley flour use. Lower proportions of wheat flour can alter the dough structure because barley seed flour does not form a gluten network like wheat flour. These changes may be visible in the product's shape, color, aroma, texture, and taste, but the extent of the changes needs to be determined through testing, not assumed.

In this study, barley seed flour was used to partially replace wheat flour at levels of 0%, 20%, 40%, and 60%. The total proportion of flour was maintained, while the amount of wheat flour was reduced according to the substitution percentage. While barley seed flour does not form a gluten network like wheat flour, changes in the proportions of the two flours can affect the formation of the product's structure and texture. However, these changes must be proven through organoleptic assessment. This study has a novelty in the application of barley seed flour in the formulation of cat's tongue cookies and the simultaneous testing of several quality attributes. The contribution of this study is to provide initial data on the substitution levels of barley seed flour tested and to serve as a basis for the development of dry cake products based on local food ingredients.

Based on this, this study aims to determine the effect of substituting jali seed flour on the quality of cat's tongue cookies, including shape, color, aroma, texture/crispness, sweetness, savory flavor, and the distinctive jali seed flavor. The results are expected to provide additional information on the use of local food ingredients in pastry products and serve as a basis for further research.

Method

Research Method and Design

This study used a quantitative approach with an experimental method. The treatment was in the form of substitution of wheat flour with jali seed flour at concentrations of 0% (X0/control), 20% (X1), 40% (X2), and 60% (X3), using a completely randomized design with three replications. The research in the source document was planned/implemented at the Culinary Arts Workshop, Department of Family Welfare, Faculty of Tourism and

Hospitality, Padang State University. Data were collected through organoleptic tests by panelists using an assessment sheet. The attributes assessed included shape, color, fragrant aroma of margarine, crunchy texture, sweet taste, savory taste, and the distinctive taste of jali seeds. Panelist scores were tabulated and analyzed using analysis of variance (ANOVA) at a significance level of 5%. The F-count value was compared with F-table; if F-count was greater than F-table, the test could be continued with further tests according to the analysis design.

Research Time and Location

This study was conducted at the Culinary Workshop, Department of Family Welfare, Faculty of Tourism and Hospitality, Padang State University

Materials and Equipment

The equipment used in this study included a digital scale, bowl, cloth, sieve, measuring spoon, mixer, spatula, baking pan, piping bag, cat tongue cookie mold, oven, and a 200ml plastic container. The materials used in the study are presented in Table 1 below:

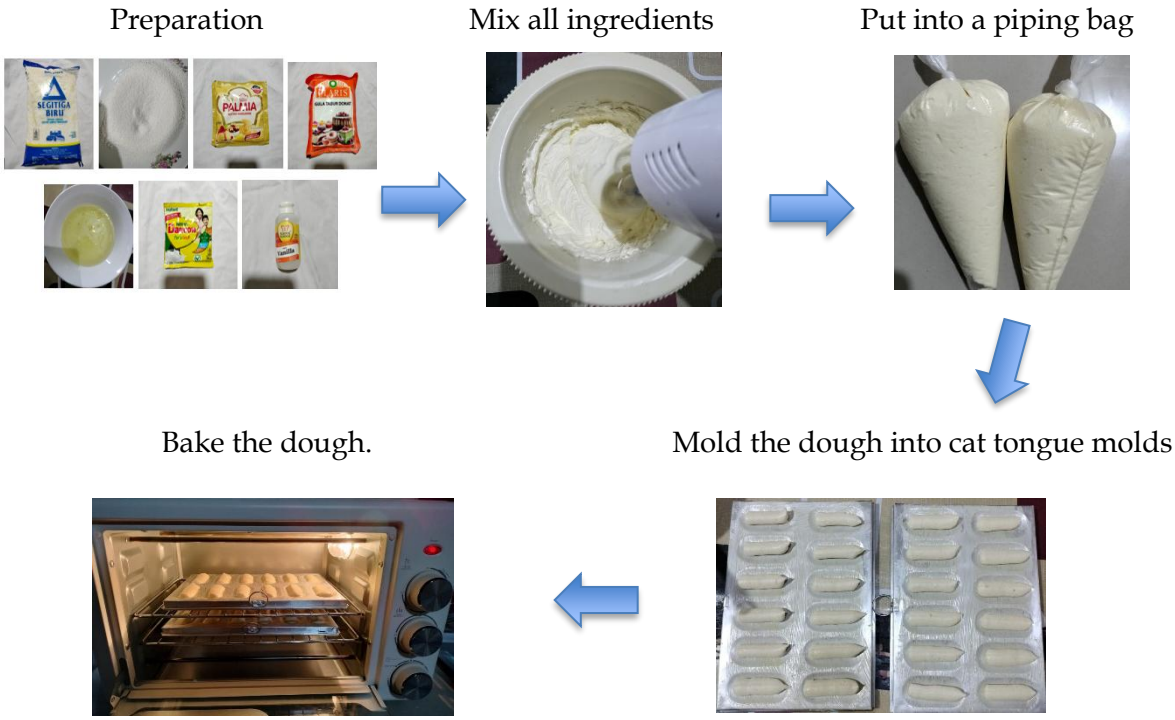
Table 1. Cat's Tongue Cake Ingredients Substituted with Jali Seed Flour

