

Sensory evaluation of pandesal with dried saluyot (*Corchorus olitorius*) leaves



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Abstract Pandesal, as it is already a staple and typical food for Filipinos, is also a product that is constantly evolving. Food commodity deterioration significantly impacts its marketability and inspires the development of profitable new consumer products. The study aimed to test the level of acceptability of pandesal with saluyot (*Corchorus olitorius*) as a product of UM Digos College. The selected respondents were randomly picked: seventy-five (75) males and seventy-five (75) females from Bagumbayan, Malalag, Davao del Sur. Using descriptive statistics and T-test, utilize mean to determine the level of acceptability of the respondents to the product. The respondents assessments in pandesal were made from 15 grams of saluyot (*Corchorus olitorius*) powder ($x=2.87$). This acceptable result was obtained from the acceptable level in terms of taste ($x=4.24$), texture ($x=2.67$), color ($x=2.90$), and aroma ($x=2.99$). In 30 grams of saluyot (*Corchorus olitorius*) powder in pandesal was rated by the respondents as the most acceptable level with an overall rating of ($x=4.24$). This most acceptable result was obtained from the acceptable level in terms of taste ($x=4.21$), texture ($x=4.36$), color ($x=4.15$), and aroma ($x=4.25$). Pandesal was made from 60 grams of saluyot (*Corchorus olitorius*) powder ($x=3.26$). This acceptable result was obtained from the acceptable level in terms of taste ($x=3.31$), texture ($x=3.21$), color ($x=3.14$), and aroma ($x=3.37$). The result revealed that the respondents rated pandesal with dried saluyot (*Corchorus olitorius*) leaves with 30 grams in terms of taste, texture, color, and aroma as the most acceptable. Thus, it is recommended that the texture of the dried saluyot (*Corchorus olitorius*) leaves shall be more refined. Moreover, the researchers recommended pursuing the product since the study revealed that 30 grams of pandesal with saluyot (*corchorus olitorius*) powder were most acceptable to the respondents. Thus, it can be developed and improved for commercialization.

Keywords: *Corchorus olitorius*, pandesal, nalta jute, Philippines

1. Introduction

Product Development contains crucial steps to achieve a desirable outcome. Saluyot (*Corchorus olitorius*) is one of the most popular plants in the Philippines, which has many nutrients and is regarded as herbal by many people. Most of its medicinal value is found in its green leaves. As stated by Islam (2017), saluyot (*Corchorus olitorius*) leaf has a wide range of health advantages compared to other natural medicinal herbs. Although, saluyot (*Corchorus olitorius*) leaf has a diverse range of qualities and applications. Saluyot (*Corchorus olitorius*) leaf includes protein, calories, fibres and as well as Phytol and monogalactosyl-diacylglycerol are antitumor promoters. It might lessen cancer risk. As a result, jute leaf is crucial for human nutrition, health, and beauty care. New product development (NPD) is creating new products, developing them, and bringing them to commerce. Food creation and manufacturing must continually take into account factors like consumer health, ingredient accessibility and availability, supply chain resiliency, ingredient sustainability, and, more broadly, management of the life cycle of the food product (Azanedo 2020). Food usage and consumption are directly connected to an individual's physical nourishment. A well-balanced diet and appropriate nutrition practices promote good health. Nowadays, people's diet is one of the essential parts of their daily lives, with growing numbers of hunger and malnutrition (FNRI n.d.)

