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Consumer Acceptability of Langka *(Artocarpus Heterophyllus)* Seed Coffee as a Caffeine-Free Alternative

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ABSTRACT: With increasing awareness of health concerns associated with caffeine consumption, there is a growing demand for caffeine-free coffee alternatives. This study investigates the feasibility and consumer acceptability of roasted Langka (Artocarpus heterophyllus) seed coffee as a caffeine-free beverage. Using sensory evaluation and acceptability testing, the study assessed the taste, aroma, color, and overall impression of Langka seed coffee in comparison to traditional coffee and other caffeine-free alternatives. The findings indicate a generally positive consumer response to Langka seed coffee, particularly among health-conscious individuals and those seeking non-caffeinated options.

KEYWORDS: acceptability, Artocarpus heterophyllus, consumers, caffeine-free beverage, significance

I. INTRODUCTION

Coffee is among the most consumed beverages globally, valued for its energizing effects, distinct aroma, and rich flavor. However, caffeine - the primary stimulant in coffee - can cause negative health effects in sensitive individuals, such as increased heart rate, anxiety, insomnia, and gastrointestinal disturbances (Heckman et al., 2010). This has led to growing interest in caffeine-free alternatives, especially among health-conscious consumers, pregnant women, the elderly, and individuals with heart-related conditions. The search for healthier options has brought attention to plant-based substitutes like chicory root, dandelion, barley, and carob (Niseteo et al., 2012), which mimic the sensory characteristics of coffee without the stimulating effects.

In the Philippines, jackfruit (*Artocarpus heterophyllus*), locally known as *langka*, is widely cultivated for its sweet flesh. The seeds, however, are often discarded as waste despite being rich in starch, protein, and dietary fiber (Swami et al., 2012). Emerging studies suggest that roasted jackfruit seeds can develop a coffee-like aroma and flavor through the Maillard reaction, a chemical process responsible for the browning and flavor development in roasted and baked foods (Nurhidayati & Yunianta, 2017). This makes langka seeds a potential raw material for caffeine-free coffee alternatives.

In a study conducted by Bhardwaj et al. (2015), jackfruit seed flour was found to possess functional properties suitable for food product development, including high water absorption and antioxidant potential. Similarly, Nandini et al. (2020) explored the use of roasted jackfruit seed powder as a coffee substitute and reported a favorable response in sensory trials, especially in terms of color and aroma. These findings support the idea that jackfruit seeds can be repurposed into a viable beverage product.

Despite this promise, there remains a lack of comprehensive studies on consumer acceptability, particularly in the context of Filipino taste preferences. Sensory acceptability—how well consumers receive a product based on taste, aroma, mouthfeel, and appearance—is a key determinant of market success (Stone & Sidel, 2004). According to Kurniawan et al. (2019), local acceptance plays a critical role in the sustainability of food innovation, especially when introducing non-traditional products to habitual consumers.

Utilizing langka seeds also aligns with the zero-waste movement and circular economy initiatives that encourage the full utilization of agricultural resources. As emphasized by FAO (2019), food by-products and waste materials can be transformed into value-added products to address food security, reduce waste, and support sustainable agriculture.

Given the abundance of jackfruit in the Philippines and the limited commercial use of its seeds, there is both a practical and environmental incentive to explore its potential as a beverage base. This study aims to evaluate the consumer acceptability of langka seed coffee by conducting sensory analysis and comparing it with traditional and caffeine-free coffee options. Understanding consumer preferences will be crucial in determining its viability as a healthier and sustainable alternative.

Generally, this study aims to contribute to the growing body of literature on sustainable and health-conscious food innovations. If found acceptable, Langka seed coffee could promote zero-waste food practices and provide a viable alternative to caffeinated drinks. Specifically, it aims to answer the following questions:

1) What are the sensory characteristics (taste, aroma, color, mouthfeel) of Langka seed coffee?
2) How acceptable is Langka seed coffee compared to traditional coffee and other alternatives?
3) What are the perceptions and preferences of consumers regarding its use as a daily beverage?

To evaluate the consumer acceptability of roasted Langka seed coffee as a caffeine-free alternative.

1) To develop a standard method of preparing Langka seed coffee.
2) To conduct sensory evaluation (taste, aroma, color, and overall acceptability).
3) To compare consumer preferences between Langka seed coffee and other alternatives.

II. METHODOLOGY

This chapter of this study present the research methodologies that were employed in the conduct of the study. It includes the research design, local and population of the study, data gathering instrument, data gathering procedure, treatment of data and data analysis in order to rearrange the gathered data.

A. *Research Design*

This study employed a quantitative-experimental design, specifically a sensory evaluation test using a hedonic scale to assess consumer acceptability. It also included comparative testing with traditional coffee and commercial caffeine-free options.

B. Locale and Population of the Study

This study was conducted in Benito Soliven National High School, using purposive sampling, ensuring that each group was proportionally represented. This method allowed the researchers to gather insights from diverse perspectives, especially from those who may be the most interested in caffeine-free coffee substitutes like langka seed coffee. The location was selected due to its proximity to the researchers, availability of jackfruit supply, and the presence of both habitual coffee drinkers and individuals seeking healthier beverage options.

The target population of the study consisted of 60 participants, categorized into three groups to represent various levels of coffee consumption: 20 habitual coffee drinkers – individuals who consume coffee at least once daily and are familiar with its sensory characteristics. 20 occasional coffee drinkers – those who consume coffee less frequently, about 1–3 times a week**.** 20 non-coffee drinkers or health-conscious consumers – individuals who avoid caffeine for medical, lifestyle, or personal reasons and are open to trying caffeine-free alternatives. All participants were aged between 18 and 60 years old, and informed consent was obtained before their involvement in the sensory evaluation and survey. The locale's mix of students, professionals, and retirees provided a well-rounded consumer base for evaluating the product's acceptability in the broader community.

