

Exploring Papaya Fruit (*Carica*) Enhanced Flavor in Confectionary as Snack Chips, Candy and Dried Fruit

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ABSTRACT: This study aimed to investigate the acceptability of Papaya (*Carica*) fruit as confectionary snack chips, candy and dried fruit. Philippines is a tropical country who have a well of diversity of plants that are beneficial to all. Papaya is one of the fruit commodities that has many functions and benefits. Widely consumed because it contained good nutrients, the price is affordable compare to other fruit and it is available all year round.

The study used a quantitative-descriptive experiment design, where 40 respondents' group composed of 10 children, 10 teenager, 10 adults and 10 food experts evaluated the Papaya fruit as chips, candy and dried fruit in terms of appearance, aroma, taste and texture. Results showed that the products received high ratings across all evaluated criteria with the appearance being the highest average in all snacks/products namely the Chips (4.44), Candy (4.22), and Dried fruit (4.51). The study found that the taste was highly acceptable with most of the respondents saying it is delicious. Through observation, it was discussed that the shelf life of the products can last for fourteen (14) days.

This study stated that while texture and appearance generally do not significantly differentiate preferences among snack chips, candy and dried fruit made from Papaya fruit, aroma and taste are critical factors that influence how these snacks are perceived and preferred by different groups of respondents. The research also adds value to the advancement and creativity in local food items that can benefit the consumers, environment, and society.

KEYWORD: Carica Papaya, Snack Chips, Candy, Dried Fruit, Confectionary Snack

I. INTRODUCTION

Papaya, scientifically known as *Carica papaya*, is a tropical fruit celebrated for its delicious taste and numerous health benefits. The origin of papaya is obscure, but it may have come from Mexico and Central America. The ripe fruit is edible, but the unripe fruit contains a chemical called papain that can damage the esophagus. Across various cultures and cuisines, papaya holds a revered status as a versatile ingredient in culinary creations, while also being recognized for its medicinal properties. Beyond its culinary appeal, papaya has garnered significant attention from researchers and health enthusiasts alike due to its rich nutrient profile and potential health-promoting effects. It is loaded with antioxidants that can reduce inflammation, fight disease, and help keep you looking young. This can also lower cholesterol and reduce your risk for heart disease, high blood pressure, and stroke.

Chip comes from an Old English word, cipp ("a small piece of wood"). Crisp comes from a Latin word that means "curly". The word candy comes from the Persian word qandi, but experts know candy itself is much older than the ancient Persians. Defining candy as any confection made with sugar, honey, or another sweetener, experts have identified manuscripts that depict candies from ancient Egypt. Dried fruit is fruit that has had almost all of the water content removed through drying methods. The fruit shrinks during this process, leaving a small, energy-dense dried fruit. Raisins are the most common type, followed by dates, prunes, figs and apricots. This research aims to investigate the importance and nutrient content of papaya with a focus on its potential health benefits and applications in dietary and medicinal contexts. Through a comprehensive review of existing literature and scientific evidence, this study seeks to shed light on the diverse array of nutrients found in papaya, their biological effects on human health, and the implications for disease prevention and management. This study explores the potential of incorporating enhanced papaya flavor into confectionary snack chips, candy, and dried fruits. The research aims to tackle critical Sustainable Development Goals (SDGs) by creating new income opportunities for farmers, raising nutritional awareness, and offering healthier snack choices. By utilizing the distinct taste profile of papaya and innovative processing methods, this investigation seeks to develop a variety of delectable and nutritious confectionary products that cater to a broad consumer base. The increasing global demand for confectionary snacks, fueled by urbanization, evolving lifestyles, and rising disposable incomes, presents challenges. Many traditional confectionary items are high in sugar and processed components, posing health risks. Additionally, heavy reliance on imported

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ingredients in the confectionary industry creates supply chain vulnerabilities and restricts local producers' economic prospects. This research project has substantial potential to contribute to sustainable development by addressing key SDGs. By exploring papaya's potential as a pivotal ingredient in confectionary snacks, this study aims to create a mutually beneficial scenario for consumers, farmers, and the broader economy. The development of tasty and nourishing confectionary snack chips, candy and dried fruit products with enhanced papaya flavor will not only meet consumer demands but also promote healthy eating habits and endorse sustainable agricultural practices.

