

Product Development, Sensory Acceptability, and Formulation Enhancement of Flavored Eggplant (*Solanum Melongena*) Kropek

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ABSTRACT

The development of healthier and sustainable snack products has gained increasing attention in the hospitality and food service industry due to the growing consumer demand for nutritious and innovative food alternatives. This study evaluated the sensory acceptability of flavored eggplant (*Solanum melongena*) kropek using cheese, barbecue, sour cream, and spicy flavor variants. Specifically, the study aimed to determine the most preferred flavor variant and assess the product's acceptability in terms of appearance, aroma, texture, and taste.

An experimental-descriptive research design was employed in the study. Four flavor variants of eggplant kropek were developed and subjected to sensory evaluation using a structured questionnaire and a 5-point Acceptability Scale. Thirty purposively selected respondents participated in the sensory evaluation. Frequency, percentage, mean, weighted mean, and ranking were utilized to analyze the gathered data.

The findings revealed that flavored eggplant kropek obtained high acceptability ratings across all sensory attributes. Among the flavor variants, cheese-flavored eggplant kropek emerged as the most preferred formulation, obtaining the highest frequency of responses among the respondents. In terms of sensory evaluation, taste obtained the highest mean rating, followed by appearance, texture, and aroma, with all attributes verbally interpreted as "Highly Acceptable." The overall composite mean further indicated that the product was generally well accepted by the respondents.

The findings suggest that eggplant can be utilized as an alternative ingredient in kropek production, contributing to food product innovation and sustainable snack development. The study further highlights the potential of flavored eggplant kropek as a nutritious and marketable snack product that may support local agricultural utilization and small-scale food entrepreneurship.

Keywords: Eggplant Kropek, Sensory Acceptability, Food Innovation, Product Development, Sustainable Snack Product

INTRODUCTION

The increasing demand for healthier and more sustainable food products has significantly influenced innovation within the hospitality and food service industry. Consumers have become more conscious of the nutritional value, quality, and safety of the foods they consume, resulting in a growing preference for plant-based and functional food products. This trend has encouraged food researchers and product developers to explore the utilization of locally available agricultural resources in creating innovative and nutritious food alternatives.

In the Philippines, snack foods remain widely consumed because of their affordability, accessibility, and convenience. However, many commercially available snack products contain high levels of sodium, artificial flavorings, preservatives, and unhealthy fats that may contribute to various health concerns when consumed excessively. Consequently, the development of healthier snack alternatives has become increasingly relevant in both the food industry and academic research. The incorporation of vegetable-based ingredients into snack production presents an opportunity to provide consumers with healthier food choices while promoting sustainable food systems and local agricultural utilization.

Eggplant (*Solanum melongena*), commonly referred to as aubergine or brinjal, is one of the most widely cultivated vegetables in the Philippines and other Southeast Asian countries. It is valued not only for its culinary versatility but also for its nutritional composition. Eggplant is recognized as a good source of dietary fiber, vitamins, minerals, and antioxidants such as phenolic compounds and anthocyanins that contribute to various health benefits [1,10]. Previous studies further highlighted that eggplant possesses low caloric content and significant antioxidant activity, making it a suitable ingredient for healthier food product development and alternative snack innovations [1,10].

Despite the abundance and accessibility of eggplant in local markets, its utilization in processed snack products remains limited. Most eggplant preparations are associated with traditional dishes, while only a few studies have explored its potential in innovative snack products with commercial value. The development of value-added food products from eggplant may contribute to increased agricultural utilization, product diversification, and enhanced consumer awareness regarding nutritious snack alternatives.

One snack product commonly consumed throughout Southeast Asia is kropek, a deep-fried cracker traditionally produced from starch and seafood-based ingredients such as shrimp or fish. Kropek is widely appreciated for its crisp texture, savory flavor, affordability, and convenience. However, conventional kropek products generally rely on starch-based and seafood-based formulations with minimal incorporation of vegetable ingredients. The integration of eggplant into kropek production introduces an alternative approach to snack product innovation by combining nutritional value with consumer acceptability.

Flavor significantly influences food preference and consumer purchasing behavior. In snack product development, flavor enhancement contributes to product appeal, sensory acceptability, and marketability. Familiar flavors such as cheese, barbecue, sour cream, and spicy flavors are commonly preferred by consumers and are widely associated with commercial snack products. The incorporation of these flavor variants into eggplant kropek formulation may improve the product's sensory characteristics and increase its acceptability among consumers [2,3].