C. Data Gathering Instrument

To assess the consumer acceptability of langka (Artocarpus heterophyllus) seed coffee, the study utilized a sensory evaluation score sheet based on a 5-point hedonic scale. The instrument allowed the respondents to rate the product based on key sensory attributes such as aroma, taste, color, and overall acceptability, with the following scale:

5 – Very Acceptable
4 – Acceptable
3 – Neutral
2 – Unacceptable
1 – Very Unacceptable

The sensory attributes evaluated were:

Aroma - The fragrance or smell of the beverage.
Taste -The flavor profile and palatability.
Color - The visual appeal and similarity to traditional coffee.
Mouthfeel - The texture and consistency in the mouth.
Overall Acceptability - General impression and willingness to consume again.

Participants tasted the brewed langka seed coffee, as well as one commercial caffeine-free coffee and one traditional coffee for comparison. The samples were coded and presented in randomized order to minimize bias. A brief structured questionnaire was also administered alongside the sensory test. It contained two parts:

1) Demographic Profile - Included questions on age, gender, coffee drinking frequency, and health-related dietary preferences.
2) Consumer Feedback - Open-ended questions were provided to allow participants to describe their impressions, suggestions for improvement, and whether they would consider consuming or purchasing langka seed coffee in the future.

E. Preparation of Langka Seed Coffee

Collection of Seeds-Mature jackfruit seeds were collected from local markets.
Cleaning-Seeds were washed thoroughly to remove debris and mucilage.
Drying-Seeds were sun-dried for 3–5 days or until moisture content was reduced.

Roasting-Dried seeds were roasted at 180°C for 25 minutes until dark brown.
Grinding-Roasted seeds were ground into a coarse powder resembling coffee grounds.
Brewing-Brewed using a standard ratio of 1 tablespoon per 200 mL boiling water, steeped for 5 minutes.

F. Data Analysis

Data were analyzed using descriptive statistics (mean and standard deviation) and ANOVA to determine significant differences among consumer groups and beverage types.

III.RESULTS AND DISCUSSION

This chapter presents the results, discussion, and the personal insight that the researchers have gathered of a study on the acceptability of Langka *(Artocarpus heterophyllus)* Seed Coffee as a Caffeine-Free Alternative"

Table I: Age and Sex

AGE	*FREQUENCY*	*PERCENTAGE*
15-20 years old	15	25%
21-25 years old	20	33.33%
26-30 years old	10	16.67%
31-35 years old	7	11.67%
36 years old and above	8	13.33%
Total	**60**	**100%**
SEX		
Male	23	38.33%
Female	37	61.67%
Total	**60**	**100%**

Out of the 60 respondents, **37 (61.67%) were female**, while **23 (38.33%) were male**. This indicates that the sample was slightly skewed toward female participants, which could influence the interpretation of consumer preferences, especially if there are gender-related differences in taste perception or health-conscious consumption behavior. However, both sexes were adequately represented to provide a balanced assessment of the product's acceptability.

Table II: Level of Acceptability

ACCEPTABILITY RATING	*DESCRIPTION*	*FREQUENCY*	*PERCENTAGE (%)*
5	Very Acceptable	18	30.00%
4	Acceptable	25	41.67%
3	Neutral	10	16.67%
2	Unacceptable	5	8.33%
1	Very Unacceptable	2	3.33%
TOTAL		60	100%

Based on the data in Table II, the majority of respondents rated the langka seed coffee as **"Acceptable" (41.67%)** or **"Very Acceptable" (30%)**, indicating a generally positive reception of the product. Only a small percentage rated it as "Unacceptable" or "Very Unacceptable", suggesting that the product has potential market acceptability as a caffeine-free alternative.

Table III: Mean Level of Acceptability of Langka Seed Coffee by Sensory Attributes

Sensory Attribute	*Scale Description*	*Mean Score*	*Verbal Interpretation*
Aroma	1-Very Unacceptable 2- Unacceptable 3- Neutral 4- Acceptable 5- Very Acceptable	4.2	Acceptable
Taste		4.4	Very Acceptable
Color		4.1	Acceptable
Overall Acceptability		4.3	Very Acceptable

Table III presents the mean level of acceptability of Langka seed coffee based on key sensory attributes. Among all attributes, taste received the highest rating with a mean score of 4.4, interpreted as Very Acceptable. This was followed by overall acceptability

(4.3), aroma (4.2), and color (4.1), all of which fell within the Acceptable to Very Acceptable range. These findings suggest that langka seed coffee is generally well-received by consumers in terms of its sensory characteristics.

Table VI: ANOVA TABLE on the LEVEL of ACCEPTABILITY

Source of Variation	*SS*	*df*	*MS*	*F.cal*	*P-value*
Between Groups	1.25	2	0.625	4.35	0.017
Within Groups	8.04	57	0.141		
Total	9.29	59			

The ANOVA results show that there is a statistically significant difference in the level of acceptability among the three formulations of langka seed coffee, with an F-value of 4.35 and a p-value of 0.017 (which is less than the 0.05 significance level). This indicates that at least one formulation differs significantly in terms of consumer acceptability.

IV. CONCLUSION AND RECOMMENDATIONS

Conclusion

The study concludes that Langka seed coffee is a generally acceptable caffeine-free alternative**,** based on sensory evaluation and consumer feedback. While traditional coffee remains preferred for its bold flavor and stimulating effects, Langka seed coffee presents a sustainable**,** health-conscious, and palatable option, particularly for those avoiding caffeine.

Recommendations

1) Investigate nutritional and phytochemical content.
2) Explore long-term storage, shelf life, and commercial packaging.
3) Analyze consumer preferences with flavored or sweetened variations.

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