II. Materials and Methods

The following are the tools, equipment and ingredients used during the conduct of the study.

Table 1. List of Tools and Equipment

Preparatory Tools	Measuring Tools	Mixing Tools	Cutting Tools	Cooking Tools	Equipment
Flour sifter	Measuring spoons and cups	Mixing bowl	Chopping board	Gas Range	Food Processor
Rolling pin	Weighing Scale	Wooden spoon	Knife	Frying pan	Dehydrator
Frying pan			Dough cutter	Cooking pot	
Grater			Peller	Casserole	
Tray				Ladle	

Table 2. The Proportion of Ingredients

Papaya Chips		Papaya Candy		Papaya Dried Fruits	
Ingredients	Measurement	Ingredients	Measurement	Ingredients	Measurement
Raw Papaya	300 grams	Grated papaya	1840 grams	Ripe papaya	1234 grams
Onion chives	50 grams	Water	1182 grams	White sugar	440 grams
Chicken broth	454 grams	Brown sugar	220 grams	Water	709 grams
All purpose flour	360 grams	Honey	336 grams		
Cornstarch	160 grams	Calamansi	85.04 grams		
Margarine	30 grams	Glucose	43.6 grams		
Cream and sour and onion flavor	240 grams				

Developmental Procedures

In order to perform the research properly, the flowchart of the procedures in making papaya as snack chips, candy and dried fruit.

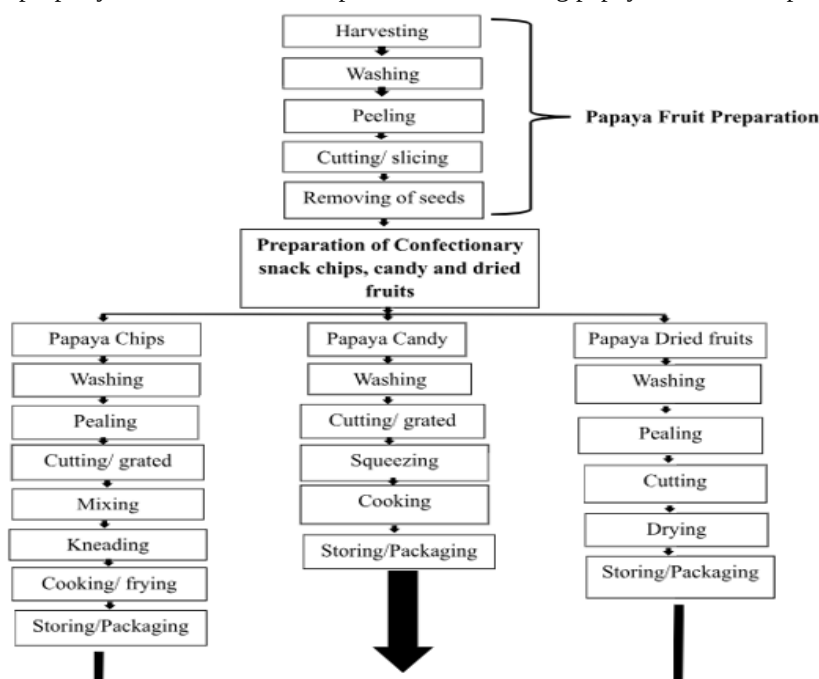


Figure 1. Flow of Diagram of Papaya Confectioners Snack Chips, Candy and Dried Fruit

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Sensory Evaluation

A written permission to conduct the study through sensory evaluation was requested, the developed food products were subjected to sensorial evaluation as to aroma, color, taste, and texture. The forty 40 evaluators perceived by the group of respondents of 10 children, 10 teenager, 10 adults, and 10 Food Experts/ Food Technology Teachers.

