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Research Article

Formulation and Consumer Acceptability of Sweet Potato (Ipomoea Batatas) Candy with Seaweed (Eucheuma sp.) Gel

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ABSTRACT

This study investigates the formulation and consumer acceptability of sweet potato candy enriched with seaweed gel. Sweet potato candy was produced, and its acceptability was evaluated through sensory evaluation focusing on taste, color, appearance, aroma, texture, and flavor. The study revealed that the incorporation of seaweed gel into sweet potato candy results in a product with high consumer acceptability, suggesting its potential as a novel food product.

Keywords: Sweet potato, seaweed gel, consumer acceptability, sensory evaluation, food product development.

INTRODUCTION

Sweet potato holds a vital position in the global market due to its potential in addressing food security and poverty alleviation. It is a strategy to combat Vitamin A deficiency in children and mothers, offering carbohydrates and phenolic compounds. Sweet potato is also crucial for disaster preparedness, enhancing resilience against climate change.

Sweet potato is among the top five crops in production, economic value, and caloric and protein contribution, predominantly cultivated in Asia. China is the largest producer, with other significant producers including Vietnam, Indonesia, India, the Philippines, and Papua New Guinea. It serves as a primary food source, dietary supplement, and vegetable crop in various countries.

In Asia, sweet potato is used in confectionery, especially in Thailand, Malaysia, and the Philippines. This tuberous root vegetable, related to the morning glory, is popular in the United States, often used in pies and as a candied vegetable. Sweet potatoes are nutritious, rich in Vitamin A, C, and E, dietary fiber, potassium, and iron, and low in fat and cholesterol. In the Philippines, sweet potatoes are commonly processed into candies.

Seaweed is rich in proteins, vitamins, minerals, and trace metals, contributing to the economic recovery of the Philippines. It is a significant export and a common ingredient in Asian dishes, valued for its phycocolloids and polysaccharide extracts used for gel formation and enhancing the viscosity of liquids in various products.

This study aims to develop a nutritious delicacy using sweet potato and seaweed, providing a unique product for special occasions or gifts.

Objectives of the Study:

The primary objective is to determine the consumer acceptability of sweet potato candies with seaweed gel. The specific objectives include:

- Producing sweet potato candies with seaweed gel.
- Assessing the acceptability based on sensory evaluation (taste, color, appearance, aroma, texture, flavor, and general acceptability) and product cost.
- Drafting a utility model application.

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Framework of the Study:

The study is theoretically based on the theory of new food product development by Kotler (2018). This theory involves stages such as idea screening, concept development and testing, marketing strategy development, test marketing, and commercialization, emphasizing the complexities of developing new food products.

Additionally, the study incorporates the Theory of New Product Development and its Application by Gurbus (2018), which outlines eight stages: generating new product ideas, screening and evaluating arguments, concept development and testing, marketing strategy, business analysis, product development, test marketing, and commercialization.

These theories provide a comprehensive framework for the research, guiding the investigation of the acceptability and sensory qualities of sweet potato candy with seaweed gel.

Flow of the Study:

The study followed an experimental process flow:

1. Sweet potato candy production (peeling, washing, boiling, mixing, and molding).
2. Sensory evaluation by a panel of semi-trained individuals, assessing color, flavor, texture, aroma, taste, and general acceptability.
3. Production cost analysis.
4. Drafting a utility model application.

Importance of the Study:

This research on sweet potato candy with seaweed gel offers a local product innovation with nutritional value, benefiting:

- The agriculture sector by promoting diversified agriculture.
- Entrepreneurs by providing new business opportunities.
- Homemakers by enabling the development of new food products.
- Consumers by offering a nutritious delicacy option.
- Future researchers by providing a foundation for further innovation with seaweed gel in candy products.

Scope and Delimitation of the Study:

The study focused on the production and consumer acceptability of sweet potato candy with seaweed gel, using an experimental design with three treatments. Sensory characteristics were evaluated by panelists with expertise in food innovation. The study did not cover economic feasibility, market potential, and long-term storage stability.

Definition of Terms:

- Aroma: The pleasant smell of the candy, perceived by the olfactory tissues.
- Appearance: The visual characteristics of the candy, including color, shape, and size.
- Color: The visual perception that differentiates objects.
- Flavor: The taste and smell sensations evoked by the candy.
- Seaweed (Eucheuma): A rich source of calcium, iodine, and vitamins found in tropical waters.
- Sensory Evaluation: The method to measure, analyze, and interpret responses to food products through the senses.
- Taste: The flavor ascertained by taking a small amount into the mouth.
- Texture: The tactile and visual surface characteristics of the candy.

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REVIEW OF LITERATURE

The literature review supports the study by discussing the utilization of sweet potato and seaweed in food production. Sweet potatoes, originating from the trifida complex, are a significant crop, especially in Asia, with China as the largest producer. In the Philippines, sweet potato production is substantial, contributing to the livelihood and resilience of farmers.

Sweet potatoes are nutritious, providing carbohydrates, energy, protein, crude fiber, and essential nutrients. However, they also contain antinutrients. Historically, sweet potatoes were the second most important root crop in the United States in the early twentieth century and are now the seventh largest food crop globally.

Seaweeds, including various algae, are economically significant for phycocolloid extraction, with the seaweed industry benefiting many Filipinos. Their utilization in food processing enhances economic development.

The reviewed literature emphasizes the nutritional value, economic significance, and cultural importance of sweet potato and seaweed, supporting their potential in value-added products.

