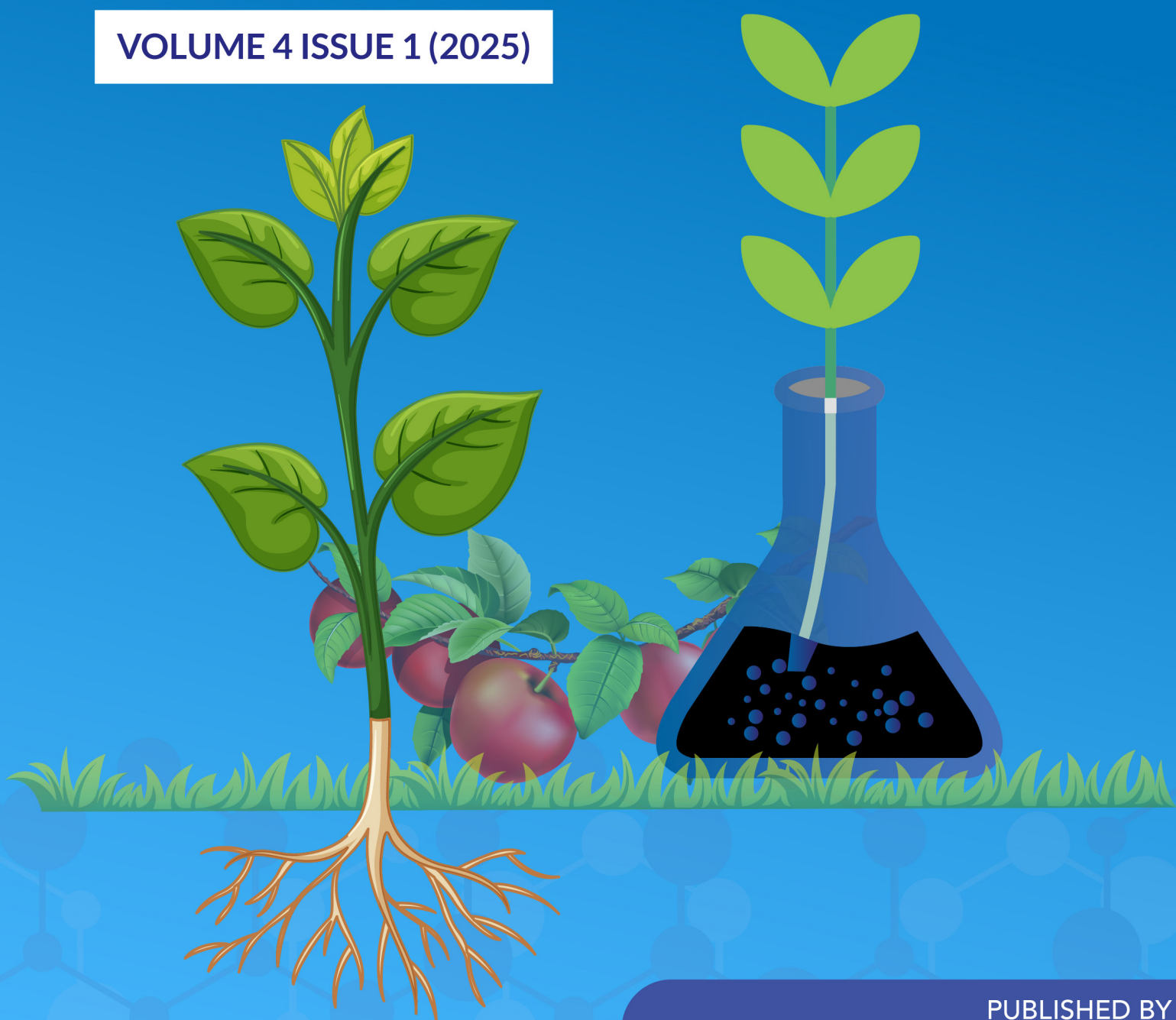




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TropiCrisps: LangKamote Chips (Jackfruit & Sweet Potato Fusion)