The instrument used for the data gathering was a sensory evaluation form using quantitative analysis method in determining the acceptability of the product. The responses as to the level of exploring papaya processing method for enhanced flavor and nutrition in confectionary, snack chips, candy and dried fruits.

The sensorial evaluation used the Likert scale below:

Scale	Numerical Rating	Qualitative Description	Qualitative Interpretation
5	4.20–5.00	Strongly Agree	Like Extremely
4	3.40–4.19	Agree	Like Very Much
3	2.60–3.39	Moderately Agree	Like
2	1.80–2.59	Disagree	Slightly Like
1	1.00–1.79	Strongly Disagree	Dislike

Statistical Tool Used

All data were gathered from the questionnaire/evaluation form given to the evaluators. The variables were analyzed and interpreted based on the output of the Statistical Package for Social Science (SPSS)Software.

1. **Mean (M) and Standard Deviation.** These tools were utilized to gauge the level of exploring papaya processing method for enhanced flavor and nutrition in snack chips, candy and dried fruits as to respondents' groups and also to determine the level of acceptability of the product in terms of appearance, aroma, taste, and texture.
2. **Analysis of Variance (ANOVA) or F-Test.** This was utilized to determine the difference in the general acceptability of the papaya fruit products across the different groups.

Product Evaluation

Table 3. Level of Acceptability of Papaya Fruit as Snack Chips in Terms of Appearance

Evaluation Criteria	Mean	Sd	Description
Appearance/Color			
The confection has a vibrant color, indicating the presence of papaya.	4.45	0.5970	Like Extremely
Each piece is perfectly shaped, and consistent in size.	4.15	0.7355	Like Very Much
The surface has a delicate appearance that enhances its visual appeal.	4.53	0.6400	Like Extremely
Upon closer inspection, the delicate texture of the confection is noticeable.	4.48	0.6320	Like Extremely
The confection is eye- catching and/or visually appealing.	4.60	0.6325	Like Extremely
Overall Mean	4.44	0.4966	Like Extremely
Aroma			
The citrusy aroma of Papaya is very distinctive.	4.25	0.8086	Like Extremely
It has sour fragrance that is inviting and pleasant.	4.08	0.8286	
The overall aroma is complex, with layers of sourness.	4.30	0.7910	Like Extremely
Overall Mean	4.21	0.6781	Like Extremely
Taste			
The sour cream and onion flavor of the confection is pleasurable.	4.55	0.5524	Like Extremely
The taste notes of Papaya is distinct and refreshing.	4.43	0.6360	Like Extremely
Every bite of this snack is flavored by its sourness.	4.23	0.8002	Like Extremely
Overall Mean	4.40	0.4665	Like Extremely
Texture			
There is a slight graininess from the snack chips, adding a nice textural contrast.	4.43	0.5943	Like Extremely
The confection is pleasantly have a crunchiness, offering a satisfying bite.	4.80	0.4641	Like Extremely
Overall, the mouth feel is luxurious and indulgent, with a lingering sourness and crunchiness flavor.	4.58	0.5943	Like Extremely
Overall Mean	4.60	0.4079	Like Extremely

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As shown in the table, having the highest overall mean of 4.60, the respondents like extremely the texture of the Papaya Fruit Snack Chips, with the sour cream and onion flavor and distinct papaya notes being particularly favored. Despite getting the lowest overall mean of 4.21, the respondents still like extremely the aroma of the papaya fruit snack chips, particularly the distinctive citrusy notes.

Table 4. Level of Acceptability of Papaya Fruit as Candy in Terms of Appearance, Aroma, Taste, and Texture