METHODOLOGY

This part details the research design, locale, respondents, data gathering procedure, data scoring, and statistical data treatment.

Research Design:

The study used an experimental research design with a randomized complete block design (RCBD) to determine consumer acceptability based on sensory attributes. A nine-point Hedonic Scale was used for sensory evaluation by 60 panelists, including community members, food technology students, and food experts.

Treatment Combinations:

The treatment combinations for the study are shown in Table 1:

Table 1

Treatment	Sweet Potato	Seaweed Gel
1	384 grams	180 grams
2	384 grams	90 grams
3	384 grams	45 grams

Tools and Equipment:

The study utilized standard kitchen tools, including a frying pan, ladle, mixing bowl, strainer, weighing scale, measuring cups, spoons, and scissors.

Sensory Evaluation:

Samples were coded with three-digit numbers and evaluated by panelists using a score sheet. Panelists rinsed their mouths with water before and after sampling. An Incomplete Block Design (IBD) was used, with each treatment assessed by 32 individuals.

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Ingredients:

The ingredients for the sweet potato candy are shown in Table 2:

Table 2

Treatment	Sweet Potato	Seaweed Gel	Sugar	Milk	Coconut	Powdered Peanut	Margarine
1	384 grams	180 grams	200 grams	120 grams	128 grams	34 grams	113 grams
2	384 grams	90 grams	200 grams	120 grams	128 grams	34 grams	113 grams
3	384 grams	45 grams	200 grams	120 grams	128 grams	34 grams	113 grams

Process:

The process of making the candy involves washing, peeling, boiling, mashing, mixing, and molding the ingredients. The process flow is shown in Figure 2.

Research Locale:

The study was conducted at Marcelino R. Veloso National High School.

Research Respondents:

The study included 60 panelists: 25 community members, 25 food technology students, and 10 food experts.

RESEARCH INSTRUMENT

A scoring system was used to evaluate the sensory qualities of the candy, including color, flavor, aroma, texture, taste, and general acceptability.

Data Scoring:

Sensory qualities were evaluated based on mean scores for color, aroma, appearance, texture, and taste

Statistical Data Treatment:

Data were analyzed using Analysis of Variance (ANOVA) and Duncan's Multiple Range Test (DMRT) to determine significant differences[1] in sensory attributes.

RESULTS AND DISCUSSION

This part presents and discusses the results of the sensory evaluation of sweet potato candy with seaweed gel.

Sensory Evaluation:

The sensory evaluation results for the sweet potato candy with seaweed gel are presented in Table 3.

Table 3

Sensory Attributes	Treatment 1 (384g SP : 180g SG)	Treatment 2 (384g SP : 90g SG)	Treatment 3 (384g SP : 45g SG)	F-value	p-value	Interpretation
Color	7.82	7.90	7.95	0.28	0.758	NS
Aroma	7.78	7.85	7.88	0.17	0.846	NS

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Sensory Attributes	Treatment 1 (384g SP : 180g SG)	Treatment 2 (384g SP : 90g SG)	Treatment 3 (384g SP : 45g SG)	F-value	p-value	Interpretation
Appearance	7.80	7.87	7.92	0.24	0.787	NS
Texture	7.65	7.75	7.80	0.69	0.504	NS
Taste	7.70	7.80	7.85	0.56	0.575	NS
General Acceptability	7.75	7.83	7.88	0.49	0.614	NS

Note: NS = Not Significant

The table shows the mean scores for each sensory attribute across the three treatments. Statistical analysis revealed no significant differences ($p > 0.05$) among the treatments for any of the sensory attributes. This indicates that varying the amount of seaweed gel did not significantly impact the color, aroma, appearance, texture, taste, or general acceptability of the sweet potato candy. All treatments received high acceptability scores, generally falling within the "like moderately" to "like very much" range on the Hedonic Scale.

DISCUSSION

The results suggest that seaweed gel can be incorporated into sweet potato candy without negatively affecting its sensory attributes. This is important because it opens up the possibility of using seaweed as a functional ingredient to potentially enhance the nutritional value or other properties of the candy. The lack of significant differences implies that consumers found the candy acceptable regardless of the seaweed gel concentration within the tested range.

Further research could explore higher concentrations of seaweed gel or investigate the impact of seaweed gel on the candy's shelf life, nutritional composition, or other quality parameters.

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

This section summarizes the study, presents the conclusions drawn from the findings, and offers recommendations for future research.

Summary:

The study aimed to determine the consumer acceptability of sweet potato candy with seaweed gel. Sweet potato candy was produced with varying amounts of seaweed gel, and sensory evaluation was conducted to assess color, aroma, appearance, texture, taste, and general acceptability. The data were analyzed using ANOVA and DMRT.

Conclusion:

Based on the findings, the study concludes that:

- Sweet potato candy with seaweed gel is acceptable to consumers.
- Varying the amount of seaweed gel (45g, 90g, and 180g per 384g of sweet potato) does not significantly affect the sensory attributes of the candy.

Recommendations:

The following recommendations are made:

- Further research should explore the effects of higher concentrations of seaweed gel on the sensory properties and other qualities of sweet potato candy.
- Investigate the impact of seaweed gel on the shelf life and nutritional composition of the candy.

- Conduct a cost analysis to determine the economic feasibility of producing sweet potato candy with seaweed gel on a commercial scale.
- Explore the potential of incorporating other functional ingredients alongside seaweed gel to enhance the nutritional value of the candy.
- Conduct consumer preference studies to identify target markets and optimize product formulation.

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