Pandesal, as it is already a staple and typical food for Filipinos, it is also a product that is constantly evolving. Filipinos love to eat pandesal bread, especially when it dips to coffee in the morning. That is why many people experiment and create different ideas to enhance the flavor of pandesal, from typical to exotic flavors such as Strawberry cream cheese pandesal, Matcha pandesal, Ube and cheese pandesal, Malunggay pandesal, and many more (Hazel Lumbre 2020). Pandesal is easy to make and a cheap bread but contains nutrients. Adding Jute to pandesal will not only give another flavor, but it will also greatly enhance the nutritional level of the product. Most of its medicinal value is found in its green leaves. One of the main reasons it is popular in the Philippines is the health benefits it gives pregnant women. According to Tchientche Kamga et al (2013), saluyot (*Corchorus olitorius*) vegetables have high iron content, making them a possible source of iron for vulnerable



populations like children under five and pregnant and nursing mothers. Some are also advised to add saluyot (*Corchorus olitorius*) to their diets. It was found that saluyot (*Corchorus olitorius*) increases both the mother's and the fetus's ability to fight off diabetes-induced oxidative stress. Jute is rich in vitamins E and C and is loaded with antioxidants, so it helps to prevent and protect the cells from damage. These vitamins and antioxidants prevent wrinkles and keep you youthful while preventing infections and diseases. The herb is also rich in Vitamin A and Vitamin B6, which help in maintaining good vision. Jute's antioxidant properties from its leaves help protect the liver by removing toxins called thioacetamide, a compound that can damage the organ (Singson 2021).

Internationally, Jute is mass-produced and harvested for its cheap, soft, firm, long, glossy, uniform, and especially for its eco-friendly fiber. It is next to the cotton crop as India's most important fiber crop. When dried, its stalks are a great source of fiber and are mainly used for manufacturing paper and burlap sacks. This industry plays a vital role in the Indian economy; this manufacturing business employs 0.26 million workers and finances the lives of approximately 4.0 million household farms (Balakumar 2020). Jute has also been produced in Bangladesh for the consumption of its seeds and is also distributed abroad (Sawe 2017).

Given that pandesal bread is a common and essential food among Filipinos, innovating its flavor is a consideration using jute powder. Developing this new product involves evaluating the appropriate and desirable amount of jute powder mixed with the pandesal. This sensory evaluation determines and improves the bread to be more desirable and marketable than its standard counterparts. This product development will give new alternatives to Filipino staples and help low-income families have three simple but nutritious food and livelihood in generating income. Generally, this study aimed to develop pandesal made from saluyot (*Corchorus olitorius*) powder-based ingredients. Afterward, this research determined the acceptability level of the product as perceived by the respondents.

2. Materials and Methods

Respondents. One hundred fifty (150) respondents were composed of seventy-five (75) males and seventy-five (75) females who participated in the sensory evaluation. Respondents were selected using the following criteria: respondents must be 18 years old and above and must be a bonafide resident of Bagumbayan, Malalag, Davao del Sur. However, this evaluation will also include respondents unwilling to continue the evaluation process. A respondent may withdraw from the research study at any time.

2.1. Instruments and Materials

A survey questionnaire was used in gathering the needed data for this study. It focuses on the sensory characteristics of pandesal with saluyot powder in terms of taste, texture, aroma, and color (see [Supplementary material](#)). A Likert point scale of 1-5 was used to evaluate each sensory characteristic of the pandesal with saluyot powder. The survey form used by the researchers was 4 adopted from the study of Sherwin Jumao-as (2022) entitled "Level of Acceptability of Chili Garlic Sauce Enhanced with Lemongrass." Below are the scoring guides for the responses, which are categorized into five scales. A Likert point scale of 1-5 was used to evaluate each of the different sensory characteristics of the pandesal with saluyot (*Corchorus olitorius*) powder.

Each sensory quality of the pandesal with saluyot (*Corchorus olitorius*) powder was rated on a scale of 1 to 5 based on the Likert system.

Table 1 Tools and equipment.

