SJIF Impact Factor (2026): 8.863| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 11 | Issue: 4 | April 2026 - Peer Reviewed Journal

FORMULATION AND SENSORY EVALUATION OF JAMAICAN CHERRY *(Muntingia calabura)* PASTRIES

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ABSTRACT

This study explored the potential of Jamaican cherry (Muntingia calabura) as an innovative and functional ingredient in pastry production. Specifically, it aimed to formulate and evaluate three variants of Jamaican cherry pastries—churros (T1), lady fingers (T2), and pretzels (T3)—and assess their sensory qualities in terms of appearance, aroma, taste, and texture. Additionally, the study examined the products' overall acceptability, respondents' preference levels, and production factors such as cost, ingredients, and marketability. A completely randomized design (CRD) with a descriptive-survey approach was employed. Sixty (60) purposively selected respondents, consisting of students, teachers, and industry practitioners from selected secondary schools in Loboc, Bohol, participated in the study. Data were gathered using a validated 5-point hedonic scale questionnaire and analyzed using weighted mean and the Friedman test to determine significant differences among treatments. Results revealed that all three formulations were highly acceptable, with mean ratings ranging from 3.41 to 4.50, interpreted as very much preferred to extremely preferred. Among the treatments, Jamaican cherry churros (T1) obtained the highest overall mean score (WM = 4.32), particularly excelling in taste and texture, while Jamaican cherry pretzels (T3) recorded the lowest mean score (WM = 3.68), though still within the "very much preferred" category. In terms of cost efficiency, pretzels had the lowest production cost (₱178.35 total cost; ₱9.00 per pack), whereas churros had the highest (₱268.40 total cost; ₱14.00 per pack). The Friedman test revealed a statistically significant difference ($p < 0.05$) among the three treatments in terms of sensory attributes, indicating that variations in formulation significantly influenced respondents' preferences, particularly in taste and texture. The findings demonstrate that Jamaican cherry can be successfully incorporated into pastry products, enhancing both sensory appeal and nutritional value. The study further establishes that Jamaican cherry churros (T1) are the most preferred formulation, while pretzels (T3) offer the most cost-efficient option. Overall, the developed products show strong potential for commercialization and contribute to the promotion of underutilized indigenous fruits. A technology package is proposed to support product development, encourage entrepreneurship, and strengthen the use of locally available resources in sustainable food innovation.

I. INTRODUCTION

Jamaican cherry (Muntingia calabura) or mansanitas was a native fruit which was widespread in many areas of the Philippines. Although it was readily available and naturally sweet, its use was minimal due to its use mainly as fresh or as a part of folk life. Very little use of this fruit was documented in formal food processing or product development, which implies that there is a market gap in the potential use of this fruit as a value-added ingredient (Villarino & Villarino, 2023).

The under-exploitation of Jamaican cherry provided a furor that can be used in innovation of food products. It could be used in pastry making, where the fruit could be used as a flavoring or filling material. Utilizing Jamaican cherry in bakery offered a way of changing a readily available yet underutilized commodity to a more marketable, processed food item.

Past research proposed that the incorporation of the Jamaican cherry (Muntingia calabura) pulp or extract in food formulations had a effect on sensory attributes and increased some of the nutritional qualities, including the antioxidant level (Ansori et al., 2021). Nevertheless, only a small amount of research specifically looked at its use in pastry products and acceptability by consumers.
This research, thus, tried to fill this gap by coming up with pastries that were flavored with Jamaican cherry and the acceptability of these pastries was tested on criteria of sensory, such as taste, aroma, color, texture and general acceptability. The results were intended to give some background of feasibility covering the use of Jamaican cherry in the pastry making and to investigate its potential as a ingredient in small-scale or cottage food businesses.

II. LITERATURE BACKGROUND

We are blessed with a wide variety of fruit of species abundant in our country. Major fruit crops are, banana, mango, pineapple and papaya. Nevertheless, a great part of the fruit crops that are grown in the country continues to go to waste as far as food processing is concerned.