No	Material Name	Composition of Research Materials			
		0%	20%	40%	60%
1.	Flour	113 gr	90.4 gr	67.8gr	45.2 gr
2.	Jali Seed Flour	0 gr	22.6 gr	45.2 gr	67.8 gr
3.	Fine granulated sugar	65 gr	65 gr	65 gr	65 gr
4.	Margarine	125 gr	125 gr	125 gr	125 gr
5.	Vanilla	0.5 gr	0.5 gr	0.5 gr	0.5 gr
6.	Egg whites	120 gr	120 gr	120 gr	120 gr
7.	Milk powder	15 gr	15 gr	15 gr	15 gr

Research Procedure

The research procedure consisted of three main stages. The first stage was preparation, which included preparing and weighing all ingredients according to the formulation specified for each treatment. The second stage was processing, beginning with the preparation of the jali seed flour. The production of the jali seed flour begins with sorting high-quality jali seeds, followed by briefly roasting them. They are then ground using a blender and sieved to obtain a fine powder. Preparation of cat's tongue cake processingPut margarine and powdered sugar into a bowl and mix until fluffy and pale white. Then, gradually add the egg whites and vanilla. Then, add the powdered milk, flour, and barley flour and mix until well combined. Put the mixture into a piping bag and pour the mixture little by little into the cat's tongue cookie mold. Place the mold filled with the mixture into a preheated oven at 150°C.°-180°C, then pour the batter into the mold and bake for 15-20 minutes until the surface is dry. The third stage involved sensory evaluation, where all cat tongue cookie samples were assessed organoleptically by panelists. The complete research procedure is illustrated in Figure 1 below:

Cat Tongue Cake Process



Data Analysis Techniques

Data for this study were collected through organoleptic evaluations involving five trained panelists from the Bachelor's and Diploma programs in Culinary Arts. Each sample was randomly coded and presented to the panelists, who independently assessed the samples using a pre-designed evaluation instrument.

The organoleptic assessment results were then tabulated and statistically analyzed using Analysis of Variance (ANOVA) to determine whether the replacement of jali seed flour affected the quality of cat's tongue cookies. When the analysis showed that F count > F table, statistical analysis was continued with Duncan's Multiple Range Test (DMRT) to determine which treatment groups were significantly different from each other.

Results and Discussion

1. Form Quality

The quality of the cat's tongue shape at four treatment levels, namely X0 (0%), X1 (20%), X2 (40%), and X3 (60%). The assessment of the quality of the cat's tongue shape was carried out through an organoleptic test (level test) by panelists based on the level of suitability of the resulting cat's tongue shape. The average value of the shape quality

assessment for each treatment is presented in the form of a line graph which can be seen in the following image.