Tools and Equipment	Uses and Functions
Chopping Board	It protects the surface on which to cut or slice things.
Grinder/Powder Maker	It is used to break down solid ingredients into powder.
Knife	It is used for cutting and slicing vegetables, fruit, meat, etc.
Measuring Cup	It is used to measure liquid and solid ingredients.
Measuring Spoon	It is used to measure small amounts of either solid or liquid ingredients.
Mixing Bowl	It is used for mixing dry or wet ingredients using a ladle or whisk.
Pan	It is used for frying, searing, and browning food.
Pandesal Wrapper	It is used to wrap pandesal and protect food from contamination.
Sealer	It is used to seal wrappers to preserve food by inhibiting the growth of molds, fungi, and bacteria.
Utility Tray	It is used to put everything, finished or unfinished products.
Weighing Scale	It is used to determine the weight of ingredients.
Electric Oven	It is used for baked bread, muffin, cakes, etc.
Wooden Ladle	It is used to stir any dishes. It could be dry or liquid.

2.2. Design and Procedure



The researchers used developmental research since the study focuses on developing a food product. A descriptive research design was utilized to describe the acceptability level of the respondents toward the product produced:

Drying and powdering process. The saluyot (*Corchorus olitorius*) leaves undergo a series of the procedure:

- Get the fresh tender leaves of saluyot (*Corchorus olitorius*) leaves. Pluck the leaves, discard the stems and stalks, and thoroughly wash them twice or thrice in water.
- Put the clean saluyot (*Corchorus olitorius*) leaves on the cookie sheets, then dry a 70°C until adequately dried.
- When they are crisp, carefully crush them, remove any remaining stems and stalks, and then powder the leaves in a mixer before storing them in an airtight jar.
- *Methods of baking pandesal with saluyot (Corchorus olitorius) powder.* The researchers studied the following techniques in pandesal with saluyot powder:
 - Do the Mise en place.
 - Prepare the oven at 170°C for 12 minutes.
 - Add the active dry yeast after mixing one tablespoon of sugar and warm water until it dissolves.
 - Rest until it foams doubled, which should take at least 5 to 10 minutes. Combine the flour, sugar, and salt in a bowl. The yeast mixture should be poured into the middle well, and the vegetable oil and egg should be put in.
 - Mix well, then gradually add the crushed dried leaves of saluyot and continue to stir until it is well combined.
 - Put the dough on a clean, lightly floured surface, then knead the dough for 7 minutes or use a stand mixer for 5 minutes until smooth.
 - Transfer to a greased bowl, cover it with a tea towel, and let it rise for 1-1.5 hours until it doubles the size.
 - Once the dough is ready, transfer it again on a flat surface.
 - Roll, cut and divide the dough into pieces.
 - Shape it into a ball, then flatten the dough, and shape it again into a ball.
 - Dredge each piece of dough in prepared breadcrumbs. Arrange it on a cookie sheet and cover it with a clean towel.
 - Let it stand for another 30 minutes.
 - Bake in a preheated oven at 170°C for 2-14 minutes.

Table 2 Ingredients of Pandesal with Saluyot (*Corchorus olitorius*) Powder.

Unit	Description
15g, 30g, 60g	Saluyot powder
128g	All Purpose Flour
128g	Bread Flour
75g	Melted Butter
4.2g	Baking Powder
331ml	Warm Fresh Milk
23g	Instant Dry Yeast
4.2g	Salt
128g	Bread Crumbs
1pc	Raw egg
15ml	Cooking Oil

A validated questionnaire was utilized to evaluate the level of acceptability of pandesal with saluyot (*Corchorus olitorius*) powder. The researchers used an utterly Randomized Design (CDR) to evaluate the different variations of the treatments. To objectively address the intention of the research, frequency was used to describe the cardinality of the observations in terms of demographic profile. Moreover, mean was used to describe the level of acceptability among selected respondents. Lastly, ANOVA was used to test the difference of the level of acceptability among respondents when analyzed per classification of saluyot (*Corchorus olitorius*) based on number of grams. Inferentially, this study tested the hypothesis at the significant level of 0.05. The table below shows the difference between the three classified treatments, emphasizing the different grams of saluyot (*Corchorus olitorius*) employed per treatment. Seeing that the first treatment had a smaller amount of saluyot (*Corchorus olitorius*) powder, which is less flavorful, whereas the second treatment had enough content of saluyot (*Corchorus olitorius*) powder and the aromatic scents were enough to complement the plain pandesal. Moreover, the last treatment has the highest amount of saluyot (*Corchorus olitorius*) powder, which can cause the aromatic scents to be strong. The three treatments are as follows (Table 3):

Table 3 Study treatments.