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ABSTRACT

This research investigates the idea behind “TropiCrisps: Langkamote Chips,” a novel snack that creatively uses jackfruit as the main flavor and combines it with sweet potato being very nutritious. It seeks to enhance healthy snack consumption and sustainable practices. To do this, the product uses modern technologies such as blast freezing and vacuum frying to retain important nutritional profiles and improve shelf life. The study conducted several rounds of tests, sensory testing, proximate testing, and microbiology testing in product formulation to guarantee product safety. Findings from the sensory studies showed that the acceptable level of jackfruit chips was achieved in the third trial, while the second trial had better sweet potato chips accepted. Proximate analysis showed low moisture movement in the jackfruit chips, which played a role in the crispness and longevity of the product compared to the sweet potato chips. FDA microbial limits were achieved on both types. Another alternative, this study meets with the UN Sustainable Development Goals (UN SDGs) in terms of encouraging responsible and sustainable food management through the use of locally sourced ingredients. Traditional culinary practices paired with the most up-to-date processes in food technology present “TropiCrisps: Langkamote Chips” as a healthy, green alternative to conventional munchies. Further studies will be conducted to check the shelf of the product at several conditions in order to ensure the quality of the product and improve future formulas. This study shows how indigenous nutrition can contribute to the designing of new snacks in the Philippines without compromising the health of its citizens or the integrity of the ecosystem.

INTRODUCTION

The combination of tropical flavors and nutrient-rich root vegetables represents an untapped frontier in snack innovation (Kalahal *et al.*, 2024). This gap creates an opportunity for ground-breaking advances in the snack industry. Journey into “TropiCrisps: LangKamote Chips”, a ground-breaking product development initiative set to transform the snacking landscape.

The jackfruit, known for its sweet and aromatic flavor profile, is a tropical fruit rich in dietary fiber, vitamins, and minerals (Swami & Kalse, 2018). Its unique texture and taste make it an ideal candidate for culinary experimentation, yet its incorporation into snack foods remains limited. Sweet potatoes, on the other hand, are nutrient powerhouses, packed with antioxidants, vitamins, and minerals (Wang *et al.*, 2016). With their natural sweetness and satisfying crunch when thinly sliced and baked, sweet potatoes offer both flavor and nutritional benefits to snack enthusiasts.

“TropiCrisps: LangKamote Chips” combines the exotic allure of jackfruit with the wholesome goodness of sweet potatoes, creating a tantalizing flavor experience unlike any other. Beyond mere taste, this innovative fusion embodies a significant contribution to the diversification and enrichment of the snack market, offering consumers a healthier alternative to traditional potato chips. Moreover, the creation of “TropiCrisps: LangKamote Chips” aligns seamlessly with the United

Nations Sustainable Development Goals (UN SDGs). By promoting the use of sustainably sourced ingredients and encouraging responsible consumption practices, this product supports the goals of sustainable agriculture, responsible consumption, and health and well-being (United Nations, 2020).

Through this study, the researchers embarked on a journey to explore the research, development of “TropiCrisps: LangKamote Chips”, unveiling its potential to reshape both the snacking industry and the pursuit of global sustainability.

LITERATURE REVIEW

The vast culinary culture of the Philippines is influenced by local fruits and root crops which include langka known as jackfruit and kamote better known as sweet potatoes that are used in both sweet and savory dishes (Guiriba, 2019). Jackfruit for instance has a sweet-fragrant taste, thus used widely in making sweet dishes like minatamis na langka as well as in cooking savory foods such as coconut milk with jackfruit. In the same manner, sweet potatoes are also quite the flexible ingredient appearing in foods such as kamote cue sold in roadsides and in traditional desserts which include ube halaya and ginataang bilo-bilo which is a dish where sweet potatoes and jackfruit are served with milk filling; thus a mouthwatering sauce. While there are many of these ingredients available for snacking, the native cooked snacks in the Philippines shelf

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are significantly lesser in quantity than other more popular or imported snacks in the Philippines, thus the, accept failure to see how these local crops can be used in giving rise to healthy creative snacking alternatives. Although this has always been interpreted with the absence of ensuring the value addition of the local tropical fruits and roots in new foods, the reverse is happening.