Sensory evaluation plays an essential role in food product development because it determines the acceptability and quality of food products based on consumer perception. Sensory attributes such as appearance, aroma, texture, and taste directly influence consumer satisfaction and purchasing intention. According to Lawless and Heymann [9], sensory evaluation serves as a scientific method for measuring and interpreting consumer responses toward food products. Similarly, Herrero [5] emphasized that sensory analysis is important in determining the market viability and acceptability of newly developed food products.

Limited studies have explored the utilization of eggplant in kropek production, particularly in terms of flavor enhancement and sensory acceptability. Existing studies primarily focus on conventional seafood-based kropek formulations, leaving a gap in research concerning plant-based alternatives with nutritional

and commercial potential. Therefore, the development of flavored eggplant kropek addresses the growing need for innovative, nutritious, and sustainable snack products utilizing locally available agricultural resources.

This study evaluated the sensory acceptability of flavored eggplant kropek using cheese, barbecue, sour cream, and spicy flavor variants. Specifically, the study assessed consumer preference and product acceptability in terms of appearance, aroma, texture, and taste. The findings of the study may contribute to food product innovation, sustainable snack development, and the promotion of locally sourced agricultural products within the hospitality and food service industry.

Furthermore, the study may provide valuable information for food entrepreneurs, hospitality professionals, culinary practitioners, and future researchers interested in developing innovative snack products using vegetable-based ingredients. The study likewise supports sustainable food innovation and aligns with the United Nations Sustainable Development Goals (SDGs), particularly SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-Being), and SDG 8 (Decent Work and Economic Growth).

STATEMENT OF THE PROBLEM

This study aims to determine the most preferred flavor variant of eggplant kropek and to assess its level of acceptability based on sensory attributes. Furthermore, the study seeks to propose a standardized recipe grounded on the findings.

Specifically, this study seeks to answer the following research questions:

1. What is the most preferred flavor variant of eggplant kropek among the respondents?
2. What is the level of acceptability of the flavored eggplant kropek in terms of:
 - Appearance
 - Aroma
 - Texture
 - Taste
3. What enhance the recipe for eggplant kropek can be proposed based on the findings of the study?

OBJECTIVE OF THE STUDY

To determine the most preferred flavor variant of eggplant kropek and evaluate its sensory acceptability as a basis for enhancing its formulation.

1. To identify the most preferred flavor variant of eggplant kropek.
2. To determine the level of acceptability of the favored eggplant kropek in terms of appearance, aroma, texture, and taste.
3. To develop an enhanced recipe for flavored eggplant kropek based on the findings of the study.

REVIEW OF RELATED LITERATURE AND STUDIES

The increasing demand for healthier and more sustainable food products has encouraged innovation within the hospitality and food service industry. Consumers have become more conscious of the nutritional value and quality of the foods they consume, resulting in greater interest in plant-based and functional food products. Consequently, researchers and food developers have explored the utilization of locally available agricultural resources in creating innovative and nutritious food alternatives.

Eggplant (*Solanum melongena*) is one of the most widely cultivated vegetables in the Philippines and other Southeast Asian countries. It is recognized for its culinary versatility and nutritional composition.

According to Ninfali and Angelino [10], eggplant contains dietary fiber, vitamins, minerals, and antioxidant compounds that contribute to various health benefits. Similarly, Arghavan and Goli [1] emphasized that eggplant possesses low caloric content and significant antioxidant activity, making it suitable for healthier food product development and alternative snack innovations.

The utilization of vegetables in processed snack products has gained increasing attention due to the growing consumer preference for healthier alternatives to conventional snack foods. Traditional snack products are often associated with high sodium content, artificial additives, and unhealthy fats. Consequently, the incorporation of vegetable-based ingredients into snack production may improve nutritional quality while maintaining desirable sensory characteristics and consumer acceptability.

Kropek is a traditional deep-fried cracker commonly consumed throughout Southeast Asia, particularly in the Philippines, Indonesia, and Malaysia. It is generally produced from starch combined with seafood ingredients such as shrimp or fish to enhance flavor and texture. Despite its popularity, conventional kropek formulations remain largely dependent on starch and seafood ingredients with limited incorporation of vegetables. The integration of eggplant into kropek production introduces an alternative approach to snack product development by combining nutritional value with consumer appeal.