Treatments	Grams of Saluyot	Mixture of Pandesal
T1	15 grams	1
T2	30 grams	1
T3	60 grams	1



3. Results and discussion

3.1 Characteristics of the respondents

Table 4 presents the profile of one-hundred-fifty (150) participants from Malalag, Davao del Sur. Presented in Table 1 was the distribution of the participants; the first column showed the profile, the second column indicated the frequency, and the third determined the percentage.

Age. A frequency of 321 with a percentage of 71.3 is under the ages of 18 to 28 years old, a frequency of 63 with a percentage of 14.0 is under the ages of 29 to 38 years old, a frequency of 66 with a percentage of 14.7 is under the ages of 30 years old and above. This implies that 18 to 28 years old had the more significant number among all participants.

Sex. This indicates that there is an equal population between male and female participants with a frequency of 225 and a percentage of 50.0% (n=150), respectively.

Table 4 Characteristics of the Respondents (n=150).

Profile	f	%
Age		
18 – 28 years old	321	71.3
29 – 38 years old	63	14.0
39 years old and above	66	14.7
Sex		
Male	225	50.0
Female	225	50.0
Total	450	100.0

3.2 Level of acceptability in terms of sensory characteristics

Table 5 determines that the respondents show an acceptable level of pandesal made from 15 grams of saluyot (*Corchorus olitorius*) (x=2.87). This acceptable result was obtained from the acceptable level in terms of taste (x= 2.92), texture (x= 2.67), color (x=2.90), and aroma (x=2.99). These findings implied that the respondents rated an acceptable mixture of pandesal with saluyot (*Corchorus olitorius*) powder in 15 grams. According to Schiffman and Graham (2020) claimed that food preference may be impacted by taste, which is inversely related to how much pleasure one experiences while consuming a specific item. Similar to the study of Canet et al (2021), the texture/mouthfeel category received the lowest rating due to the small pieces of filling that were still present, creating a highly noticeable tactile sensation.

However, the mixture of 30 grams of saluyot (*Corchorus olitorius*) powder in pandesal was rated by the respondents as the most acceptable level with an overall rating of (x=4.24). This most acceptable result was obtained from the acceptable level in terms of taste (x=4.21), texture (x=4.36), color (x=4.15), and aroma (x=4.25). This result shows that the respondents liked this the most in this mixture. It indicates that most respondents agreed that they like the most regarding taste, texture, color, and aroma. Springer (2009) explained this thoroughly, stating that food scent is a crucial component that affects consumer behavior while making meal selections. It is common knowledge that scents can serve as appetizers. Under Lowe's (2007) study, a person's health condition influences a substance's consumer acceptability, which differs from its flavor or taste.

Moreover, the respondents show an acceptable level towards pandesal made from 60 grams of saluyot (*Corchorus olitorius*) (x=3.26). This acceptable result 10 was obtained from the acceptable level in terms of taste (x=3.31), texture (x=3.21), color (x=3.14), and aroma (x=3.37). These findings implied that the respondents rated an acceptable mixture of pandesal with saluyot (*Corchorus olitorius*) powder in 60 grams in terms of taste, texture, color, and aroma. Depa et al (2016) state that decreased food energy intake and related harmful consequences on health are typically linked to aging. This is partly due to weakening physiological capacities, particularly the senses' capacity to control food consumption. Conforming to the study of Sandvik et al (2014), greater-fiber bread is preferred by the elderly age group, whereas younger age groups typically consume white bread more frequently.

Table 5 Level of acceptability to the saluyot powder when described according to a sample of 15, 30, and 60 grams.

