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RESEARCH ARTICLE

INNOVATIVE FUSION: THE DEVELOPMENT OF OKRA POWDER INFUSED IN COOKIES

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Abstract

This study aimed to determine the acceptability of okra powder infused in cookies by evaluating different treatment formulations in terms of sensory properties, consumer preference, nutritional value, food cost, and packaging suitability. An experimental-descriptive research design was employed to assess three cookie formulations consisting of varying proportions of okra powder and all-purpose flour: Treatment 1 (25% okra powder and 75% all-purpose flour), Treatment 2 (50% okra powder and 50% all-purpose flour), and Treatment 3 (75% okra powder and 25% all-purpose flour). A total of 125 students from the College of International Tourism and Hospitality Management of Lyceum of the Philippines University, Cavite, participated in the sensory evaluation using a 5-point hedonic scale and the Food Action Rating Scale (FACT). The results revealed that the 50:50 okra powder and all-purpose flour formulation obtained the highest mean scores in terms of appearance, aroma, taste, and texture, indicating the highest level of acceptability among the respondents. The balanced formulation was described as having an appealing appearance, pleasant aroma, desirable crisp texture, and well-balanced flavor. Findings also showed that respondents demonstrated greater willingness to purchase the 50:50 formulation compared to the other treatments. Furthermore, the incorporation of okra powder enhanced the nutritional potential of the cookies due to its dietary fiber and micronutrient content. The study concludes that okra powder can be successfully incorporated into cookie production as a functional ingredient that supports both nutritional improvement and consumer acceptability.

Keywords: *okra powder, functional food, cookies, sensory evaluation, consumer acceptability, bakery products, food innovation, nutritional enhancement*

Introduction

Cookies are among the most widely consumed baked products because of their desirable sensory characteristics, convenience, and adaptability to various ingredients and formulations. According to Gisslen (2018), cookies differ considerably in texture and flavor depending on ingredient composition and baking conditions. Similarly, Pareyt and Delcour (2008) emphasized that flour type, sugar, fat content, moisture level, and baking temperature significantly influence cookie quality and consumer acceptability. Their versatility in flavor, texture, and presentation contributes to their popularity across different cultures and social gatherings (Guiné, 2022). Cookies may exhibit soft, chewy, crispy, or crunchy textures depending on the proportion of flour, sugar, and fat incorporated into the formulation, making them suitable vehicles for functional food innovation.

In recent years, the food industry has increasingly focused on the development of functional bakery products that provide not only sensory satisfaction but also nutritional benefits. The incorporation of vegetable-based flours into baked products has become a common strategy to improve the nutritional profile of cookies and similar snacks. Previous studies explored the use of cassava flour (Rosario, 2023), amaranth flour (Espitia-Rangel et al., 2022), and chickpea flour (Dogruer et al., 2023) as partial substitutes for wheat flour in cookie production. These studies demonstrated that alternative plant-based ingredients can enhance fiber, protein, and micronutrient content while maintaining acceptable sensory qualities. However, despite the growing interest in functional bakery products, limited research has investigated the application of okra powder as a flour substitute in cookie production.

Okra (Abelmoschus esculentus) is recognized as a nutrient-dense vegetable with substantial functional and medicinal properties. It contains dietary fiber, vitamins, minerals, polyphenols, oils, and polysaccharides that contribute to antioxidant, anti-inflammatory, hypoglycemic, and hypolipidemic effects (Durazzo et al., 2018; Elkhalifa et al., 2021). Liu et al. (2019b) further noted that okra is particularly rich in vitamins C and K, which are essential for immune response and bone health. In addition, the high dietary fiber content of okra supports digestive health and may aid in regulating blood glucose levels by slowing sugar absorption in the intestines. These nutritional and therapeutic properties highlight the potential of okra as a functional ingredient in food product development.

The utilization of okra powder in bakery products offers a promising approach to increasing vegetable consumption while improving nutritional quality. Despite its health benefits, okra is often rejected by younger consumers because of its slimy texture and distinctive flavor profile. Integrating okra into familiar snack products, such as cookies, may improve consumer acceptance by masking these undesirable sensory characteristics. Through dehydration and powder processing, okra can be incorporated into baked products without substantially affecting product palatability. This approach aligns with current consumer trends favoring healthier snack alternatives that combine nutritional value with sensory appeal (Timpanaro & Cascone, 2022).