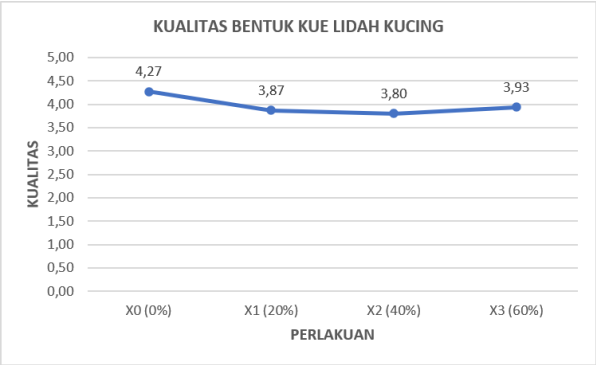


Figure 1. Average Shape Quality

Figure 4.1 shows the average value of the organoleptic test results on the quality of the cat's tongue shape at various levels of substitution of jali seed flour. Based on the graph, the average value of the quality of the cat's tongue shape in the 0% (X0) treatment was 4.27, 20% (X1) was 3.87, 40% (X2) was 3.80, and 60% (X3) was 3.93. The highest average value was obtained in treatment X0 with a substitution of jali seed flour of 0%, while the lowest average value was obtained in treatment X2 at 40%. These data indicate that descriptively the shape of the cat's tongue in treatment X0 received the highest assessment from the panelists.

To determine whether the difference in average shape quality values between treatments was statistically significant, an analysis of variance (ANOVA) was performed. The results of the ANOVA calculation for cat tongue shape quality are presented in the following table:

Table 1. Analysis of Variance (ANOVA) of Shape Quality

SK	DB	JK	KT	Fhitung	Ftabel
					0,05
Sampel	3,00	0,64	0,21	1,63	3,49
Panelis	4,00	0,42	0,11	0,80	3,26
Galat/sisa	12,00	1,58	0,13		
Total	19,00	2,64			

The results of the analysis of variance showed an F count of 1.63, while the F table was 3.49 at a significance level of 5%. Because F count ≤ F table, there was no significant difference between the 0%, 20%, 40%, and 60% substitution treatments for the shape of the cat's tongue. Thus, the increase in the percentage of substitution of the cat's tongue in this study did not show a significant effect on the shape of the cat's tongue.

The lack of significant effect on the shape of the cat's tongues was due to the product shape being more influenced by the molding process, the amount of dough added to the mold, and the baking process than by the difference in the percentage of substitution of barley flour. Throughout the manufacturing process, all treatments used the same mold and processing procedure, resulting in a relatively uniform final shape..

2. Color Quality

The color quality of cat tongues at four treatment levels, namely X0 (0%), X1 (20%), X2 (40%), and X3 (60%). The assessment of the color quality of cat tongues was carried out through organoleptic tests (level tests) by panelists based on the level of suitability of the resulting cat tongue color. The average value of the color quality assessment for each treatment is presented in the form of a line graph which can be seen in the following image.



Figure 2. Average quality of cat tongue color

Figure 2 shows the average value of the organoleptic test results on the color quality of cat's tongue at various levels of substitution of jali seed flour. Based on the graph, the average value of color quality shows that the average value of 0% (X0) is 4.47, 20% (X1) is 3.87, 40% (X2) is 3.93, and % (X3) is 3.73. The highest average value was obtained in treatment X0 as a control, while the lowest value was found in treatment X3 with 60% substitution of jali seed flour. Based on these values, descriptively, the higher the substitution of jali seed flour, the panelists' preference value for the color of cat's tongue tends to decrease.

To determine whether the difference in average tongue color quality between treatments was statistically significant, an analysis of variance (ANOVA) was performed. The results of the ANOVA calculation for tongue color quality are presented in the following table.

Table 2. Analysis of Variance (ANOVA) of Color Quality

SK	DB	JK	KT	Fhitung	Ftabel
					0,05
Sampel	3,00	1,56	0,52	1,72	3,49
Panelis	4,00	1,06	0,26	0,88	3,26
Galat/sisa	12,00	3,61	0,30		
Total	19,00	6,22			

The results of the analysis of variance showed that the F count value of 1.72 was smaller than the F table of 3.49. Thus, the substitution of jali seed flour did not have a significant effect on the color of the cat's tongue at the 5% level. Although there was a tendency for an increase in the average value of the cat's tongue color from X0 to X3, the difference was not large enough to produce a statistically significant effect. This indicates that the use of jali seed flour up to 60% was still able to produce a cat's tongue color that was relatively acceptable to the panelists.

The lack of significant effect on the color of the cat's tongues is due to the product color being more influenced by the baking temperature, baking time, sugar content,

protein, and other components that react during heating than by the substitution of barley seed flour. Throughout the manufacturing process, all treatments used the same temperature and processing procedures, resulting in a relatively uniform final color of the cat's tongues.