Since the country is abundant in fruit crops, it only needs initiative and resourcefulness to answer the starving Filipinos. Innovation plays a great role in producing such alternative ingredients. Innovation is creating something out of an existing one. For this reason,

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locally abundant fruit crops that are not commonly recognized by most people due to the new generation's mechanism of acquiring food supplies will be known and utilized (FAO, 2009).

The Philippines, being one of the countries situated along the equator, is suitable for growing many medicinal trees and plants. Jamaican cherry is one of the most common trees abundant in our country that provides a lot of medicinal benefits. Some studies show that Jamaican cherry exhibits properties beneficial for diabetic individuals, as it helps lower blood sugar. Under this medicinal context, the researcher will investigate Jamaican cherry's potential as an artificial sweetener in making Jamaican cherry pastries.

Thus, this encourages the researcher to create a food item made of Jamaican cherry because there is enough supply of this fruit in Bohol. The researcher ventured to produce Jamaican cherry pastries— a type of food that can be enjoyed by everyone as a healthy snack. Pastries stand out for their delightful combination of texture and flavor — crispy on the outside and soft on the inside. They are also fun to eat, often enjoyed at fairs, carnivals, and festivals, and can be shared with friends or enjoyed solo, making them a great option for any occasion.

Recent studies have determined a potential to utilize indigenous fruits for pastry and dough-based applications in efforts to develop new food products. Roig-Miranda et al. (2021) demonstrated that cookies made with Muntingia calabura (i.e., Jamaican cherry) fruit meal had a protein content of 26.29 g/100 g and fiber content of 13.33 g/100 g and were liked during sensory acceptability post-applications of the cookies. This indicates that Jamaican cherry may be a suitable functional ingredient baked goods. In a similar manner, Nawawi et al. (2022) investigated the innovation of the traditional churro by increasing nutritional value with sweet potato in consideration of consumers' preferences. The results demonstrated churros' potential adaptability to be a vessel for local ingredients that may evoke further experimentation with indigenous fruits.

With further development on these methods, a diverse literature on the incorporation of fruit-based ingredients to the dough-based product and their possible effects on sensory acceptability have been studied. For example, research conducted by Mahajan et al. (2024) incorporated guava flour into cookies and developed cookies that had a more favorable nutritional profile and sensory scores.Notably, research was undertaken by Pereira et al. (2018) to examine the fruit Muntingia calabura due to its antioxidant compounds and remarked on the notion that the incorporation of Muntingia calabura into the food products themselves would provide functional properties without impacting the food products' flavors. Rodríguez-Miranda et al. (2021) also demonstrated that cookies with Muntingia calabura meal were positively accepted in sensory testing, thereby supporting their assertion regarding the fruit's potential functional ingredient usage.

The fruit contains high vitamins, especially vitamin C and has gained interest from the public for its health benefits including antioxidant activity (Hasanuddin et al., 2024). For example, an Indonesian study mentioned that the ripe fruit of M. calabura demonstrated high antioxidant activity along with high vitamin C content (Hasanuddin et al., 2024). Additionally, an extract from leaves and fruits of M. calabura have high flavonoid and phenolic content (Sujono et al., 2020), in addition to immunmodulatory effects in animal models (Sujono et al., 2020; Reczeki et al., 2023).

Jamaican cherry leaves and bark are used in folk practices for headache relief, fever reduction and wound treatment. Its fruit is eaten fresh and made into jams and juices as it is deliciously refreshing. In the past several years, there has been increased interest in food products made from underutilized fruits like Jamaican cherry. Creating new snack foods with local fruits can help bolster sustainable agriculture and support food security and nutritional diversity (Miranda et al., 2021). A study conducted in the Philippines hydraulic phenolic profiling of thirty fruits indicated that Jamaican Cherry had some of the highest total phenolic content (> 350 mg GAE/100 g fresh matter); this supports exploration for functional foods (Recuenco et al., 2016). Also, different possibilities for food processing or since fruit trees are typically grown with under-utilized fruit could create another opportunity to reduce food waste (Reczeki et al., 2023)

This study was conducted to address these gaps by developing Jamaican cherry pastries and evaluating their acceptability based on sensory attributes. It aimed to provide empirical data on the feasibility of utilizing an underutilized indigenous fruit in pastry production and to explore its potential for food product innovation and small-scale enterprise development.