Several studies have demonstrated that moderate incorporation of okra flour or powder into baked products can improve nutritional composition while maintaining acceptable sensory characteristics. Akoja and Coker (2018) reported that biscuits containing up to 25% okra powder substitution remained acceptable in terms of taste, texture, and overall acceptability. Likewise, Xavier et al. (2022) found that cookies with partial substitution of wheat flour using okra flour achieved favorable consumer acceptance at lower substitution levels, although sensory ratings declined as the concentration increased. These findings suggest that identifying the optimal proportion of okra powder is critical in balancing nutritional enhancement and sensory quality in bakery products.

Apart from nutritional improvement, the incorporation of okra powder may also contribute to sustainable food innovation. The increasing demand for plant-based and functional ingredients has encouraged the exploration of underutilized agricultural products in food processing (Spencer-Jolliffe, 2024). Okra powder represents a sustainable and locally available ingredient that can enhance food diversification and promote healthier dietary practices. Furthermore, the development of vegetable-enriched bakery products may support consumer interest in functional foods while creating opportunities for value-added agricultural utilization.

Given these considerations, the present study aimed to evaluate the acceptability of okra powder infused in cookies using different treatment formulations. Specifically, the study examined the sensory properties of the developed cookies in terms of appearance, aroma, taste, and texture, identified the most preferred treatment formulation, and assessed the product's general acceptability, theoretical nutrient content, food cost, and suitable packaging. Through this investigation, the study seeks to contribute to the growing body of research on functional bakery products and provide insights into the potential of okra powder as an innovative ingredient in cookie production.

Research Objectives

The study aimed to determine the acceptability and optimal formulation of okra powder infused in cookies in terms of sensory properties, consumer preference, nutritional content, food cost, and packaging suitability. Specifically, this study aims to:

1. Determine the sensory properties of Okra Powder in terms of:
   1.1. appearance;
   1.2. aroma;
   1.3. taste; and
   1.4. texture.
2. Determine the best treatment for Okra Powder:
   2.1. Treatment 1: 25% Okra Powder, 75% All Purpose Flour;
   2.2. Treatment 2: 50% Okra Powder, 50% All Purpose Flour; and
   2.3. Treatment 3: 75% Okra Powder, 25% All Purpose Flour.
3. Determine the general acceptability of Okra Powder
4. Determine the theoretical nutrient content of Okra Powder
5. Determine the food cost of Okra Powder
6. Determine the suitable packaging of Okra powder

Methodology

Research Design

The study employed an experimental-descriptive research design to evaluate the acceptability of cookies infused with okra powder using different treatment formulations. The experimental component was utilized to systematically examine the effects of varying proportions of okra powder and all-purpose flour on the sensory characteristics of the developed cookies. Three treatment formulations were prepared and tested: Treatment 1 (25% okra powder and 75% all-purpose flour), Treatment 2 (50% okra powder and 50% all-purpose flour), and Treatment 3 (75% okra powder and 25% all-purpose flour). This design enabled the researchers to determine the most acceptable formulation based on respondents' evaluations of appearance, aroma, taste, and texture. In addition, a descriptive approach was applied to assess the general acceptability, consumer preference, theoretical nutrient content, food cost, and packaging suitability of the developed product. The combined research design was deemed appropriate because it allowed the researchers to generate both comparative and descriptive data necessary for product development and sensory evaluation.

Respondents

The respondents of the study consisted of 125 students from the College of International Tourism and Hospitality Management (CITHM) of Lyceum of the Philippines University, Cavite, who were enrolled in Culinary Arts and Kitchen Operations (CAKO) and CLOCA-related courses during the conduct of the study. The participants were selected through purposive sampling based on their availability,

willingness to participate, and familiarity with food sensory evaluation activities. The inclusion of students from hospitality and culinary-related programs was considered appropriate because of their exposure to food preparation, food quality assessment, and sensory evaluation practices. The sample size was determined with the assistance of a statistician to ensure sufficient representation for sensory evaluation and acceptability testing.

Instruments

The primary instrument used in the study was a structured sensory evaluation questionnaire designed to assess the acceptability of okra powder-infused cookies. The questionnaire consisted of two major components. The first component utilized a 5-point hedonic scale to evaluate the sensory attributes of the cookies in terms of appearance, aroma, taste, and texture, where 5 indicated the highest level of acceptability, and 1 indicated the lowest. The second component employed the Food Action Rating Scale (FACT), a 9-point scale developed by Howard G. Schutz (Schutz, 1965), to measure the respondents' willingness to purchase or consume the product based on consumer preference. The questionnaire was subjected to content validation by experts in hospitality and food research to ensure clarity, relevance, and appropriateness of the items. In addition to the survey instrument, standard baking tools, measuring instruments, and food preparation equipment were utilized during the preparation and production of the okra cookies to maintain consistency across all treatment formulations.