3. Aroma Quality

The quality of cat's tongue aroma at four treatment levels, namely X0 (0%), X1 (20%), X2 (40%), and X3 (60%). The quality of cat's tongue aroma was assessed through organoleptic testing (level testing) by panelists based on the level of suitability of the resulting cat's tongue aroma. The average value of the aroma quality assessment for each treatment is presented in the form of a line graph which can be seen in the following figure.

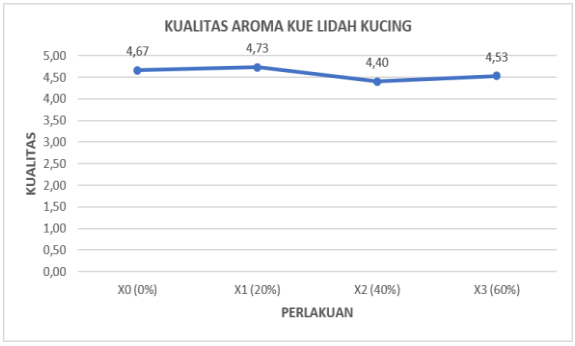


Figure 3. Average Quality of Cat Tongue Aroma

Figure 3 shows the average value of the organoleptic test results on the quality of margarine fragrance at various levels of substitution of jali seed flour. Based on the graph, the quality of margarine fragrance shows an average value of 4.67 at 0% (X0), 4.73 at 20% (X1), 4.40 at 4.40, and 4.53 at 60% (X3). The highest average value was obtained in the control treatment X1, while the lowest value was found in X2 with a substitution of 40%. These results show that the addition of jali seed flour tends to reduce the assessment of margarine fragrance in several treatments, although this pattern does not occur consistently. The aroma produced by cat's tongue is a combination of the aromas of all the ingredients used, so changing one ingredient does not necessarily result in a major change in the overall aroma of the product.

To determine whether the difference in the average value of the aroma quality between treatments was statistically significant, an analysis of variance (ANOVA) was performed. The results of the ANOVA calculation of the aroma quality of margarine on the cat's tongue are presented in the following table:

Table 3. Analysis of variance (ANOVA) of Fragrant Aroma Quality

SK	DB	JK	KT	Fhitung	Ftabel
					0,05
Sampel	3,00	0,33	0,11	1,20	3,49
Panelis	4,00	1,22	0,31	3,37	3,26
Galat/sisa	12,00	1,09	0,09		
Total	19,00	2,64			

The results of the analysis of variance showed an F count of 1.20 and an F table of 3.49. Since F count ≤ F table, the substitution of jali seed flour did not have a significant effect on the aroma of cat's tongue margarine. The decrease in the average value of the aroma in the treatment using jali seed flour is thought to be related to the emergence of the distinctive aroma of jali seed flour which can affect the overall aroma of the product.

However, the aroma of cat's tongue also comes from other ingredients, such as margarine, egg white, milk, and flavoring ingredients used in the formulation. Therefore, the resulting aroma is a combination of the aroma of all the ingredients used.

In addition to ingredient composition, the roasting process can also influence panelists' perception of cat's tongue aroma. Heating causes changes in the ingredient components and produces volatile compounds that contribute to the product's aroma. The relatively similar roasting conditions applied to each treatment allowed aroma formation to occur under uniform conditions. Thus, aroma differences resulting from increased substitution of barley seed flour may be less dominant than aromas formed during the roasting process. This uniformity of processing procedures may be one reason why changes in the proportion of barley seed flour have not resulted in significant differences in margarine aroma between treatments.

4. Texture Quality

The texture quality of cat tongue at four treatment levels, namely X0 (0%), X1 (20%), X2 (40%), and X3 (60%). The assessment of the texture quality of cat tongue was carried out through organoleptic testing (level testing) by panelists based on the level of suitability of the resulting cat tongue texture. The average value of the texture quality assessment for each treatment is presented in the form of a line graph which can be seen in the following image.