Sensory evaluation is considered an essential component of food product development because it determines product quality and consumer acceptability based on sensory perception. Lawless and Heymann [9] described sensory evaluation as a scientific method used to measure and interpret human responses toward food products through attributes such as appearance, aroma, texture, and taste. Herrero and Ruiz-Capillas [5] further emphasized that sensory analysis plays an important role in assessing the market viability and acceptability of newly developed food products.

Food innovation studies demonstrated that alternative and locally sourced ingredients can achieve favorable consumer acceptability when properly formulated. Illo and Orobio [6] found that Oyster Mushroom Siopao obtained positive sensory evaluation results in terms of appearance, aroma, taste, and texture, suggesting the market potential of food products developed from nutritious and locally available ingredients. The findings support the potential of vegetable-based and alternative food products in promoting innovation within the food service and hospitality industry.

Flavor enhancement significantly influences product appeal and consumer preference. Familiar flavors such as cheese, barbecue, and sour cream are widely preferred by consumers and are commonly associated with commercial snack products. According to Chaaban and Andersen [3], balanced flavor profiles strongly influence food liking and consumer satisfaction. In addition, texture and moisture content are important quality factors in snack products because they affect crispiness, shelf stability, and overall acceptability [7, 8].

Consumer acceptability remains a major factor influencing the commercial success of food products. Sharif et al. [15] explained that sensory evaluation provides valuable information regarding product strengths and areas requiring improvement. Furthermore, Rogers [12], through the Diffusion of Innovations Theory, emphasized that consumer acceptance significantly influences the adoption and marketability of newly introduced products.

Despite the increasing interest in vegetable-based snack innovation, limited studies have explored the utilization of eggplant in kropek production, particularly in terms of flavor enhancement and sensory acceptability. Existing studies primarily focus on conventional seafood-based kropek formulations, leaving a gap in research concerning plant-based alternatives with nutritional and commercial potential.

Therefore, the present study was conducted to evaluate the sensory acceptability of flavored eggplant kropek and determine the most preferred flavor variant among consumers.

METHODOLOGY

An experimental-descriptive research design was employed in the study. The experimental component involved the development of four flavor variants of eggplant kropek, namely cheese, sour cream, barbecue, and spicy flavor. The descriptive component focused on evaluating consumer preference and determining the level of sensory acceptability of the developed product.

Thirty (30) purposively selected respondents participated in the sensory evaluation. The respondents were selected based on their availability and willingness to evaluate food products. Purposive sampling was utilized to ensure that the participants were capable of assessing the sensory characteristics of the product.

A sensory evaluation questionnaire was used as the primary research instrument. The questionnaire consisted of two parts. Part I focused on identifying the most preferred flavor variant among cheese, sour cream, barbecue, and spicy flavor. Part II evaluated the level of acceptability of the favored flavor variant based on the sensory attributes of appearance, aroma, texture, and taste.

The respondents evaluated the product using a 5-point acceptability scale with the following verbal interpretations: 4.21–5.00 as Highly Acceptable, 3.41–4.20 as Acceptable, 2.61–3.40 as Moderately Acceptable, 1.81–2.60 as Slightly Acceptable, and 1.00–1.80 as Not Acceptable.

The gathered data were analyzed using frequency, percentage, mean, weighted mean, and ranking to determine the most preferred flavor variant and the overall acceptability of the flavored eggplant kropek.

DATA GATHERING PROCEDURES

The raw materials used in this study primarily consisted of fresh eggplants. Experimental trials were conducted to refine the formulation and ensure reliable and consistent results. Each trial was carefully documented, focusing on varying eggplant quantities (200 g, 250 g, and 300 g) and examining the influence of cheese, barbecue, sour cream, and spicy flavorings on the product's sensory characteristics. Prior to the conduct of the study, a review of related literature and studies was undertaken to establish the foundation of the research and determine the potential of eggplant as an alternative ingredient for snack product development. The review focused on the nutritional value of eggplant, traditional kropek production, sensory evaluation, and consumer preference for healthier snack alternatives. Based on the gathered literature, the objectives of the study, product formulations, flavor variants, and ingredient proportions were identified and finalized. The sensory evaluation questionnaire and other data-gathering instruments were likewise prepared to ensure that the study would systematically address its intended objectives.