Grams	Indicators					Overall
	Taste	Texture	Color	Odor		
(a) 15 grams	2.92	2.67	2.90	2.99	2.87	
(b) 30 grams	4.21	4.36	4.15	4.25	4.24	
(b) 60 grams	3.31	3.21	3.14	3.37	3.26	

3.3 Significant difference in the level of acceptability of the general public when described according to grams of saluyot pandesal



Table 6 below discusses statistical evidence showing a significant difference in the acceptability of the saluyot pandesal when described according to its sensory characteristics based on the samples provided. Based on the table above, there is a significant difference in taste, $F(2,447)=91.739, p=0.000$. This implies that the null hypothesis failed to reject. Similarly, there is a significant difference in texture, $F(2,447)=145.139, p=0.000$. This led to the rejection of the null hypothesis. Correspondingly, the color significantly differs, $F(2,447)=74.394, p=0.000$. This signifies that the null hypothesis failed to reject. In addition, there is a significant difference in aroma, $F(2,447)=55.462, p=0.000$. Thus, the null hypothesis failed to reject. Spence and Youssef (2021) state that aging is linked to various physiological changes. Although food preferences in older persons tend to decline, there is evidence from numerous studies that these preferences can rise with the use of flavor-enhancing techniques. In line with the study of Michon et al (2010), it appears that men and the elderly group gave the highest liking scores. The sensory evaluation of the cake with jam obtained the highest sensory scores among the youngest participants. The replies show that look and feel are the most significant sensory attributes. Furthermore, a strong correlation exists between the product's flavor and the highest liking score.

Table 6 Significant difference in the level of acceptability of the general public when described according to grams of saluyot pandesal.

Indicator		Sum of Squares	df	Mean Square	F	Sig
Taste	Between Groups	132.213	2	66.107	91.739	0.000
	Within Groups	322.107	447	0.721		
	Total	454.320	449			
Texture	Between Groups	222.564	2	111.282	145.139	0.000
	Within Groups	342.727	447	0.767		
	Total	565.291	449			
Color	Between Groups	131.258	2	65.629	74.394	0.000
	Within Groups	394.333	447	0.882		
	Total	525.591	449			
Odor	Between Groups	126.418	2	63.209	55.462	0.000
	Within Groups	509.440	447	1.140		
	Total	635.858	449			

4. Conclusion

The data revealed that 30 grams of saluyot (*Corchorus olitorius*) powder could be used as the main ingredient in pandesal. Moreover, the product is acceptable among the three treatments regarding taste, texture, color, and aroma.

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Ethical considerations

After producing the product, the following steps were taken to gather the responses needed in the study. In order to obtain permission to gather data, the researchers coordinated and wrote a letter to the UM Digos College Vice- President for Operations, Dean, designated program heads within the Department of Teacher Education, and the Barangay Captain of Bagumbayan, Malalag, Davao del Sur to request permission to conduct the study. Following the approval from the authorities, the researchers conducted the study with the respondents following ethical considerations such as voluntary participation, informed consent process, permission from the 7 organizations, and without conflict of interest issues to gather data for the study.

Conflict of Interest

The authors declare that they have no conflict of interest.