Procedure

The researchers first prepared the okra powder through a dehydration process before incorporating it into the cookie formulations. Three treatment formulations with varying proportions of okra powder and all-purpose flour were developed and baked under standardized conditions to ensure consistency in preparation, temperature, and baking time. After the preparation of the samples, the researchers sought the assistance of a statistician to determine the appropriate number of respondents for the sensory evaluation. The selected participants were then oriented regarding the objectives of the study, the evaluation procedures, and the proper use of the sensory evaluation instrument. Each respondent was provided with samples of the three treatment formulations and was instructed to evaluate the products independently using the 5-point hedonic scale for sensory attributes and the 9-point FACT scale for general acceptability. The completed questionnaires were collected, checked for completeness, and organized for statistical analysis. The systematic procedure ensured uniformity in product presentation and minimized bias during the sensory evaluation process.

Data Analysis

The data gathered from the sensory evaluation and acceptability tests were tallied, encoded, and analyzed using descriptive statistical tools. Frequency counts and percentages were used to summarize the respondents' demographic distribution and preferences for the different treatment formulations. Mean and standard deviation were computed to determine the level of acceptability of the okra cookies in terms of appearance, aroma, taste, and texture. The interpretation of the hedonic scale ratings was based on predetermined numerical ranges corresponding to levels of acceptability. The Food Action Rating Scale (FACT) responses were also analyzed using frequency and percentage distribution to assess the respondents' willingness to purchase or consume the product. The statistical treatment enabled the researchers to identify the most preferred treatment formulation and to evaluate the general acceptability of okra powder-infused cookies.

Ethical Considerations

Ethical principles were strictly observed throughout the conduct of the study. Prior to participation, the respondents were informed about the objectives, nature, and purpose of the research. Participation was entirely voluntary, and the respondents were given the freedom to withdraw from the study at any stage without any form of penalty or consequence. Informed consent was obtained from all participants before the sensory evaluation was conducted. The researchers ensured the confidentiality and anonymity of the respondents by not disclosing any personally identifiable information in the data gathering, analysis, and reporting processes. All collected data were used solely for academic and research purposes. Furthermore, proper food safety and sanitation procedures were observed during the preparation and handling of the cookie samples to ensure the health and safety of the participants throughout the sensory evaluation activity.

Results and Discussion

This table shows how many participants rated the sensory properties of Okra Powder Infused in Cookies using the three Treatment designs: 25% okra powder - 75% AP Flour, 50% okra powder - 50% AP Flour, and 75% okra powder - 25% AP Flour. The table is used to show which sensory property of the three treatment methods the participants rated as the most preferred in terms of appearance.

Table 1. *The sensory properties of Cookies with okra powder in terms of Appearance*

Sample	*Valid*	*Mean*	*Std. Deviation*	*Interpretation*
25% Okra Powder 75% AP Flour	125	4.128	0.833	Like a Lot
50% Okra Powder 50% AP Flour	125	4.304	0.775	Like a Lot
75% Okra Powder 25% AP Flour	125	3.808	1.169	Like a Little

Hedonic-scale: 5- Like a lot; 4- Like a little; 3- Neither Like nor Dislike; 2- Dislike a little; 1- Dislike a lot Interpretation: 4.20 – 5 -- Like a lot; 3.40-4.19 -Like a little; 2.60-3.39 - Neither Like nor Dislike; 1.80-2.59- Dislike a little; 1.00-1.79 -Dislike a lot

This table shows the sensory evaluation results for the appearance of cookies prepared with varying percentages of okra powder. The highest-ranked treatment based on appearance is the 50% Okra Powder + 50% AP Flour blend, with a mean score of 4.304, interpreted as “Like a lot” (4.20–5.00). This indicates it was the most visually preferred by participants. In comparison, the 25% Okra Powder + 75% AP Flour scored 4.128, which falls into the “Like a little” category (3.40–4.19). The lowest-ranked treatment was the 75% Okra Powder + 25% AP Flour blend, with a mean score of 3.808, also categorized as “Like a little.” Because it harmonized the natural qualities of okra without overpowering its aesthetics, the 50% Okra Powder blend most likely received the highest rating. Due to the fiber texture and earthy color of okra, the cookies might have looked darker, grittier, or less consistent at 75% Okra Powder, which would have diminished their attractiveness. On the other hand, the 25% okra powder formulation may have diminished the distinct characteristics of okra, causing the cookies to closely resemble those made with conventional flour. However, the 50% blend probably added minor visual distinctiveness, like a slight golden hue or even texture, while keeping familiarity, which made it more appealing to participants.