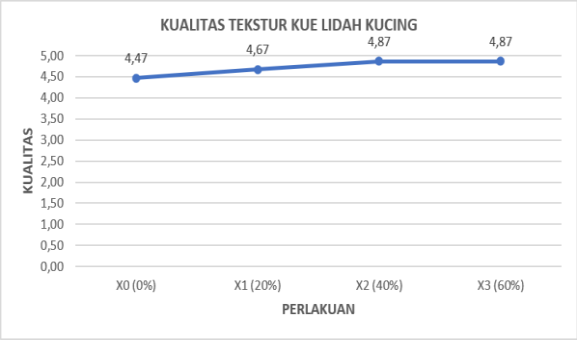


Figure 4. Average Quality of Cat Tongue Texture

Figure 4 shows the average value of the organoleptic test results on the quality of the crunchy texture of cat's tongue at various levels of substitution of jali seed flour. Based on the graph, the average value of the crunchy texture of cat's tongue is 4.47 at 0% (X0), 4.67 at 20% (X1), 4.87 at 40% (X2), and 4.87 at 60% (X3). The highest average value is found in treatment X3, while the lowest value is found in treatment X0.

To determine whether the difference in the average crunchy texture quality of cat tongue between treatments was statistically significant, an analysis of variance (ANOVA) was performed. The results of the ANOVA calculation for crunchy texture quality of cat tongue are presented in the following table:

Table 4. Analysis of Variance (ANOVA) of Crispy Texture Quality

SK	DB	JK	KT	Fhitung	Ftabel
					0,05
Sampel	3,00	0,55	0,18	2,25	3,49
Panelis	4,00	0,53	0,13	1,64	3,26
Galat/sisa	12,00	0,98	0,08		
Total	19,00	2,06			

The results of the analysis of variance showed an F count of 2.25 and an F table of 3.49. Because F count ≤ F table, the substitution of jali seed flour did not have a significant effect on the crispiness of the cat's tongue. Descriptively, there is a tendency for an increase in the crispiness value along with the increasing percentage of jali seed flour substitution. This condition can be associated with the differences in the characteristics of jali seed flour and wheat flour. Wheat flour contains gluten-forming proteins that play a role in forming the dough structure, while jali seed flour has different characteristics so that increasing its use can affect the structure and texture of the product's crispiness.

However, this increase in value did not produce a statistically significant difference. This indicates that the change in texture was relatively small at the substitution percentage used, so the panelists did not provide a significantly different assessment.

5. Sweet Taste Quality

The quality of sweet taste of cat's tongue at four treatment levels, namely X0 (0%), X1 (20%), X2 (40%), and X3 (60%). The assessment of the quality of sweet taste of cat's tongue was carried out through organoleptic tests (level tests) by panelists based on the level of suitability of the sweet taste of cat's tongue produced. The average value of the sweet taste quality assessment for each treatment is presented in the form of a line graph which can be seen in the following figure.

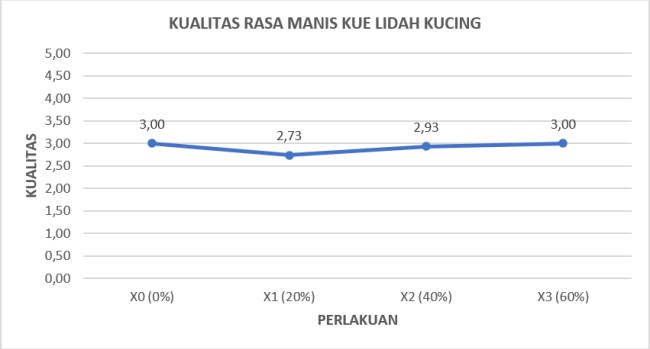


Figure 5. Average Sweetness Quality

Figure 5 shows the average value of the organoleptic test results on the quality of the sweet taste of cat's tongue at various levels of substitution of jali seed flour. Based on the graph, the results of the sweet taste assessment show an average value of X0 of 3.00, X1 of 2.73, X2 of 2.93, and X3 of 3.00. The highest value was obtained in treatment X0, namely the control treatment and X3 of 60%, while the lowest value was obtained in treatment X2 of 20%.

To determine whether the difference in average sweetness quality between treatments was statistically significant, an analysis of variance (ANOVA) was

performed. The results of the ANOVA calculation for the sweetness quality of cat's tongue are presented in the following table.

Table 5. Analysis of Variance (ANOVA) of Sweet Taste Quality.