III.THE PROBLEM

The main thrust of the study is to formulate and evaluate the sensory attributes of Jamaican cherry pastries in Oy National High School and Camayaan National High School Cookery students and TVL teachers for the Academic year 2025-2026 together with the industry practitioners in the town of Loboc. With this, the researcher hopes to answer the following questions:

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Specifically , the research sought to answer the following questions:

1. What is the profile of the product in terms of:
   - 1.1 ingredients and cost;
   - 1.2 tools and equipment;
   - 1.3 procedure;
   - 1.4 nutritive value;
   - 1.5 marketability; and
   - 1.6 shelf life?
2. What is the sensory attributes of Jamaican cherry pastry product in terms of?
   - 2.1 appearance;
   - 2.2 aroma;
   - 2.3 taste; and
   - 2.4 texture?
3. What is the respondents preference level among the three formulations of Jamaican cherry pastries?
4. Is there a significant difference of the respondents' preference level among the three formulation?
5. What technology package could be proposed based on the study?

IV.METHODOLOGY

Design

The researcher employed a completely randomized experiment design (CRD) and sensory evaluation. This is applied to scientifically examine Jamaican cherry pastries with different formulations and obtain consumer feedback.

The treatment consisted of three formulations of Jamaican cherry pastries; churros, lady finger and pretzels. The independent variable is the type of pastry created, whereas the dependent variables are the sensory properties of the pasries, i.e., aroma, appearance, taste, and texture, as measured using a structured hedonic scale questionnaire.

The design allows for comparison of consumer acceptability from various levels of Jamaican cherry pastries directly, and the survey component obtains participants' attitude and perceptions to support the experimental findings.

Environment and Participant

The study was conducted at Oy National High School Food Technology Shop, Oy, Loboc, Bohol, and Camaya-an National High School Food Technology Shop, Camaya-an, Loboc, Bohol, for school year 2025–2026. The schools were selected because in the Technical-Vocational-Livelihood (TVL) Strand, the schools provide subjects Cookery and Bread and Pastry Production, meaning the students will have the knowledge and skills on how to prepare food and bake.

The research has utilized purposive sampling in its sample selection where respondents were used who have the required skills and knowledge to judge the sensory qualities of the Jamaican cherry pastries as an accurate method. The sample will be a total of 60 respondents (students, teachers and industry practitioners) who will be a comprehensive evaluation on both educational and professional angles. Purposive sampling can be employed because it involves selecting those with certain characteristics, which can be of interest to the research especially knowledge on food handling and experience in food assessment.

Instrument

The questionnaire was considered in this study to help the researcher adapt the questionnaire on sensory evaluation to suit the purpose of this study. The instrument is employed to identify the recommended Jamaican cherry pastries, not just in sensory qualities, but also respondent preference level in the properties of aroma, color, flavor and texture. The instrument consists of two parts: one measuring the sensory traits and the other quantifying the respondents' level of preference.

In order to measure preferences, a 5-point Hedonic scale with no neutral option was adopted that ranges from 1 (least preference) to 5 (most preference). This scale prompts the respondents to give a final answer in their assessment of the product. The respondents were asked to give qualitative comments and suggestions on how to enhance the product.

To establish validity, the revised questionnaire were subjected to three experts in food technology and sensory testing to ensure that the items effectively measure the relevant sensory characteristics and preference constructs. Reliability was tested through pilot testing on 10 respondents that are representative of the target population, with Cronbach's alpha computed to assess internal consistency.

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In addition, daily monitoring will be done to evaluate the pastries' shelf life, identifying how long the product is safe and acceptable for consumption by people in typical storage conditions.