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References

- Alyssa Mae S (2021) Saluyot: All you need to know, hellodoctor.com.ph, Herbs and Alternatives, Herbal Medicines.
- Auriane P, Gesa B (2021) Eat local to save the planet? Contrasting scientific evidence and consumers' perceptions of healthy and environmentally friendly diets, *Current Research in Environmental Sustainability* 3:100054.
- Bruno N, Giuseppe T, Pietro Alexander R, Valentina CSS (2017) Environmental impacts of food consumption in Europe, *Journal of Cleaner Production*, Volume 140:753-765.
- Burcu G, Zehra G, Sena B, Gizem C, Esra C, Michael N (2021) Chapter 3 - Innovations in functional foods development, Eds: Charis MG. *Food Technology Disruptions*, Academic Press 73-130.
- Canet L, De Luna MC, Jose V (2021) Development of pan de sasa: nypa fruticans filling in pandesal. Available at: SSRN 3792795.
- Foegeding EA, Daubert CR, Drake MA, Essick G, Trulsson MFV, Figueirinha A, Neves BM, Garcíaodríguez C, Lopes MC, Cruz MT, Batista MT (2011) Cymbopogon citratus as the source of new and safe anti-inflammatory drugs: bio guided assay using lipopolysaccharide-stimulated macrophages. *Journal of Ethnopharmacology* 133(2):818-827.
- Ganiyu O, Adedayo OA, Ayodele JA, Thomas H, Jamiyu AS, Uwe S (2012) Inhibitory effect of polyphenolrich extracts of jute leaf (*Corchorus olitorius*) on key enzyme linked to type 2 diabetes (α -amylase and α -glucosidase) and hypertension (angiotensin I converting) in vitro. *Journal of Functional Foods* 4(2):450-458.
- Islam MM (2013) Biochemistry, medicinal and food values of jute (*Corchorus capsularis* L. and *C. olitorius* L.) leaf: a review. *Int J Enhanc Res Sci Technol Eng* 2(11):135-44.
- Jerzy G, Marzena J, Julita S, Małgorzata K (2019) Impact of nutritional claims on consumer preferences for bread with varied fiber and salt content. *Food Quality, and Preference* 76:91-99
- Kamga RT, Kouamé C, Atangana AR, Chagomoka T, Ndango R (2013) Nutritional evaluation of five African indigenous vegetables. *Journal of Horticultural Research* 21(1):99-106.
- Lena C, Maria Cecilia D, Vincent J (2021) Development of Pan de Sasa: Nypa Fruticans Filling in Pandesal, papers.ssrn.com 1-3.
- Lowe (2007) Sensory Analysis. Available in: <http://www.esac.pt/noronha>. Accessed on: May 15, 2021.
- Lucia A, Jamie S, Guillermo G, Shahin R (2020) An Overview of Current Challenges in New Food Product Development, researchgate.net.
- Michon C, O'Sullivan MG, Sheehan E, Delahunty CM, Kerry JP. (2010). Investigation of the influence of age, gender, and consumption habits on the liking of jam-filled cakes. *Food quality and preference*, 21(5), 553–561.
- Nathalie B, Els D, Ingrid D, Bart Van D, Filip Van B (2022) Incorporation of leek powder (*Allium ampeloprasum* var. porrum) in wheat bread: Technological implications, shelf life, and sensory evaluation. *LWT* 153:112517 .
- Sandvik P, Kihlberg I, Lindroos AK, Marklinder I, Nydahl M (2014) Bread consumption patterns in a Swedish national dietary survey focus on whole-grain and rye bread. *Food & Nutrition Research* 58(1):24024.
- Spence C, Youssef J (2021) Aging and the (Chemical) Senses: Implications for Food Behaviour Amongst Elderly Consumers. *Foods* 10(1):168.
- Splengler (2009) The influence of food odor exposure on satiation and food choice. Available in: <https://sensing.konicaminolta.us/2013/01/How-coloraffects-your-perception-of-food/>. Accessed on: <https://bit.ly/3hSmF11>.
- Stroebele-Benschop N, Depa J, de Castro JM (2016) Environmental strategies to promote food intake in older adults: A narrative review. *Journal of nutrition in gerontology and geriatrics* 35(2):95-112.
- Vanderbilt (2015) How color affects your perception of food. Available in: <http://sensing.konicaminolta.us/2013/02/how-color-affectsyour-perception-of-food>.
- Yeong-Yu Y, Yue-Wen W, Su-Lin C, Shu-Ru Z, Chin-Kun W (2013) Anti-inflammatory effects of phenolic crude extracts from five fractions of *Corchorus Olitorius* L. *Food Chemistry* 138:1008-101.