Evaluation Criteria	Mean	Sd	Description
Appearance/Color			
The confection has a vibrant color, indicating the presence of papaya.	4.20	0.7579	Like Extremely
Each piece is perfectly shaped, coated with sugar and consistent size.	4.20	0.7579	Like Extremely
The surface has a delicate appearance that enhances its visual appeal.	4.23	0.7675	Like Extremely
Upon closer inspection, the delicate texture of the confection is noticeable.	4.20	0.8829	Like Extremely
The confection is eye- catching and/or visually appealing.	4.28	0.8469	Like Extremely
Overall Mean	4.22	0.6338	Like Extremely
Aroma			
The citrusy aroma of Papaya is very distinctive.	4.25	0.7763	Like Extremely
There's sweet fragrance that is inviting and pleasant.	4.28	0.7506	Like Extremely
The aroma carries hints of creaminess, reminiscent of dairy- based desserts.	4.28	0.8161	Like Extremely
The overall aroma is complex, with layers of citrus, and sweet notes.	4.40	0.6718	Like Extremely
Overall Mean	4.30	0.6284	Like Extremely
Taste			
The sweetness of the confection is pleasurable.	4.43	0.6751	Like Extremely
The taste notes of Papaya is distinct and refreshing.	4.20	0.7232	Like Extremely
Every bite of this dessert is flavored by its sweetness.	4.45	0.7143	Like Extremely
Overall Mean	4.36	0.6010	Like Extremely
Texture			
The surface of the confection is smooth and velvety to touch.	3.93	0.9443	Like Very Much
The interior of the confection has a creamy texture and melts in the mouth.	4.00	0.8771	Like Very Much
There is a slight graininess from the papaya candy, adding a nice textural contrast.	4.03	0.8002	Like Very Much
The confection is pleasantly chewy, offering a satisfying bite.	4.48	0.7506	Like Extremely
Overall, the mouth feel is luxurious and indulgent, with a lingering sweetness.	4.43	0.7120	Like Extremely
Overall Mean	4.17	0.6572	Like Very Much

As exhibited in the table, the respondents like extremely the taste of the papaya fruit candy, particularly its sweetness and distinct papaya notes having the highest mean score of 4.36. Contrariwise, the texture was liked very much by the respondents with an overall mean of 4.17 indicating that the respondents highly appreciate the texture of the papaya fruit candy particularly the creamy, chewy, and indulgent aspect.

Table 5. Level of Acceptability of Dried Papaya Fruit in Terms of Appearance, Aroma, Taste, and Texture

Evaluation Criteria	Mean	Sd	Description
Appearance/Color			
The confection has a vibrant color, indicating the presence of papaya.	4.70	0.5639	Like Etremely
Each piece is perfectly shaped, coated with sugar and consistent size.	4.25	0.7071	Like Etremely
The surface has a delicate appearance that enhances its visual appeal.	4.30	0.7232	Like Etremely
Upon closer inspection, the delicate texture of the confection is noticeable.	4.30	0.7579	Like Etremely
The confection is eye- catching and/or visually appealing.	4.50	0.6405	Like Etremely
Overall Mean	4.51	0.5728	Like Etremely
Aroma			
The juicy and sweet aroma of Papaya dried fruit is very distinctive.	4.20	0.8227	Like Etremely
There's sweet fragrance that is inviting and pleasant.	4.03	0.8002	Like Very Much

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The aroma carries hints of sweetness, reminiscent of confectioners.	4.25	0.8336	Like Etremely
The overall aroma is complex, with layers of juicy, and sweet notes.	4.25	0.8086	Like Etremely
Overall Mean	4.16	0.6763	Like Very Much
Taste			
The sweetness of the confection is pleasurable.	4.38	0.6675	Like Etremely
The taste notes of Papaya is distinct and refreshing.	4.20	0.8228	Like Etremely
Every bite of this dessert is flavored by its sweetness.	4.28	0.8161	Like Etremely
Overall Mean	4.28	0.6295	Like Etremely
Texture			
The surface of the confection is smooth and velvety to touch.	3.63	0.8969	Like Etremely
The interior of the confection has a chewy texture and melts in the mouth.	3.55	1.0115	Like Etremely
There is a slight graininess from the dried fruit, adding a nice textural contrast.	3.88	0.9388	Like Etremely
The confection is pleasantly chewy, offering a satisfying bite.	3.88	1.1365	Like Etremely
Overall, the mouth feel is luxurious and indulgent, with a lingering sweetness. .	4.18	0.8639	Like Very Much
Overall Mean	3.82	0..8495	Like Very Much

As displayed in the table, with the highest overall mean score of 4.51, the respondents highly appreciate the appearance and color aspects of the Dried Papaya Fruit indicating that the overall visual appeal and eye-catching nature of the confection are extremely favored. On the other hand, the respondents gave an overall mean score of 3.82 to the texture of dried papaya fruit. This suggests that the respondents like extremely the texture of the product particularly the chewiness. Slight graininess, and luxurius mouthfeel.