Procedure

The study was conducted in sequential phases. First secure permission from the Campus Director and the Dean of the School of Advanced Studies to conduct the study. Then asked the permission from the District Supervisor of Loboc District and Principals of Oy National High School and Camayaan National High School to conduct the study at their respective schools. After the approval , the researcher got the list of the students and teachers who served as the respondents. Then the researcher prepared the distribution for sampling and reproduced the questionnaire.

After the distribution of sample product, the questionnaire was given to the participant to evaluate the sensory attributes of Jamaican cheery pastries. To ensure that the respondents answered the questions sincerely, clear instruction and enough time were given to them.

The researcher summarized the questionnaires that was collected and it did the interpretation of the data gathered. The results were talied , computed and interpreted as a basis for the conclusion of the study.

Statistical Treatment

To determine the sensory attributes of Jamaican cherry pastries in different treatments in terms of aroma, appearance, taste and texture, the weighted mean formula was employed.
The obtained mean was interpreted using the 5-point Hedonic Scale.

To determine the respondents' preference level towards the three treatments of Jamaican cherry pastries, the weighted arithmetic will be used. The researcher shall interpret the results using the following scale.

V. RESULTS AND DISCUSSION

After the data were gathered, analyzed, and interpreted accordingly, the researcher came up with the following:

Table 1.1 Ingredients and Cost

Ingredients	Unit	Unit Cost	Formulation 1		Formulation 2		Formulation 3	
Ingredients								
			Qty	Cost	Qty	Cost	Qty	Cost
Jamaican cherry	grams	120.00/ 1000g	400g	₱50.00	400g	₱50.00	400g	₱50.00
All Purpose Flour	grams	80.00/1000g	400g	₱30.00	400g	₱30.00	400g	₱30.00
Butter	grams	55.00/ 250g	250g	₱54.10			5g	₱2.00
Vanilla	ml	40.00/60ml	5ml	₱1.00	5ml	₱1.00		
Yeast	grams	10.00/ 50g					50g	₱10.00
Baking soda	grams	30.00/100g					100 g	₱30.00
Egg	grams	8.00/50g	50g	₱8.00	300g	₱48.00		
Water	ml	1.00/240ml	240ml	₱1.00			480ml	₱1.00
Sugar	grams	50.00/500g			200g	₱20.00		
Salt	grams	1.00/5 g	5g	₱1.00	5g	₱1.00		
Oil for cooking	ml	40.00/500ml	500ml	₱40.00				
Production Cost								
Total Cost			₱185.10		₱150.00		₱123.00	
Operating Expenses 20%			₱37.02		₱30.00		₱24.60	
Mark-up Cost 25%			₱46.28		₱37.5		₱30.75	
Total Cost of Production			268.40		₱217.00		₱178.35	
Total serving packs			20 packs		20 packs		20 packs	
Price per pack			₱13.42		₱10.85		₱8.92	
Selling price			₱14.00		₱11.00		₱9.00	

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The cost of producing the three Jamaican cherry pastries—churros, lady fingers, and pretzels—varied mainly because of the ingredients used in each recipe. The churros were the most expensive to make (₱185.10) since they used butter and more Jamaican cherry purée, while the lady fingers cost ₱150.00 due to higher amounts of eggs and sugar. The pretzels were the cheapest at ₱123.00 because they only required simple ingredients like flour, water, yeast, and purée. After adding labor, operating expenses, and a 25% markup, the total production costs became ₱268.40 for churros, ₱217.00 for lady fingers, and ₱178.35 for pretzels. With 20 packs produced per batch, the cost per pack was ₱13.42, ₱10.85, and ₱8.92, leading to selling prices of ₱14.00, ₱11.00, and ₱9.00. Overall, even though the costs differ, all three products are still affordable to make and have good potential for small-scale selling.