However, the snack market in the Philippines predominantly featured imported or processed snacks, often lacking the nutritional benefits of locally sourced ingredients (USDAFAS, 2024). This presented a gap in the market and an opportunity for the development of innovative snack products that celebrated the country's rich biodiversity while promoting health and wellness.

Addressing this gap, the proposed study aimed to explore the feasibility and consumer acceptance of "TropiCrisps: LangKamote Chips" within the Philippine context. By leveraging the unique flavors and nutritional benefits of jackfruit and sweet potatoes, this innovative snack offering had the potential to resonate deeply with Filipino consumers, tapping into their cultural appreciation for local ingredients and their growing interest in healthier snack options.

To ensure that "TropiCrisps: LangKamote Chips" maintained their nutritional content and remained healthy, the product utilized advanced technology in blast freezing and vacuum frying. Blast freezing preserved the natural flavors and nutrients of the jackfruit and sweet potatoes (University of Minnesota Extension, n.d.), while vacuum frying minimized the use of oil and reduced the formation of harmful compounds (Belkova *et al.*, 2019), resulting in a healthier snack option without compromising taste or texture. Moreover, the development of "TropiCrisps: LangKamote Chips" aligned with the Philippines' commitment to achieving the United Nations Sustainable Development Goals (UN SDGs), particularly Goal 2 (Zero Hunger), Goal 3 (Good Health and Well-being), and Goal 12 (Responsible Consumption and Production). By promoting the use of locally sourced, sustainably produced ingredients and offering a healthier alternative to traditional snacks, "TropiCrisps: LangKamote Chips" contributed to the country's efforts to build a more sustainable and resilient food system.

Through this study, the researchers sought to shed light on the potential of indigenous ingredients to drive innovation in the snack industry, promote healthier eating habits, and support sustainable development in the Philippines.

MATERIALS AND METHODS

The methodology for developing "TropiCrisps: LangKamote Chips (Jackfruit & Sweet Potato Fusion)" was carried out through several key steps to ensure the creation of a high-quality, nutritious snack product aligned with consumer preferences and sustainability principles.

Local suppliers of jackfruit and sweet potatoes were identified to procure fresh, high-quality ingredients,

fostering partnerships with farmers and agricultural cooperatives to promote sustainable sourcing practices. Recipe development proceeded through sensory evaluations and taste tests, optimizing flavor combinations, ingredient ratios, and texture using food science techniques, while considering Filipino tastes and preferences.

Prototyping of "TropiCrisps: LangKamote Chips" involved small-scale production trials, employing blast freezing and vacuum frying technologies to preserve nutritional content and enhance shelf stability. Nutritional analysis was conducted to compare the product's nutritional profile with traditional snacks, highlighting its health benefits.

Consumer acceptance studies gauged sensory attributes, taste preferences, and purchase intent among target demographics through surveys, focus groups, and taste panels. Market testing, in collaboration with retailers and foodservice establishments, assessed consumer feedback and sales performance, guiding product refinement.

A sustainability assessment evaluated environmental impact and social responsibility initiatives across the product lifecycle. Continuous improvement efforts focused on refining the formulation, packaging, and marketing strategies based on consumer insights and market trends to ensure the long-term success of "TropiCrisps: LangKamote Chips" in the marketplace.