Table 6. General Level of Acceptability of Papaya Fruit as Snack Chip, Candy, and Dried Fruit as Evaluated by the Children in Terms of Appearance,Aroma, Taste, and Texture

<i>Product</i>		Mean	Sd	Description
Snack Chips	Appearance/Color	4.62	0.4264	Like Extremely
	Aroma	4.63	0.3986	Like Extremely
	Taste	4.57	0.4179	Like Extremely
	Texture	4.67	0.3147	Like Extremely
Overall Mean		4.61	0.2551	Like Extremely
Candy	Appearance/Color	4.54	0.2675	Like Extremely
	Aroma	4.68	0.1687	Like Extremely
	Taste	4.73	0.2637	Like Extremely
	Texture	4.34	0.4993	Like Extremely
Overall Mean		4.49	0.2338	Like Extremely
Dried Fruits	Appearance/Color	4.64	0.3627	Like Extremely
	Aroma	4.55	0.2297	Like Extremely
	Taste	4.73	0.2629	Like Extremely
	Texture	4.44	0.3373	Like Extremely
Overall Mean		4.59	0.1856	Like Extremely

As presented in the table, generally, all three categories (Snack Chips, Candy, and Dried Fruits) received high ratings across appearance, aroma, taste, and texture, with means ranging mostly between 4.34 to 4.73, indicating that children liked these aspects of Papaya fruit across different forms.

Table 7. General Level of Acceptability of Papaya Fruit as Snack Chip, Candy, and Dried Fruit as Evaluated by the Teenagers in Terms of Appearance, Aroma, Taste, and Texture

<i>Product</i>		Mean	Sd	Description
Snack Chips	Appearance/Color	4.58	0.3938	Like Extremely
	Aroma	4.13	0.8054	Like Very Much
	Taste	4.23	0.5676	Like Extremely
	Texture	4.63	0.3323	Like Extremely

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Overall Mean		4.39	0.3949	Like Extremely
	Appearance/Color	4.32	0.7786	Like Extremely
	Aroma	4.43	0.4091	Like Extremely
Candy	Taste	4.53	0.5035	Like Extremely
	Texture	4.36	0.7444	Like Extremely
Overall Mean		4.41	0.5485	Like Extremely
	Appearance/Color	4.46	0.6467	Like Extremely
	Aroma	4.30	0.5986	Like Extremely
Dried Fruits	Taste	4.30	0.6176	Like Extremely
	Texture	3.72	1.1003	Like Extremely
Overall Mean		4.20	0.6827	Like Extremely

Generally, all three categories, Snack Chips, Candy, and Dried Fruits, received high mean ratings for taste, with means ranging from 4.23 to 4.53. This indicates that teenagers generally found the taste of Papaya fruit in snack form to be enjoyable across all categories. Further, data indicate that teenagers generally enjoy the taste of Papaya Fruit snacks across Snack Chips, Candy, and Dried Fruits. Candy form seems to be slightly preferred in terms of taste, but all forms received high ratings, highlighting the overall acceptability of Papaya fruit as a tasty snack option for teenagers.