Table 1.2 Tools and Equipment

Quantity	Unit	Description	Usage
1	Piece	Mixing bowl	Used for combining dry and wet ingredients and mixing the dough or batter thoroughly.
1	Set	Measuring cups and spoons	Used to ensure accurate measurement of ingredients during formulation.
1	Piece	Food processor	Used to process Jamaican Cherry fruit into puree or powder.
1	Piece	Saucepan	Used for heating mixtures and activating yeast during preparation.
2	Piece	Piping bag	Used to shape churros and lady fingers uniformly.
2	Pieces	Baking Tray	Used for baking Jamaican cherry Lady finger and Pretzels.
1	Piece	Frying pan	Used to fry Jamaican cherry churros until golden brown.
1	Piece	Oven	Used to bake Jamaican cherry Lady finger and Pretzels.
1	Piece	Sealer	Used to seal the plastic packaging of the Jamaican cherry pastries.
1	Piece	Weighing Scale	Used to measure ingredient quantities accurately.
1	Piece	Cooling rack	Used to cool the finished products prior to sensory evaluation.
1	Piece	Gas Stove	Used as a heat source for cooking and preparation.

As shown in Table 1.2, the materials, tools, and equipment used in making the Jamaican cherry pastries were carefully selected to ensure safe, efficient, and consistent production. Accurate measuring tools, proper mixing and cooking equipment, and packaging materials all helped maintain product quality, uniformity, and hygiene. Overall, using the right tools and following proper processes played a key role in the successful preparation of the pastries.

Table 1.3 Procedure

Product	Step No.	Procedure Description
Churros	1	Blend Jamaican Cherry until puree texture is achieved. Set aside.
	2	Boil water, butter, sugar, and salt in a saucepan until it reaches boiling point.
	3	Add flour to the hot mixture and stir continuously until a smooth dough forms.
	4	Allow the dough to cool slightly, then add Jamaican cherry puree and eggs. Mix until smooth.
	5	Transfer the dough into a piping bag with a star-shaped nozzle.
	6	Heat oil in a deep pan and pipe strips of dough directly into the hot oil. Fry until golden brown.
	7	Remove from oil and drain on paper towels.
Lady Fingers	1	Sun-dry Jamaican Cherry fruits for 2-3 days until completely dehydrated. Cool dried fruits and grind into powder. Set aside.
	2	Separate egg whites from egg yolks and whip egg whites until soft peaks form.
	3	Gradually add sugar and whip until stiff peaks form.
	4	Beat egg yolks lightly and fold into the whipped egg whites. Gently fold in sifted flour and Jamaican cherry powder.
	5	Transfer batter into a piping bag and pipe finger-shaped strips onto a baking tray.
	6	Bake until light golden and firm.
Pretzels	1	Blend Jamaican Cherry until puree texture is achieved. Set aside.
	2	Activate yeast by mixing warm water, yeast, and sugar.

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	3	Add flour, Jamaican cherry, and salt. Mix and knead for 8–10 minutes until smooth and elastic.
	4	Allow the dough to rise until doubled in size, then divide into equal portions.
	5	Roll each portion into a rope and shape into pretzels.
	6	Dip each pretzel into a baking soda solution and place on a baking tray.

The preparation of Jamaican cherry pastries follows simple but standardized steps for churros, lady fingers, and pretzels, with the fruit added for flavor and nutrition. Each product uses a different technique—churros use cooked dough, lady fingers rely on whipped eggs for a light texture, and pretzels undergo fermentation for structure and taste. Overall, combining these basic methods with Jamaican cherry results in pastries that are consistent, safe, and more nutritious.