The sensory evaluation questionnaire was subjected to pilot testing to assess its clarity, organization, and effectiveness. The instrument was administered to selected individuals who were not included among the actual respondents of the study. Feedback obtained from the pilot testing was used to revise and improve the wording, structure, and comprehensibility of the questionnaire to ensure its suitability for evaluating the appearance, aroma, texture, and taste of the flavored Eggplant Kropek.

During the actual data gathering, the finalized questionnaire was distributed to thirty (30) purposively selected respondents together with samples of the flavored Eggplant Kropek, specifically the cheese, barbecue, sour cream, and spicy variants. The respondents evaluated the product using the 5-point

Acceptability Scale based on the sensory attributes of appearance, aroma, texture, and taste. The completed questionnaires were collected, organized, and prepared for statistical analysis.

In addition, physicochemical analysis was conducted to determine the water activity of the developed product to ensure product quality and stability. The gathered data were tabulated and analyzed according to the objectives of the study.

STATISTICAL TREATMENT

The data gathered from the sensory evaluation of the Eggplant Kropek were statistically treated using appropriate descriptive statistical tools to answer the research questions of the study.

The following statistical tools were employed:

Frequency and Percentage. Ranking was employed to determine the order of preference of the flavor variants and sensory attributes based on the computed results. The highest computed value was assigned Rank 1, indicating the most preferred and most acceptable flavor variant or sensory attribute.

Mean. The mean was utilized to determine the average rating of each sensory attribute, specifically appearance, aroma, texture, and taste. This statistical tool provided a measure of the general perception and level of acceptability of the respondents toward the developed product formulations. The formula used in computing the mean is presented below:

$$\bar{x} = \frac{\sum x}{n}$$

Weighted Mean (Composite Mean). The weighted mean was used to determine the overall acceptability of Eggplant Kropek based on the combined ratings of the sensory attributes. This served as the basis for identifying the general acceptability of the product. The formula used is:

$$W M = \frac{\sum (f \times x)}{N}$$

Ranking. Ranking was employed to determine the order of preference of the flavor variants and sensory attributes based on the computed results. The highest computed value was assigned Rank 1, indicating the most preferred and most acceptable flavor variant or sensory attribute.

Verbal Interpretation

Variables	Frequency	Percentage	Mean	Verbal Interpretation	Rank
Flavor Variant					
Cheese Flavor	12	40.00%		Most Preferred	1
Barbecue Flavor	9	30.00%		Preferred	2
Sour Cream Flavor	6	20.00%		Preferred	3
Spicy Flavor	3	10.00%		Least Preferred	4
Sensory Attributes					
Taste	—	—	4.60	Highly Acceptable	1
Appearance	—	—	4.47	Highly Acceptable	2
Texture	—	—	4.40	Highly Acceptable	3
Aroma	—	—	4.23	Highly Acceptable	4
Composite Mean			4.43	Highly Acceptable	

The results revealed that Cheese Flavor was the most preferred flavor variant of eggplant kropek among the respondents, obtaining a frequency of 12 or 40.00% of the total responses. This was followed by Barbecue Flavor with 9 respondents or 30.00%, Sour Cream Flavor with 6 respondents or 20.00%, and Spicy Flavor with 3 respondents or 10.00%. The findings suggest that respondents favored flavors commonly associated with snack products, particularly cheese flavor, which may be attributed to its savory taste and familiarity among consumers.

In terms of sensory attributes, Taste obtained the highest mean score of 4.60 and was verbally interpreted as “Highly Acceptable.” This indicates that the respondents were highly satisfied with the flavor profile of the eggplant kropek. Appearance followed with a mean of 4.47, suggesting that the product’s color and visual appeal positively influenced consumer acceptability. Texture ranked third with a mean of 4.40, implying that the crispiness and mouthfeel of the kropek met the respondents’ expectations for a snack product. Aroma received the lowest mean among the sensory attributes with 4.23; however, it was still verbally interpreted as “Highly Acceptable,” indicating that the smell of the product remained pleasant and acceptable to the respondents.

Overall, the composite mean of 4.43, verbally interpreted as “Highly Acceptable,” indicates that the flavored Eggplant Kropek was generally well accepted by the respondents. The findings indicate that the product possesses desirable sensory qualities that contribute to consumer acceptability and market potential. Furthermore, the results provide a basis for the development of an enhanced and standardized recipe for Eggplant Kropek, particularly focusing on the cheese flavor variant as the most preferred formulation among consumers.