Table 8. General Level of Acceptability of Papaya Fruit as Snack Chip, Candy, and Dried Fruit as Evaluated by the Adults in Terms of Appearance, Aroma, Taste, and Texture

<i>Product</i>		Mean	Sd	Description
	Appearance/Color	4.34	0.4115	Like Extremely
	Aroma	4.30	0.5764	Like Extremely
Snack Chips	Taste	4.53	0.2352	Like Extremely
	Texture	4.67	0.4442	Like Extremely
Overall Mean		4.46	0.2835	Like Extremely
	Appearance/Color	4.10	0.5354	Like Very Much
	Aroma	4.18	0.8084	Like Very Much
Candy	Taste	4.10	0.5219	Like Very Much
	Texture	4.02	0.5371	Like Very Much
Overall Mean		4.10	0.5242	Like Very Much
	Appearance/Color	4.48	0.4442	Like Extremely
	Aroma	3.98	0.6861	Like Very Much
Dried Fruits	Taste	4.13	0.4766	Like Very Much
	Texture	3.80	0.5812	Like Very Much
Overall Mean		4.10	0.4220	Like Very Much

The high overall acceptability ratings suggest that Papaya Fruit snacks are well-liked by adults across various sensory attributes. The data indicate that Papaya fruit snacks are generally well-accepted by adults in terms of appearance, aroma, taste, and texture across Snack Chips, Candy, and Dried Fruits. Snack Chips tend to excel in taste and texture, while Dried Fruits are appreciated for appearance despite slightly lower aroma ratings. Candy form, while also well-liked, shows slightly lower ratings in comparison to Snack Chips and Dried Fruits.

Table 9. General Level of Acceptability of Papaya Fruit as Snack Chip, Candy, and Dried Fruit as Evaluated by the Food Experts in Terms of Appearance, Aroma, Taste, and Texture

<i>Product</i>		Mean	Sd	Description
	Appearance/Color	4.22	0.6630	Like Extremely
	Aroma	3.77	0.6478	Like Very Much
Snack Chips	Taste	4.27	0.5390	Like Extremely
	Texture	4.43	0.5217	Like Extremely
Overall Mean		4.17	0.4945	Like Very Much
	Appearance/Color	3.92	0.7315	Like Very Much
	Aroma	3.93	0.7173	Like Very Much
Candy	Taste	4.07	0.7831	Like Very Much
	Texture	3.96	0.7763	Like Very Much
Overall Mean		3.97	0.6852	Like Very Much

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Dried Fruits	Appearance/Color	4.06	0.6867	Like Very Much
	Aroma	3.80	0.8563	Like Very Much
	Taste	3.97	0.8233	Like Very Much
	Texture	3.32	0.8651	Like
Overall Mean		3.78	0.7154	Like

As shown in the table, all three categories, Snack Chips, Candy, and Dried Fruits, received positive mean ratings for overall acceptability among food experts, with overall means ranging from 3.78 to 4.17. Snack Chips had the highest overall mean of 4.17, while the Dried Fruits got the lowest overall mean score of 3.78, indicating that food experts generally found Snack Chips and Candy more acceptable compared to Dried Fruits.

Table 10. Comparison on the General Level of Acceptability of Papaya Fruit as Snack Chips, Candy, and Dried Fruits in Terms of Appearance, Aroma, Taste, and Texture as Perceived by the Different Groups of Respondents

Product	Criteria	F-Value	p-Value	Decision	Remarks
Snack Chips	Appearance/Color	1.5564	0.2168	Accept H_0	Not Significant
	Aroma	3.3325	0.0301	Reject H_0	Significant
	Taste	1.4413	0.2469	Accept H_0	Not Significant
	Texture	0.7428	0.5336	Accept H_0	Not Significant
Candy	Appearance/Color	2.0280	0.1278	Accept H_0	Not Significant
	Aroma	3.0550	0.0407	Reject H_0	Significant
	Taste	3.5658	0.0234	Reject H_0	Significant
	Texture	1.0170	0.38965	Accept H_0	Not Significant
Dried Fruits	Appearance/Color	2.000	0.1314	Accept H_0	Not Significant
	Aroma	2.7799	0.0550	Accept H_0	Not Significant
	Taste	3.2022	0.0346	Reject H_0	Significant
	Texture	3.5664	0.0234	Reject H_0	Significant

In conclusion, while texture and appearance/color generally do not significantly differentiate preferences among Snack Chips, Candy, and Dried Fruits made from Papaya fruit, aroma and taste are critical factors that influence how these snacks are perceived and preferred by different groups of respondents.