According to Soliman et al. (2023), okra powder has been evaluated for its sensory attributes when incorporated into desserts. In terms of appearance, okra powder can influence the color, texture, and visual uniformity of the final product. Specifically, the greenish tint and sometimes slightly fibrous particles of okra powder may alter the typical smooth and homogeneous appearance expected in many desserts. This may affect consumer acceptance depending on the type of dessert and the concentration of okra powder used.

This table shows how many participants rated the sensory properties of Okra Powder Infused in Cookies using the three Treatment design: 25% okra powder - 75% AP Flour, 50% okra powder - 50% AP Flour, and 75% okra powder - 25% AP Flour. The table is used to show which sensory property of the three treatment methods the participants rated as the most preferred in terms of Aroma.

Table 2. *The sensory properties of Cookies with okra powder in terms of Aroma*

Sample	*Valid*	*Mean*	*Std. Deviation*	*Interpretation*
25% Okra Powder 75% AP Flour	125	4.096	0.911	Like a Little
50% Okra Powder 50% AP Flour	125	4.184	0.874	Like a Little
75% Okra Powder 25% AP Flour	125	3.744	1.191	Like a Little

Hedonic-scale: 5- Like a lot; 4- Like a little; 3- Neither Like nor Dislike; 2- Dislike a little; 1- Dislike a lot. Interpretation: 4.20 – 5 -- Like a lot; 3.40-4.19 -Like a little; 2.60-3.39 - Neither Like nor Dislike; 1.80-2.59- Dislike a little; 1.00-1.79 -Dislike a lot

Table 2 presents the sensory evaluation results for the aroma of okra cookies prepared using different treatment formulations. The cookies made with a 50% okra powder and 50% all-purpose flour blend received the highest mean aroma rating (M = 4.18, SD = 0.87), suggesting that panelists generally 'liked slightly' the scent of okra in this formulation more than in the others. In comparison, the 25 percent okra formulation scored slightly lower (M = 4.10, SD = 0.91), and the 75 percent okra formulation scored the lowest (M = 3.74, SD = 1.19), showing not only reduced overall liking but also greater variability in responses. Hence, the 50/50 blend delivered the most appealing and consistently liked aroma in the cookies. Of the three cookie formulations tested (25 %, 50 %, and 75 % okra powder), the 50 % okra + 50 % flour blend achieved the highest average aroma liking score, indicating panelists “liked a little” of its scent more than the 25 % or 75 % okra formulations.

Falade and Omojola (2010) assessed the effects of four processing techniques on the sensory quality of okra when it is rehydrated or employed in food products: freezing/thawing, sun-drying, foam-mat drying, and solar-drying. In contrast, both sun-dried and solar-dried okra scored significantly lower for color, aroma, taste, and overall acceptability, demonstrating that direct-heat drying methods can degrade the sensory appeal of okra more significantly than gentle or low-temperature processes. The sensory panelists found that fresh, frozen/thawed, and foam-mat-dried okra did not differ significantly in color, aroma, or overall acceptability, indicating that these three treatments preserved the sensory attributes nearly as well as fresh pods.

This table shows how many participants rated the sensory properties of Okra Powder Infused in Cookies using the three Treatment design: 25% okra powder - 75% AP Flour, 50% okra powder - 50% AP Flour, and 75% okra powder - 25% AP Flour. The table is used to show which sensory property of the three treatment methods the participants rated as the most preferred in terms of Taste.