SK	DB	JK	KT	Fhitung	Ftabel
					0,05
Sampel	3,00	0,24	0,08	0,30	3,49
Panelis	4,00	2,50	0,63	2,32	3,26
Galat/sisa	12,00	3,23	0,27		
Total	19,00	5,97			

The results of the analysis of variance showed an F count of 0.30 and an F table of 3.49. Since F count ≤ F table, the substitution of jali seed flour did not have a significant effect on the sweetness of cat's tongue at the 5% level. This indicates that statistically there is a tendency for differences in sweetness assessments between treatments, but this difference has not reached the specified level of significance.

Differences in average sweetness values can be influenced by the composition of cat's tongue ingredients, particularly sugar and other ingredients. Substituting tears millet seeds can change the proportion of wheat flour in the formulation, but not directly alter the amount of sugar used. Therefore, the changes in sweetness are relatively small.

6. Savory Taste Quality

The savory taste quality of cat's tongue at four treatment levels, namely X0 (0%), X1 (20%), X2 (40%), and X3 (60%). The assessment of the savory taste quality of cat's tongue was carried out through organoleptic testing (level testing) by panelists based on the level of suitability of the savory taste of the cat's tongue produced. The average value of the savory taste quality assessment for each treatment is presented in the form of a line graph which can be seen in the following figure.

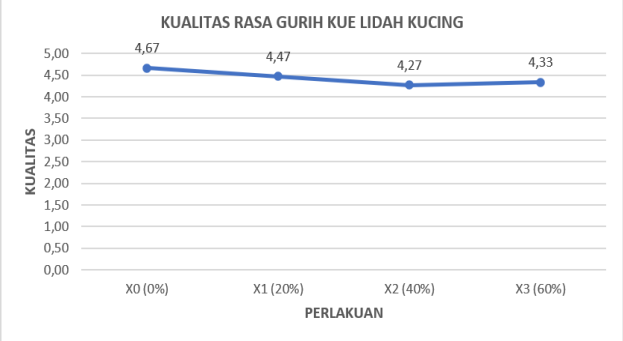


Figure 6. Average Quality of Savory Taste

Figure 6 shows the average value of the organoleptic test results on the savory taste quality of cat's tongue at various levels of substitution of jali seed flour. Based on the graph, the savory taste assessment results show an average value of X0 of 4.67, X1 of 4.47, X2 of 4.27, and X3 of 4.33. The highest value was obtained in treatment X0, namely the control treatment, while the lowest value was obtained in treatment X2 of 20%.

To determine whether the difference in the average savory taste quality between treatments was statistically significant, an analysis of variance (ANOVA) was

performed. The results of the ANOVA calculation for the savory taste quality of cat's tongue are presented in the following table.

Table 6. Analysis of Variance (ANOVA) of Savory Taste Quality

SK	DB	JK	KT	Fhitung	Ftabel
					0,05
Sampel	3,00	0,47	0,16	2,30	3,49
Panelis	4,00	6,74	1,69	24,95	3,26
Galat/sisa	12,00	0,81	0,07		
Total	19,00	8,02			

The results of the analysis of variance showed an F count of 2.30 and an F table of 3.49. Because F count ≤ F table, the substitution of jali seed flour did not have a significant effect on the savory taste on the cat's tongue. Descriptively, there was a tendency for a decrease in the savory value along with the increasing percentage of jali seed flour substitution. This condition can be attributed to the differences in the characteristics of jali seed flour and wheat flour so that increasing its use can affect the structure and savory taste of the product.

However, this decrease in value did not produce a statistically significant difference. This indicates that the change in savory flavor was relatively small at the substitution percentage used, so the panelists did not provide a significantly different assessment.

7. Taste Quality of Jali Seeds

The taste quality of cat's tongue jali seeds at four treatment levels, namely X0 (0%), X1 (20%), X2 (40%), and X3 (60%). The assessment of the savory taste quality of cat's tongue jali seeds was carried out through organoleptic testing (level testing) by panelists based on the level of suitability of the taste of the cat's tongue jali seeds produced. The average value of the taste quality assessment of jali seeds at each treatment is presented in the form of a line graph which can be seen in the figure.following.