Table 1.4 Nutrient Value of Jamaican Cherry Churros

Nutrients	Unit	Result	Test Method	Recommended Daily Allowance for Children 6-18	Recommended Daily Allowance for Adults 19-49
Moisture	g/100g	22.2	Air Oven	-	-
Ash	g/100g	1.12	Ignition	5.0 /100g	5.0 /100g
Total Fat	g/100g	19.5	Mojonnier with Acid Hydrolysis	25-35% of daily calories 46-32g	25-35% of daily calories 46-32g
Crude Protein (Nx6.25)	g/100g	6.40	Kjeldahl Method	29-72g	62-71g
Carbohydrates	g/100g	50.8	By Computation	130g	130g
Total Sugar	g/100g	3.93	Munson-Walker	24-30g	25-36g
Sodium	mg/100 g	482	Flame AAS	400-500mg	500mg
Potassium	mg/kg	0.238	Flame AAS	1600-2000mg	2000mg
Calcium	mg/kg	0.348	Flame AES	1000-1300mg	1000g

Laboratory results reveal that Jamaican Cherry Churros contain a balanced mix of nutrients, including protein, fats, carbohydrates, and essential minerals like sodium, potassium, and calcium, making them a good source of energy when eaten in moderation. Overall, the analysis highlights their nutritional value as a snack. Meanwhile, market testing showed that the products were sold to respondents over five days to assess their appeal and potential for commercialization.

Table 1.5 Marketability of Jamaican Cherry-Based Pastries

Week	T1 Displayed	T1 Sold	T2 Displayed	T2 Sold	T3 Displayed	T3 Sold
1	10	8	10	5	10	3
2	10	7	10	6	10	5
3	10	10	10	8	10	6
4	10	9	10	8	10	4
5	10	8	10	5	10	5
Sold products	42		32		23	
Rank	1		2		3	

Jamaican Cherry Churros were the most popular, selling the highest number of pieces, followed by Lady Fingers and Pretzels. While all products were acceptable, pretzels may still need some improvement to attract more consumers. Overall, the results show that these pastries have good potential for small-scale selling, especially in school canteens and local markets, with shelf life depending on proper storage conditions.

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Table 1.6 Shelf Life of Jamaican Cherry Pastries

Length of Storage	Sensory Attributes	T1	T2	T3
Day 1-2	Appearance	Golden brown color with no discoloration; visually fresh and appealing.	Light golden color with uniform shape; visually appealing.	Evenly browned surface with characteristic pretzel shape; visually appealing.
	Aroma	Pleasant, freshly fried aroma with no off-odors.	Mild, sweet aroma with no off-odors.	Pleasant baked aroma with no off-odors.
	Taste	Sweet, well-balanced flavor with distinct Jamaican cherry notes.	Light, sweet flavor with subtle Jamaican cherry taste.	Slightly sweet and savory flavor with Jamaican cherry notes.
	Texture	Crisp exterior with a soft interior; optimal texture.	Soft, spongy, and airy texture.	Firm exterior with a slightly chewy interior.
Day 3-4	Appearance	No significant visual changes; still appealing.	No noticeable change; still visually acceptable.	No significant visual changes; still acceptable.
	Aroma	Aroma remained acceptable and characteristic.	Aroma remained acceptable.	Aroma remained acceptable.
	Taste	Flavor remained acceptable with minimal changes.	Flavor remained acceptable.	Flavor remained acceptable.
	Texture	Slight loss of crispness; mild softening observed.	Slight softening observed; less spongy but still acceptable.	Slight softening observed; reduced firmness.
Day 5-8	Appearance	Slight dullness in color but still acceptable.	Slight discoloration and dullness observed.	Slight dullness in color observed
	Aroma	Aroma slightly reduced but still pleasant	Aroma slightly diminished.	Aroma slightly reduced.
	Taste	Acceptable but less fresh flavor.	Less fresh but still acceptable.	Acceptable but less fresh.
	Texture	Noticeable dryness and reduced crispness due to staling.	Noticeable dryness and firmness due to moisture loss.	Increased dryness and firmness due to staling.
Day 9-12	Appearance	Presence of mold growth and discoloration.	Visible mold formation and discoloration.	Presence of mold and discoloration.
	Aroma	Unpleasant, sour odor detected.	Unpleasant odor developed.	Unpleasant odor detected.
	Taste	Off-flavor; no longer acceptable.	Unacceptable, off-flavor present.	Off-flavor; unacceptable.
	Texture	Undesirable texture—either too soft or excessively dry; unsafe for consumption.	Undesirable texture—either too dry or overly soft; not consumable.	Very dry or overly soft; no longer suitable for consumption.