Table 3. *The sensory properties of Cookies with okra powder in terms of Taste*

Sample	*Valid*	*Mean*	*Std. Deviation*	*Interpretation*
25% Okra Powder 75% AP Flour	125	3.896	1.061	Like a Little
50% Okra Powder 50% AP Flour	125	3.992	1.043	Like a Little
75% Okra Powder 25% AP Flour	125	3.272	1.304	Neither Like nor Dislike

Hedonic-scale: 5- Like a lot; 4- Like a little; 3- Neither Like nor Dislike; 2- Dislike a little; 1- Dislike a lot Interpretation: 4.20 – 5 -- Like a lot; 3.40-4.19 -Like a little; 2.60-3.39 - Neither Like nor Dislike; 1.80-2.59- Dislike a little; 1.00-1.79 -Dislike a lot

The table presents the sensory evaluation results focusing on the taste of okra-infused cookies prepared using varying treatment methods. Among the three formulations, the cookies with a 50% okra powder and 50% all-purpose flour blend achieved the highest flavor appeal, registering a mean score of 3.99, which falls within the "like a little" category. This score, coupled with relatively low variability, indicates a consistently favorable taste perception among the panelists. In contrast, the 75% okra formulation received a mean score of

3.27, placing it in the "neither like nor dislike" range, suggesting a more subdued or less appealing flavor profile. The 25% okra variant garnered a mean score of 3.90, also within the "like a little" category, but slightly lower than the 50% blend. These findings suggest that the 50/50 okra and all-purpose flour combination offers the most balanced and consistently pleasant flavor among the tested formulations.

Research by Oluwole et al. (2022) that was published in the Journal of Culinary Science and Technology states that the polysaccharide and phenolic content of okra powder contribute to its pleasantly earthy flavor with faint undertones of sweetness and bitterness. The drying method (such as freeze-drying versus oven-drying) has a major effect on flavor retention, according to the researchers. While thermally processed okra powder develops slightly intensified bitterness due to Maillard reaction byproducts, freeze-dried okra powder maintains a fresher, grass-like sweetness. Its "balanced vegetal taste," which allows it to be used in soups, baked products, and smoothies without dominating other components, was emphasized by sensory panelists. The study highlights how mixing okra powder with savory or sweet carriers might lessen its moderate bitterness and increase its culinary diversity.

Table 4 summarizes the number of participants who rated the sensory attributes of cookies infused with okra powder across three treatment formulations: 25% okra powder–75% all-purpose flour, 50% okra powder–50% all-purpose flour, and 75% okra powder–25% all-purpose flour. The table is used to show which sensory property of the three treatment methods the participants rated as the most preferred in terms of Texture.

Table 4. *The sensory properties of Cookies with okra powder in terms of Texture*

Sample	*Valid*	*Mean*	*Std. Deviation*	*Interpretation*
25% Okra Powder 75% AP Flour	125	4.088	1.008	Like a Little
50% Okra Powder 50% AP Flour	125	4.176	1.017	Like a Little
75% Okra Powder 25% AP Flour	125	3.648	1.303	Like a Little

Hedonic-scale: 5- Like a lot; 4- Like a little; 3- Neither Like nor Dislike; 2- Dislike a little; 1- Dislike a lot Interpretation: 4.20 – 5 -- Like a lot; 3.40-4.19 -Like a little; 2.60-3.39 - Neither Like nor Dislike; 1.80-2.59- Dislike a little; 1.00-1.79 -Dislike a lot

The table shows the sensory evaluation in terms of taste in Okra Cookies using different treatment methods. Among the three samples, the cookie containing 50% okra powder and 50% all-purpose flour received the highest mean score of 4.176, with a standard deviation of 1.017. This indicates that most respondents rated this sample favorably in terms of texture, falling within the "Like a Little" category. The next highest score was from the sample with 25% okra powder and 75% all-purpose flour, which obtained a mean score of 4.088 and a standard deviation of 1.008. Although slightly lower, it also falls under the same interpretation range of "Like a Little." The sample with 75% okra powder and 25% all-purpose flour had the lowest mean score of 3.648 and the highest standard deviation of 1.303, suggesting more variability in the responses. While this score still falls under the "Like a Little" category, it is noticeably lower than the other two samples, possibly due to the increased fibrous or gummy texture contributed by the higher concentration of okra powder. Based on the data, the sample with a 50:50 ratio of okra powder to all-purpose flour is considered the best in terms of texture, as it achieved the highest average rating from the respondents while maintaining a relatively low variation in responses. This suggests that a balanced proportion of okra powder and all-purpose flour results in a more acceptable and pleasant cookie texture.