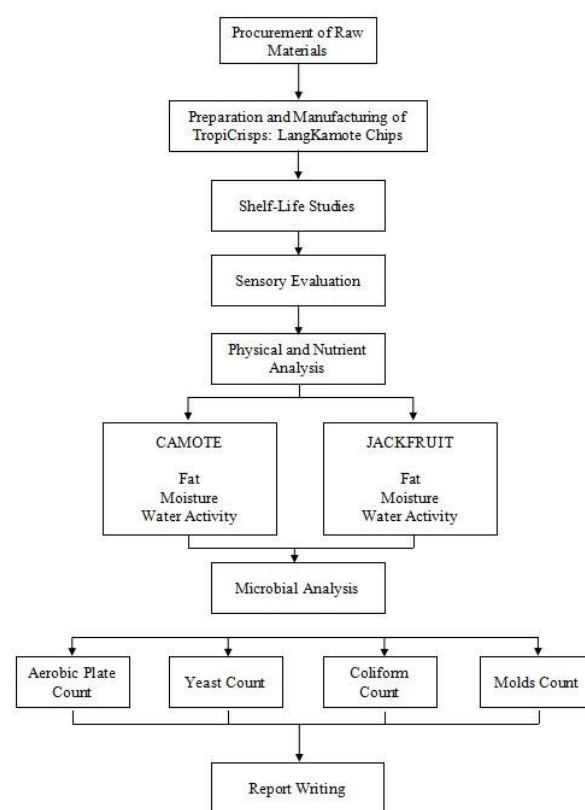


Figure 1: Flowchart for Research Design

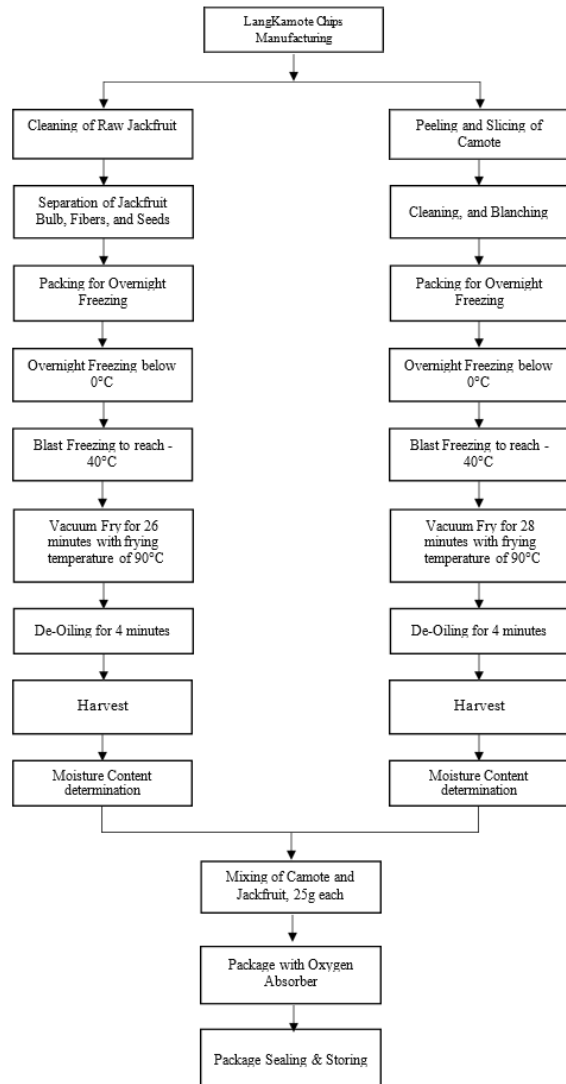


Figure 2: Flowchart for Preparation of “TropiCrisps: LangKamote Chips”

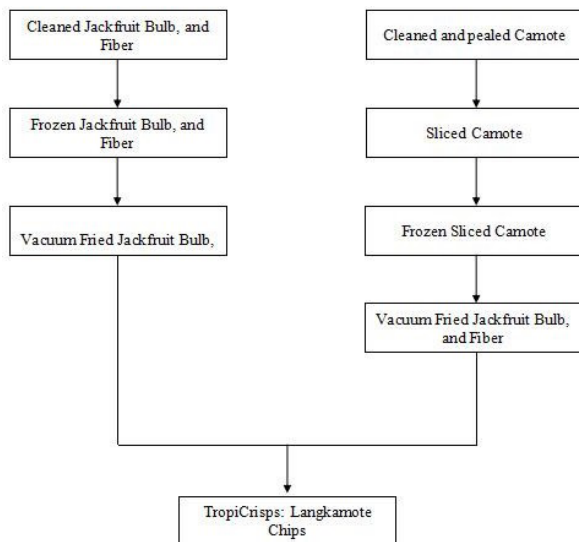


Figure 3: Different stages of “TropiCrisps: LangKamote Chips”

Standardization of the Product

The study aimed to create and establish the ideal combination of jackfruit (langka) and sweet potato (kamote). The resulting product underwent standardization through numerous modifications at the food innovation center, as well as rigorous sensory assessment by analytical testing laboratory technicians. Three distinct trials were developed and then evaluated using organoleptic assessments and a 5-point hedonic scale rating system. The product's formulation was refined and adjusted based on the sensory evaluation results.