CONCLUSION

Based on the findings of the study, the Texture and Appearance/Color generally does not significantly differentiate the preferences among Snack Chips, Candy, and Dried Fruits made from Papaya. Aroma and Taste are critical factors that influence how these snacks are perceived and preferred by different groups of respondents. Furthermore, the storage conditions of the papaya snack chips, candy and dried can be stored in the packaging for about 14 days at room temperature. For best results within the first week and store in an alright container to keep freshness. The papaya candy started to change slightly in color and shape on the 14th day of observation. Overall, across all categories (Snack Chips, Candy, and Dried Fruits), there are significant differences in how respondents perceive the Aroma and Taste of Papaya fruit snacks. This indicates that these attributes play a crucial role in distinguishing preferences among the different forms of Papaya fruit snacks. Also, the differences in perception regarding Texture and Appearance/Color are not as pronounced, with many comparisons showing no significant differences. This suggests that Texture and Appearance/Color may be less influential factors compared to Aroma and Taste in determining preferences among Papaya fruit snack forms. In conclusion, while Texture and Appearance/Color generally do not significantly differentiate preferences among Snack Chips, Candy, and Dried Fruits made from Papaya Fruit, Aroma and Taste are critical factors that influence how these snacks are perceived and preferred by different groups of respondents.

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RECOMMENDATIONS

In the light of the foregoing findings and conclusion, the researcher recommends the following:

1. The food expert, teenagers and adult are encouraged to optimize the process for making snack chips, candy and dried fruits to ensure efficiency and consistency in production.
2. Provide information on packaging about the nutritional benefits and unique flavor of products made with papaya. This can help in building consumer awareness and appreciation for these ingredients.
3. Include serving suggestions and pairing ideas on packaging or in marketing materials to enhance the consumer experience and encourage the use of these products in various settings.
4. Regularly conduct market research to gather feedback from consumers about their preferences and perceptions.
5. Researcher may consider to explore making other food products using the same raw ingredients.
6. Further research is needed to improve the products storage to lessen the moisture content.
7. Develop standardized recipes for snack chips, candy and dried fruits using papaya to ensure efficiency and consistency in production.