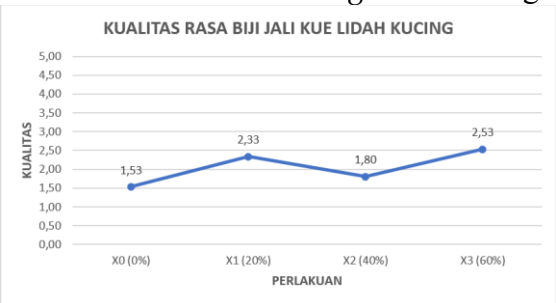


Figure 7. Average Taste Quality of Job's Tea Seeds

Figure 7 shows the average value of the organoleptic test results on the taste quality of cat's tongue jali seeds at various levels of substitution of jali seed flour. Based on the graph, the results of the jali seed taste assessment show an average value of X0 of 1.53, X1 of 2.33, X2 of 1.80, and X3 of 2.53. The highest average value was obtainedin treatment X3 with 60% substitution of jali seed flour, while the lowest value was obtained in X0.

To determine whether the difference in the average taste quality of the tears apple seeds between treatments was statistically significant, an analysis of variance (ANOVA) was performed. The results of the ANOVA calculation for the taste quality of tears apple seeds on cat's tongue are presented in the following table.

Table 7. Analysis of Variance (ANOVA) of Taste Quality of Job's Tea Seeds

SK	DB	JK	KT	Fhitung	Ftabel
					0,05
Sampel	3,00	3,22	1,07	2,00	3,49
Panelis	4,00	3,31	0,83	1,55	3,26
Galat/sisa	12,00	6,42	0,54		
Total	19,00	12,95			

The results of the analysis of variance showed an F count of 2.00 and an F table of 3.49. Since F count ≤ F table, the substitution of jali seed flour did not have a significant effect on the taste of cat's tongue. Although there was no statistically significant effect, descriptively there was a clear tendency that the higher the percentage of jali seed flour substitution, the more the jali seeds were felt by the panelists. This can be explained because increasing the amount of jali seed flour directly increases the proportion of components that provide a slight distinctive taste of jali seeds in the product.

Treatment X3 achieved the highest average score, 2.53, indicating that the taste of the tears apple seeds was more recognizable when using tears apple seed flour by 60%. This finding suggests that substituting tears apple seed flour can impart a distinctive flavor characteristic to cats' tongues, although the statistical analysis did not reveal a significant difference.

Overall, the study reported that substitution of 0%, 20%, 40%, and 60% of barley seed flour did not significantly affect the quality attributes tested at the 5% significance level. Insignificant results do not necessarily indicate a failure of the study; they indicate that, given the formulation, panelists, and testing procedures used, statistical evidence is insufficient to establish a difference between treatments. Differences in mean scores can still be used to describe trends in results, while clearly distinguishing between descriptive findings and statistical conclusions.

These findings provide preliminary evidence that barley seed flour can be tested as a substitute for cat's tongue cookies at up to 60% concentration without detecting significant changes in the sensory attributes assessed in this experiment. However, these results do not automatically prove that all aspects of the product's quality or nutritional content remain unchanged. Further research is recommended to include additional physical and chemical measurements, clarify the assessment scale for each attribute, increase the number of panelists, and verify the consistency of statistical calculations and data presentation before publication.

Conclusion

Based on the research results, substitution of jali seed flour at levels of 0%, 20%, 40%, and 60% did not have a significant effect on the quality of shape, color, aroma, texture/crispyness, sweetness, savory taste, and the distinctive taste of jali seeds at a significance level of 5%. The highest average value of crispiness was obtained in the 40% and 60% treatments, respectively, at 4.87, while the highest average value of the distinctive taste of jali seeds was obtained in the 60% treatment, namely 2.53. These findings indicate that jali seed flour has the potential to be used as a partial substitute for wheat flour in making cat's tongue up to 60% under the formulation conditions and processes of this study. However, these results do not mean that the substitution results in a significant increase in quality.

The use of barley seed flour can be an alternative for developing cookies based on local food ingredients. Future research is recommended to examine the product's physical and chemical characteristics, such as moisture content, protein content, dietary fiber, instrumental color, hardness, and crispness, and to expand consumer acceptance testing with a larger number of panelists. Shelf-life testing is also needed to determine product quality stability during storage.

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