Table 1: Composition of Ingredients

Ingredients	Trial 1	Trial 2	Trial 3
Jackfruit	233 g	682 g	470 g
Kamote	390 g	1570g	1328g

The final version of the product was created by incorporating changes suggested by the technical staff at the food innovation center. The resulting “TropiCrisps: LangKamote Chips” underwent sensory evaluation. Among the three trials evaluated, the third version received the highest sensory evaluation rating and was designated as the standard sample.

In the previous testing conducted inside the facility, it was determined that the optimal starting parameters for Frying Tank Temperature (Frying Temperature of the sample) and Pre-Heating Tank Temp (Pre-Heating of oil before transferring to Frying Tank) are 90°C and 110 °C respectively for all the previous experiments and a base of 25 minutes cooking time for 1 Kg sample size. It was also determined that the addition of sample size weight by approximately 1 kg only increases cooking time by 1-2 minutes depending on the material.

A total of 3 Trials were conducted in both Jackfruit and Camote before achieving the preferred results. In Jackfruit the first trial conducted with a cooking time of 25 minutes yielded a result of optimal color, texture, crispiness, and taste proving that the initial parameters are effective. In the 2nd trial, it was determined that increasing the sample size to 3 kg from 1 kg and increasing the time to 28 minutes yielded with darker color and crisper, although it started to develop a burnt taste. In the 3rd trial increasing the 1 Kg sample size from 1 kg to 2 kg and with an increased temperature of 26 minutes, provided the best results in all 3 with optimal color, texture, crisp, and higher sample size for more efficient production.

In the development of Camote Chips, the same as in Jackfruit, with an initial parameter of 90 degrees Celsius of frying temp, and an increased cooking time of 26 minutes due to varying thickness. In the 1st trial, it was determined that it yielded optimal color, although the sample lacked in crisp. In the 2nd trial, by increasing sample size and frying temp, the products produced had more dark color but yielded optimal crispiness. In the 3rd trial, by increasing the frying temperature to 29 minutes to further develop crisp, failed, producing a distinct burn taste. In the result of the 3 trials, it was determined that

Table 2: Summary of vacuum fryer parameters and moisture content

Trial	Fresh weight (g)	Dry Weight(g)	Moisture Content(g)	%Moisture removed	Cooking Time (min)	Frying Tank Temp (°C)	Pre- Heating Tank Temp(°C)
Jackfruit							
1	1000	233	767	76.70	25	90	110
2	3000	682	2318	77.27	28	90	110
3	2000	470	1530	76.50	26	90	110
Sweet Potato							
1	1000	390	610	61.00	26	90	110
2	4000	1570	2430	60.75	28	90	110
3	3479	1328	2151	61.83	29	90	110

the successful parameters were developed in trial 2.

Studies on the Product's Shelf Life

Conducting shelf life studies for “TropiCrisps: LangKamote Chips” is crucial to ascertain its storage stability and overall quality over time. By monitoring the product's shelf life at different storage periods, ranging from initial storage to 15 days, 30 days, and 45 days, we can gain valuable insights into its keeping quality under various conditions. These studies allow us to assess any changes in the physical attributes, nutrient content, and

microbial safety of the product throughout the storage period. Such monitoring is essential for ensuring that “TropiCrisps: LangKamote Chips” maintains its desired characteristics and remains safe for consumption throughout its shelf life. Additionally, understanding the factors that influence the product's shelf life enables us to implement appropriate storage practices and packaging strategies to prolong its freshness and enhance consumer satisfaction.

Sensory Evaluation

Table 3: Mean scores for different organoleptic attributes of "TropiCrisps: LangKamote" samples.