REFERENCES

- 1) Agarwal, G. and Mangaraj, S. (2005) Studies on Physico-Chemical Changes in Selected Fruits during Storage. *Beve-rage and Food World*, 32, 72-75.
- 2) Armando, H. J., Luceño, M., Chu, F. C., & Almajar, I. A., Jr. (2023, June 1). *The acceptability of the combined Ripe Papaya (Carica papaya linneaus) Horseradish Tree (moringa oleifera lamoureux) leaves as jam*. BAHÁNDÌAN, Institutional Repository of Central Philippine University.
- 3) Business News, Research, Updates. (2024, March 5). *Dried Fruit and Vegetable Snack Market Trends and Growth Perspectives: Top Key players Analysis for 2032*. <https://www.linkedin.com/pulse/dried-fruit-vegetable-snack-market-trends-9betc>
- 4) Chavan, U. D., et al. (2019). Development and Nutritional Evaluation of Papaya-Based Snacks. *International Journal of Food Science*, 54(1), 45-53.
- 5) Cruz, R. M., Albertos, I., Romero, J., Agriopoulou, S., & Varzakas, T. (2024). Innovations in food packaging for a sustainable and circular economy. In *Advances in food and nutrition research* (pp. 135–177). <https://doi.org/10.1016/bs.afnr.2023.10.003>
- 6) Devi P S, Sreeja & Kumar, Neethu (2017). The surprising health benefits of papaya seeds: A review.
- 7) Fabian, B., Ermakova, T., Junghanns, P. : Collaborative and secure sharing of healthcare data in multi-clouds. *Information Systems* 48, 132–150 (2015). 10.1016/j.is.2014.05.004 [CrossRef] [Google Scholar]
- 8) Hernandez, M., & Garcia, R. (2021). Consumer Acceptability of Seasoned Papaya Chips. *Journal of Food Products Marketing*, 27(4), 315-330.
- 9) Johnson, K., et al. (2022). Market Trends and Consumer Preferences for Dried Fruits and Fruit-Based Snacks. *Food Industry Insights*, 40(6), 543-560.
- 10) Khatun, H., Jahan, N., Hosain, M., Mardy, T., & Rahman, S. (2016). Effect of papaya and storage time on the quality of the newly developed papaya crackers. *Journal of Experimental Biology and Agricultural Sciences*, 4(2), 194–200. [https://doi.org/10.18006/2016.4\(2\).194.200](https://doi.org/10.18006/2016.4(2).194.200)
- 11) Kumar, P., & Anuradha, N. (2018). Shelf Life Extension of Papaya Candy Using Natural Preservatives. *Food Preservation Science*, 25(2), 100-110.
- 12) LeBail A, Boillereaux L, Davenel A, Hayert M, Lucas T, Monteau JY. 2003. Phase transition in foods: effect of pressure and methods to assess or control phase transition. *Innov Food Sci Emerg Technol* 4:15–24.
- 13) Li, X., & Wang, Y. (2020). Nutritional Impact of Drying Techniques on Papaya. *Journal of Agricultural and Food Chemistry*, 68(12), 3567-3575.
- 14) Madani, R., et al. (2016). Nutritional and Sensory Analysis of Papaya Candy. *Journal of Food Science and Technology*, 53(3), 1405-1412. https://www.researchgate.net/publication/304364314_Sensory_Evaluation_and_Nutritional_Composition_of_Developed_Papaya-Gooseberry_Jam
- 15) Ministry of Health & Government of Chile (2016) Food Law <http://www.minsal.cl/reglamento-de-la-ley-de-etiquetado-de-alimentos-introduccion/> (accessed October 2016).
- 16) Patel, H., et al. (2017). Effect of Drying Methods on the Quality of Dried Papaya. *Drying Technology*, 35(10), 1256-1264.
- 17) Radojčin, M., Pavkov, I., Kovačević, D. B., Putnik, P., Wiktor, A., Stamenković, Z., Kešelj, K., & Gere, A. (2021). Effect of selected drying methods and emerging drying intensification technologies on the quality of dried fruit: a review. *Processes*, 9(1), 132. <https://doi.org/10.3390/pr9010132>.

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- 18) Reis, R. C., De Souza Viana, E., Da Silva, S. C. S., De Oliveira Mamede, M. E., & Da Silva Araújo, Í. M. (2018). Stability and sensory quality of dried papaya. *Food and Nutrition Sciences*, 09(05), 489–501. <https://doi.org/10.4236/fns.2018.95038>.
- 19) Rivera JÁ, de Cossío TG, Pedraza LS, Aburto TC, Sánchez TG, Martorell R. Childhood and adolescent overweight and obesity in Latin America: a systematic review. *Lancet Diabetes Endocrinol*. 2014;2:321–332. - PubMed
- 20) Silva, J.d.; Rashid, Z.; Nhut, D.T.; Sivakumar, D.; Gera, A.; Souza, M.T.; Tennant, P. Papaya (*carica papaya* l.) biology and bio-technology. *Tree For. Sci. Biotechnol*. 2007, 1, 47–73 <https://biologyandbio-technology.treeforsci>.
- 21) Smith, J., & Lee, D. (2023). Sustainability in Packaging for Dried Fruit Snacks. *Sustainable Food Packaging*, 19(1), 20–30.
- 22) TM Singo & D. Beswa (2019) Effect of roselle extracts on the selected quality characteristics of ice cream, *International Journal of Food Properties*, 22:1, 42
- 23) Verma, N. K. (2014). A brief study on *Carica Papaya*- a review. *ResearchGate*. *A_Brief_Study_on_Carica_Papaya-_A_Review* <https://www.researchgate.net/publication/307904829>
- 24) Yoshikawa, T., Toyokuni, S., Yamamoto, Y. and Naito, Y. (2000) *Free Radicals in Chemistry Biology and Medicine*. OICA International, London