In the study by Santos et al. (2022), the researchers tested what would happen if they replaced part of the wheat flour in cookies with okra flour at different levels 0%, 5%, 10%, and 15%. One of the most noticeable changes they observed was in the texture of the cookies. As they added more okra powder, the cookies became heavier and more compact. This is because okra flour has a high fiber content, which affects how the dough holds together and how the final cookie feels when eaten. The cookies with 10% and 15% okra were denser and may have felt more crumbly or chewy, which could make them less appealing to some consumers. However, the cookies with only 5% okra powder (called Formulation B in the study) were still soft and pleasant in texture, while also being healthier because they had more fiber and protein than regular cookies. These findings are very helpful for our study on the sensory properties of cookies with okra powder, especially in terms of texture. Texture is an important part of how people enjoy cookies it affects how easy it is to bite, chew, and swallow. This study shows that adding a small amount of okra powder (like 5%) can improve nutrition without ruining the cookie's texture. But if too much okra is added, the texture can become too thick or rough, which may lower people's interest in eating it. This proves that okra powder changes the texture depending on how much is used, and that texture plays a big role in whether consumers like or dislike the product (Santos et al., 2022).

Table 5. *Distribution of Respondents in terms of Best Sample*

Preferred Treatment	*Frequency*	*Percent*	*Rank*
Treatment 1	45	31.250	2
Treatment 2	57	39.583	1
Treatment 3	23	15.972	3

This table shows respondents' distribution in terms of the best sample of Okra Cookies using the three treatment methods: Treatment 1 (25% okra powder - 75% AP Flour), Treatment 2 (50% okra powder - 50% AP Flour), and Treatment 3 (75% okra powder - 25% AP Flour). The table shows which of the treatment methods participants preferred most based on their preferences.

Treatment 2 was the most preferred, with 57 respondents selecting it, representing 39.583% of the total. Among the samples for treatment

methods used, ranked according to frequency and percentage, was treatment 2, with a frequency of 56 and a rate of 56%, followed closely by Treatment 1 with a frequency of 46 and a rate of 46%, and the last is treatment 3 with a frequency of 23 and a rate of 23%.

It implies that most of the respondents chose Treatment 2 (50% okra powder - 50% AP Flour) as their preference when it comes to Okra Cookies. Based on the available research, incorporating okra powder into cookies can enhance their nutritional profile, particularly by increasing protein and fiber content. However, higher substitute levels may affect sensory attributes such as texture and flavor. Studies suggest that substitution levels up to 25% are generally acceptable, with 5% to 20% being optimal for maintaining desirable sensory qualities. For instance, Akoja and Coker (2018) found that biscuits with up to 25% okra powder substitution were acceptable in terms of sensory qualities, including taste, texture, and overall acceptability. Higher substitution levels resulted in diminished sensory scores, particularly in texture and flavor. Similarly, Amadi (2019) reported that biscuits with 20% okra flour substitution were most preferred, while higher substitution levels negatively impacted taste and texture, leading to lower acceptability. These findings support the idea that the moderate inclusion of okra powder in cookie formulations can enhance nutritional value without compromising sensory appeal.

The table summarizes the willingness of the respondents to purchase the Okra Cookies. It is categorized into 9 levels, ranging from (9) "I would buy this every opportunity that I had" to "I would buy this only if forced." The data also highlights the frequencies and percentages for each level, with a total of 125 respondents.

Table 6. *Distribution of Respondents in terms of Best Sample*

Best describes how he/she feels about it	*Frequency*	*Percent*	*Rank*
(9) I would buy this every opportunity that I had.	4	3.200	7
(8) I would buy this very often.	1	0.800	9
(7) I would frequently buy this.	3	2.400	8
(6) I like this and would buy it now and then.	14	11.200	5
(5) I would buy this if available but would not go out of my way.	31	24.800	1
(4) I do not like this but would buy this on an occasion.	18	14.400	4
(3) I would hardly ever buy this.	22	17.600	2
(2) I would buy this if there were no other food choices	13	10.400	6
(1) I would buy this only if forced.	19	15.200	3
Total	125	100.000	