As shown in Table 1.6, all the Jamaican cherry pastries gradually lost quality over time, with texture being the first to change—churros lost crispness, lady fingers softened, and pretzels became less firm. By later days, the products showed clear signs of staling and eventually spoilage, making them unsafe to consume. Overall, the results highlight that while all products have similar shelf life, texture is the most sensitive indicator of freshness.

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Table 2 Sensory attributes of Jamaican Cherry Pastries

Sensory Attributes	T1 (Jamaican cherry Churros)			T2 (Jamaican cherry Lady Fingers)			T3 (Jamaican cherry Pretzels)		
	WM	Description	Interpretation	WM	Description	Interpretation	WM	Description	Interpretation
Appearance	4.88	Highly Acceptable	Excellent visual appeal	4.42	Highly Acceptable	Excellent visual appeal	4.23	Highly Acceptable	Excellent visual appeal
Aroma	4.68	Extremely Preferred	Pleasing aroma	4.26	Extremely Preferred	Pleasing aroma	3.76	Extremely Preferred	Pleasing aroma
Taste	4.80	Extremely Preferred	Flavorful and well-balanced	4.25	Extremely Preferred	Pleasantly Flavorful	3.75	Extremely Preferred	Flavorful
Texture	4.33	Extremely Preferred	Crispy outside, soft inside	3.68	Extremely Much Preferred	Slightly crisp outside, soft inside	3.83	Very Much Preferred	Crispy and soft texture

Table 2 shows that all three Jamaican cherry pastries were well liked, but churros consistently got the highest ratings across appearance, aroma, taste, and texture. This means churros had the best overall balance of qualities and were the most preferred by respondents. Overall, while all products were acceptable, churros showed the strongest potential for marketability.

Table 3 Preference Level of Jamaican Cherry Pastries in Three formulations

Sensory Attributes	Jamaican Cherry Churros		Jamaican Cherry Lady Finger		Jamaican cherry Pretzels	
	Weighted Mean	Descriptive Indicator	Weighted Mean	Descriptive Indicator	Weighted Mean	Descriptive Indicator
Aroma	4.683	Extremely Preferred	4.258	Very Much Preferred	3.758	Very Much Preferred
Appearance	5.000	Extremely Preferred	4.500	Extremely Preferred	4.300	Very Much Preferred
Taste	4.900	Extremely Preferred	4.400	Extremely Preferred	3.500	Very Much Preferred
Texture	4.400	Very Much Preferred	3.600	Very Much Preferred	4.000	Very Much Preferred
Overall Acceptability	4.638	Extremely Preferred	4.258	Very Much Preferred	3.758	Very Much Preferred

Results shows that all three Jamaican cherry pastries were well liked by the 60 respondents, with churros receiving the highest overall preference, followed by lady fingers, and pretzels ranking last. Churros stood out because of their appealing look, aroma, taste, and texture, making them the most favored. Overall, the results highlight that better balance in sensory qualities leads to higher consumer preference.

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Table 4 Significant Difference in the Respondents Preference Level among the three Formulations.
Pairwise comparisons- Sensory Evaluations for each Attributes