Jackfruit			
Sensory Attributes	Trial 1	Trial 2	Trial 3
Appearance	4	3	5
Color	5	4	5
Taste	5	4	5
Texture	4	4	4
Flavor	5	5	5
Overall acceptability	4.6	4	4.8
Sweet Potato			
Sensory Attributes	Trial 1	Trial 2	Trial 3
Appearance	3	5	4
Color	4	5	4
Taste	4	4	3
Texture	5	5	4
Flavor	5	5	5
Overall acceptability	4.4	4.8	4

Proximate Analysis of the Product

Table 4: Score for standardized "TropiCrisps: LangKamote" samples

Parameters	Jackfruit	Sweet Potato
Moisture (%)	1.18%	4.13%
Water Activity	0.240 aw	0.218 aw
Crude Fat (%)	33.09%	37.34%

Table 5: Microbial Analysis of the product:

Parameters	Jackfruit	Sweet Potato	FDA Standard
Aerobic Plate Count	< 10 ³ cfus/g	< 10 ³ cfus/g	< 10 ⁴ cfus/g
Coliform Count	< 10 ¹ cfus/g	< 10 ¹ cfus/g	< 10 ² cfus/g
Yeast Count	< 10 ¹ cfus/g	< 10 ¹ cfus/g	< 10 ² cfus/g
Molds Count	< 10 ² cfus/g	< 10 ² cfus/g	< 10 ³ cfus/g

CONCLUSIONS

Sensory evaluation of ‘TropiCrisps: LangKamote Chips’ using three trials for each of jackfruit and sweet potato varieties revealed that the third trial for jackfruit scored the highest for all sensory attributes, while for sweet potato chips, trial two was better in terms of appearance, taste, and overall acceptability. Proximate analysis revealed that jackfruit chips had lower moisture content and water activity than sweet potato chips, whereas sweet potato chips had a slightly higher crude fat content. Microbial analysis showed that these two varieties met FDA standard microbial specifications ensuring the safety of the product for consumption.

These results imply that the production process parameters optimal for jackfruit chips and sweet potato chips differ, which makes it necessary for separate trials for each ingredient. The expected fact might have accurately come from the lower moisture and water activity present in jackfruit chips as compared to sweet potato chips, which may lead to crispiness and more shelf-life extension. The microbial analysis aspect assured safety standards for consumers. The successful establishment of the ‘TropiCrisps: LangKamote Chips’ validates the sound use of rigorous testing methods for optimally sensory attributes, nutritional composition, and safety. Going forward, continued research and development and shelf life monitoring will be vital in improving product quality, nutritional composition, and marketing performance in the market.

REFERENCES

- Belkova, B., Hradecký, J., Hurková, K., Forštová, V., Vaclávek, L., & Hajšlová, J. (2018). Impact of vacuum frying on quality of potato crisps and frying oil. *Food Chemistry*, 241, 51-59. <https://doi.org/10.1016/j.foodchem.2017.08.062>
- Guiriba, G. O. (2019). Documentation of Indigenous Knowledge on Production And Post-Harvest Management Of Sweet Potato In The Bicol Region, Philippines. *Journal of Asian Rural Studies*, 3(1), 93.
- Kalahal, S. P., Gavahian, M., & Lin, J. (2024). Development of innovative tigernut-based nutritional snack by extrusion process: effects of die temperature, screw speed, and formulation on physicochemical characteristics. *Quality Assurance and Safety of Crops & Foods*, 16(1), 1–22. <https://doi.org/10.15586/qas.v16i1.1310>
- Swami, S. B., & Kalse, S. K. (2018). Jackfruit (*Artocarpus heterophyllus*): Biodiversity, nutritional contents, and health. In S. K. Kedia, A. Prakash, & G. A. Ravishankar (Eds.), *Bioactive molecules in food* (pp. 87–101). Springer.
- United Nations. (2020). *The Sustainable Development Goals Report 2020*. UN DESA.
- United States Department of Agriculture Foreign Agricultural Service. (2024). *Snack Foods Market Brief - Manila, Philippines* [Report RP2024-0015]. Retrieved from https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Sna%20ck%20Foods%20Market%20Brief_Manila_Philippines_RP2024-0015.pdf
- University of Minnesota Extension. (n.d.). *The science of freezing foods*. Retrieved August 2024, from <https://extension.umn.edu/preserving-and-preparing/science-freezing-foods>
- Wang, S., Nie, S., & Zhu, F. (2016). Chemical constituents and health effects of sweet potato. *Food Research International*, 89(Pt 1), 90–116. <https://doi.org/10.1016/j.foodres.2016.08.032>