The data show that most people found the okra-powder cookie merely “acceptable” at best but not exciting: nearly one in four would buy it if it were simply on the shelf (rating 5), yet over half of tasters (57.6%) placed it in the lower half of the scale (ratings 1–4), meaning they’d only eat it if forced, on special occasions, or not at all. Only a small fraction (17.6%) gave it genuinely positive marks (ratings 6–9), and an even tinier group (6.4%) were true fans who would seek it out often. In practical terms, the cookie has managed to avoid outright rejection, but it fails to inspire strong purchase intent, suggesting that tweaks to the recipe (for example, balancing the flavor or adding complementary ingredients) or targeted marketing toward health-focused consumers might be needed to turn casual tasters into repeat buyers. Out of 125 people who tasted the okra-powder cookies, the single largest group (31 people, or 24.8%) said, “I would buy this if available but would not go out of my way,” meaning they find it acceptable enough for a routine purchase but not compelling. The next most common response (22 people, 17.6%) was “I would hardly ever buy this,” indicating a sizable minority were not convinced by the cookie. Nineteen tasters (15.2%) said, “I would buy this only if forced,” while eighteen (14.4%) admitted, “I do not like this but would buy this on an occasion,” showing some ambivalence. Thirteen respondents (10.4%) would purchase it only if no other food choices were available. Fourteen people (11.2%) fell in the center with “I like this and would buy it now and then,” reflecting moderate approval. On the positive end, four enthusiastic buyers (3.2%) said they would buy it every chance they got, three (2.4%) would frequently buy it, and one person (0.8%) would buy it very often. Together, these results reveal that while a quarter of participants are mildly favorable, opinions vary widely from strong disinterest to genuine enthusiasm for okra-powder cookies.

The study by Xavier et al. (2022) supports the observation that okra-powder cookies receive moderate consumer acceptance. In their research, cookies with a 5% substitution of wheat flour with okra flour achieved a global impression acceptability index of 76.67%, indicating moderate approval. However, as the proportion of okra flour increased to 10% and 15%, the acceptability index declined to 67.44% and 62.22%, respectively, suggesting that higher concentrations of okra flour negatively impact sensory acceptance. These findings align with the data indicating that while okra-powder cookies are generally acceptable, they do not elicit strong enthusiasm from consumers, highlighting the need for recipe modifications or targeted marketing strategies to enhance appeal.

Conclusion

The study demonstrated that incorporating okra powder into cookie formulations is a feasible and innovative approach to developing a functional bakery product with acceptable sensory qualities. Among the three treatment formulations tested, the cookie containing 50% okra powder and 50% all-purpose flour consistently obtained the highest ratings in terms of appearance, aroma, taste, and texture. Respondents particularly appreciated the product’s balanced flavor profile, desirable crisp texture, and visually appealing appearance. Although the other formulations also achieved acceptable ratings, the balanced 50:50 formulation emerged as the most preferred treatment, indicating that moderate incorporation of okra powder can enhance product quality without negatively affecting sensory acceptability.

The findings further revealed that the incorporation of okra powder contributed positively to the nutritional value of the cookies. Okra is recognized for its high dietary fiber, vitamin, mineral, and antioxidant content, which may provide potential health benefits when

integrated into commonly consumed snack products. The study confirmed that the utilization of okra powder can improve the nutritional profile of cookies while maintaining favorable consumer acceptance. Consequently, the developed product may serve as a healthier alternative to conventional cookies and may support the increasing consumer demand for nutritious and functional food products.

In terms of consumer preference and marketability, the 50:50 okra powder-cookie formulation demonstrated the highest purchase intention among the respondents. Most participants indicated their willingness to consume and potentially purchase the product if made commercially available. This suggests that okra powder-infused cookies possess promising commercial potential, particularly among health-conscious consumers seeking innovative snack options. The findings also support the viability of utilizing locally available agricultural products, such as okra, in food product innovation and value-added processing.

Based on the findings of the study, it is recommended that future researchers further explore the use of okra powder in other bakery and food products, such as bread, crackers, cakes, and gluten-free snacks, to expand its application in the food industry. Future studies may also include laboratory-based nutritional analysis, shelf-life evaluation, microbial testing, and advanced sensory profiling to strengthen the scientific validity and commercial applicability of the product. Moreover, increasing the sample size and involving respondents from diverse demographic groups may provide broader insights into consumer preferences and product acceptability.

It is also recommended that food entrepreneurs, hospitality practitioners, and educational institutions consider the development and promotion of okra powder-infused products as part of sustainable and health-oriented food innovation initiatives. Improvements in flavor enhancement, packaging design, and marketing strategies may further increase consumer acceptance and purchasing behavior. Additionally, collaboration with nutritionists and food technologists may help optimize the product formulation to maximize both nutritional quality and sensory appeal while ensuring food safety and commercial competitiveness.

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