Between Groups (Treatments)	Test Stat Value	P-value	Decision	Interpretation
Aroma				
T1 vs T2	1.8015	.072	Fail to reject Null Hypothesis	Insignificant
T1 vs T3	12.1599	<.001	Reject Null Hypothesis	Significant
T2 vs T3	10.3584	<.001	Reject Null Hypothesis	Significant
Appearance				
T1 vs T2	6.9885	<.001	Reject Null Hypothesis	Significant
T1 vs T3	6.2120	<.001	Reject Null Hypothesis	Significant
T2 vs T3	0.7765	.438	Fail to reject Null Hypothesis	Insignificant
Taste				
T1 vs T2	2.9973		Reject Null Hypothesis	Significant
T1 vs T3	15.4057	<.001	Reject Null Hypothesis	Significant
T2 vs T3	12.4084	<.001	Reject Null Hypothesis	Significant
Texture				
T1 vs T2	8.3396	<.001	Reject Null Hypothesis	Significant
T1 vs T3	7.9824	<.001	Reject Null Hypothesis	Significant
T2 vs T3	0.3572	.721	Fail to reject Null Hypothesis	Insignificant
Overall				
T1 vs T2	4.4571	<.001	Reject Null Hypothesis	Significant
T1 vs T3	11.6940	<.001	Reject Null Hypothesis	Significant
T2 vs T3	7.2369	<.001	Reject Null Hypothesis	Significant

Significant at 0.05

Table 4 shows that the three Jamaican cherry pastries were generally distinguishable based on sensory evaluation, especially in taste and overall impression, which showed significant differences across all treatments. For aroma, appearance, and texture, differences were only noticeable in some comparisons—mainly involving churros—while lady fingers and pretzels were often rated similarly. Overall, the results suggest that formulation differences affected how the products were perceived, with taste being the strongest factor influencing preference.

Proposed Technology Guide

Jamaican Cherry (*Muntingia calabura*)–Enhanced Pastry Products

The technology package focuses on using Jamaican Cherry (Muntingia calabura) as a key ingredient in making three value-added pastries: churros, lady fingers, and pretzels. Based on the results, churros stood out as the most acceptable product, while the other two can still be improved in terms of texture, taste, and aroma. A standardized process is followed from preparing the fruit to baking each product, ensuring consistency, quality, and safety. Overall, the innovation shows strong potential for small-scale and commercial production since it is cost-effective, nutritious, and locally sourced, although shelf life and seasonal availability remain as limitations.

VI. Conclusion and Recommendations

Conclusions

Using the results of the research, the researcher made the conclusion that Jamaican Cherry can be used as an appropriate ingredient to make pastries with good flavor, aroma, and nutritional value. The Jamaican Cherry pastries developed were identified to be of High Acceptable appearance, aroma, taste, texture and most generally to be fully acceptable. In addition, appropriate formulation, method of frying, boxing, and storage were recognized as crucial issues in product quality provisions, longevity of product, and marketability. This means that Jamaican Cherry pastries can be effectively produced in small scale quantities and commercialized with high probability as a snack marketable product as it is accepted by consumers.

Recommendations

On the ground of the conclusions made during the study, the following recommendations can be given:

1. Jamaican Cherry Pretzels should be improved, principally in regard to taste, that is, it received the lowest score of sensory rating. Formulation changes like higher concentration of Jamaican cherry, more sweetness, and addition of complementary flavorings can aid in, increasing its overall acceptability.

SJIF Impact Factor (2026): 8.863| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 11 | Issue: 4 | April 2026 - Peer Reviewed Journal

2. It is advised to further refine ingredients and processing methods in order to improve the texture, appearance, and sensory overall of all pastry products.
3. New processing times or ingredient adding options might be considered to enhance production flexibility, and to create new product profiles.
4. Proper packaging and storage (with special reference to use of airtight containers and refrigeration) should be accentuated to maintain the quality of the product and the shelf life.
5. Modified packaging, controlled moisture or even natural preservatives can be considered as an additional preservation method that will prolong the shelf life of the pastries further.
6. It can be marketed to the consumers by product sampling, marketing and attending local food fairs to create awareness and acceptance.
7. The transfer of technology through schools and local communities can be used to spread the production process and promote livelihoods opportunities.
8. Protection of the developed technology may be in form of intellectual property protection like patenting of the formula or process.
9. It is suggested that additional research on prolonged shelf-life test and in-depth nutritional analysis is necessary to give more information about the products and facilitate commercialization.
10. This research can be utilized by future researchers when studying the variation in incorporation, flavoring, or coating Jamaican cherry, or by creating new pastry products or enhancing existing ones.

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