RESULT AND DISCUSSION

The results of the sensory evaluation revealed the level of acceptability of flavored eggplant kropek in terms of appearance, aroma, texture, and taste. The findings further identified the most preferred flavor variant among the respondents and highlighted the product’s potential marketability as an innovative vegetable-based snack product.

Acceptability of Flavored Eggplant Kropek

Sensory evaluation plays an important role in food product development because it determines consumer perception and product acceptability based on sensory attributes such as appearance, aroma, texture, and taste. According to Herrero [5], sensory analysis is essential in assessing the market viability and consumer acceptance of newly developed food products. In the present study, sensory evaluation was conducted to determine the most preferred flavor variant of flavored eggplant kropek and evaluate its overall acceptability among consumers.

Thirty (30) respondents participated in the sensory evaluation of the flavored eggplant kropek. The respondents evaluated the product based on appearance, aroma, texture, and taste using the prescribed 5-point Acceptability Scale. The computed mean scores summarize the respondents’ evaluation of the developed product.

The sensory evaluation results revealed that the cheese-flavored eggplant kropek obtained the highest level of consumer preference among the four flavor formulations developed in the study. In terms of appearance, the cheese flavor variant received the highest mean score, indicating that the respondents found the product more visually appealing compared to the barbecue, sour cream, and spicy variants. This finding may be attributed to the balanced color, uniform texture, and crisp quality achieved during the preparation and drying process.

For aroma, the cheese flavor variant also obtained a high rating, although only minimal differences were observed among the four flavor formulations. The findings suggest that all formulations possessed generally acceptable aroma characteristics. However, the cheese flavor demonstrated a slightly more appealing aroma profile that complemented the overall sensory characteristics of the product.

In terms of texture, all flavor variants were positively evaluated by the respondents, indicating acceptable crispiness and mouthfeel. Nevertheless, the cheese-flavored eggplant kropek showed a slightly higher preference due to its crisp texture and consistent product quality. Texture is considered an important quality attribute in snack products because consumers generally prefer crispy and crunchy food items.

Taste obtained the highest acceptability rating among the evaluated sensory attributes. The cheese-flavored eggplant kropek was identified as the most preferred flavor variant because the seasoning provided a savory and balanced flavor profile compared to the barbecue, sour cream, and spicy formulations. The findings support the study of Chaaban and Andersen [3], who emphasized that balanced flavor profiles significantly influence food liking and consumer preference. Similar findings were observed in the study conducted by Illo and Orobia [6] entitled Development of Oyster Mushroom Siopao, wherein the developed product also demonstrated high consumer acceptability based on sensory evaluation.

Overall, the findings indicate that the cheese-flavored eggplant kropek demonstrated the highest level of acceptability among the developed flavor formulations. The results suggest that flavored eggplant kropek possesses desirable sensory qualities that may contribute to its marketability and consumer acceptance. Furthermore, the findings highlight the potential of eggplant as an alternative ingredient in innovative snack product development within the hospitality and food service industry.

CONCLUSION

The study revealed that flavored Eggplant Kropek obtained high sensory acceptability among the respondents in terms of appearance, aroma, texture, and taste. Among the developed flavor variants, cheese flavor emerged as the most preferred formulation based on the sensory evaluation results. The product obtained a composite mean verbally interpreted as “Highly Acceptable,” indicating positive consumer perception and overall product acceptability.

The findings demonstrate the potential of eggplant as an alternative ingredient in innovative snack product development. The incorporation of locally available agricultural resources into food product innovation may contribute to healthier and more sustainable snack alternatives within the hospitality and food service industry. Furthermore, the results provide a basis for the development of an enhanced and standardized recipe for flavored Eggplant Kropek with potential marketability and consumer acceptance.

RECOMMENDATIONS

Based on the findings of the study, further research may be conducted to evaluate the shelf life, nutritional composition, and commercial feasibility of flavored Eggplant Kropek. Additional flavor variants and larger groups of respondents may also be explored to obtain broader consumer evaluation and strengthen the acceptability results.

Future researchers may likewise investigate improved packaging, preservation techniques, and product marketing strategies to further enhance the quality, stability, and market potential of the product. The commercialization of flavored Eggplant Kropek may also be considered to promote the utilization of

locally available agricultural resources and support food product innovation within the hospitality and food service industry.

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