

Acceptability of calamansi-cucumber fusion

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Abstract: This study explores the acceptability of a novel calamansi-cucumber fusion applied as tea, jam, and dressing. This delves into the general acceptability of calamansi-cucumber tea, jam, and dressing. Utilizing a nine-point hedonic scale rating and employing random sampling methods, data from 10 semi-trained panelists and 100 diverse consumers were collected. This study evaluated the overall acceptability of a 3-in-1 calamansi-cucumber product applied as tea, jam, and dressing. Treatment A, with 20 ml calamansi and 210 ml cucumber, consistently achieved the highest ratings across appearance, aroma, taste, and viscosity, marking it as extremely appealing, pleasant, delicious, and thick. Treatment B, featuring 30 ml calamansi and 200 ml cucumber, maintained favorable ratings but slightly lower than Treatment A. Treatment C, with 40 ml calamansi and 190 ml cucumber, showed a slightly lower in some sensory attributes compared to Treatments A and B, yet still performed well. All treatments received high general acceptability ratings, with Treatment A being particularly preferred.

Keywords: Calamansi, Cucumber, Tea, Jam, Dressing

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INTRODUCTION

In the dynamic world of culinary innovation, the fusion of diverse flavors and ingredients has emerged as a driving force, leading to the creation of novel and delectable dishes. The pursuit of unique flavor combinations that not only tantalize the taste buds but also offer potential health benefits has become a growing area of interest. Aligning with this trend, the present study delves into the exploration of an unconventional blend – calamansi-cucumber tea, jam, and dressing.

This novel condiment aims to provide a unique sensory experience while potentially offering nutritional advantages. The synergistic interplay of flavors has long been a cornerstone of culinary innovation. Studies have demonstrated a heightened preference among consumers for foods that feature complementary flavor combinations, such as sweet and sour, salty, and sweet, and bitter and sweet (Chandra, 2012). Furthermore, the congruence of flavors with consumer expectations plays a significant role in the acceptance of novel food products (de Graaf & Sijtsma, 2008). Understanding consumer flavor preferences is crucial for developing successful food products that meet their expectations (Brockhoff & van der Lans, 2010).

Calamansi, a citrus fruit native to Southeast Asia, is prized for its tangy and citrusy flavor, making it a versatile ingredient in various culinary applications. It is a rich source of antioxidants, including potassium, limonene, calcium, and Vitamin A, and exhibits beneficial properties such as soothing acidity, stimulating growth, aiding in weight loss, and boosting immunity (Tamisetti, 2023).

Cucumbers, belonging to the Cucurbitaceae family, are widely consumed due to their refreshing taste, high water content, and nutritional profile. They are a good source of fiber, vitamins, and minerals and have been linked to various health benefits, including weight management, improved hydration, digestive health, and blood sugar control (Ajmera, 2023).

In the context of escalating inflation and rising prices of commodities, there exists a significant research gap regarding innovative solutions that not only address economic challenges but also provide tangible benefits to consumers. The study of calamansi-cucumber tea, jam, and dressing offers a unique perspective in this regard. Firstly, it is essential to understand the prevailing trends driving inflation and commodity prices to appreciate the economic landscape that consumers currently face. By delving into the production costs, market dynamics, and consumer behaviors associated with these products, researchers can shed light on potential strategies to mitigate the financial strain caused by inflation.

Moreover, the introduction of a 3-in-1 product like calamansi-cucumber tea, jam and dressing presents a compelling case for consumer savings. Calamansi and cucumber are widely available and often cheaper than the ingredients used in existing products in the market, making them an economically viable option for both producers and consumers. This affordability aspect is particularly crucial in the current context where health considerations are increasingly prioritized. As new diseases emerge over time due to changing environmental and lifestyle factors, the need for healthier dietary choices becomes imperative.

Through careful analysis of the cost-efficiency of producing these items in bulk and their comparative market prices against individual products, researchers can quantify the economic advantages that such a product offers. This exploration goes beyond mere cost reduction; it extends to understanding how consumers perceive value and ownership in their purchases.

Statement of the problem

Generally, this study aimed to formulate three treatments of calamansi-cucumber fusion applied as tea, jam, and dressing and determine their acceptability in terms of appearance, taste, aroma, and viscosity.

LITERATURE REVIEW

Tea

Beyond its role as a drink, tea is often used in culinary creations, infusions, and even as a base for jams or dressings (Chen et al., 2016). Jam, a preserved fruit product with varying textures and flavors, adds sweetness and tanginess to a wide range of dishes, from breakfast staples to desserts (Sharma et al., 2019). Dressings, commonly associated with salads, enhance the flavor, moisture content, and texture of dishes, making them more appealing (Nunes et al., 2020). Tea's versatility extends beyond its traditional role as a beverage, finding its way into various culinary applications. Chen et al. (2016) explored the concept of tea-infused jams, highlighting the potential to enhance both flavor and health benefits. Tea's diverse flavor profile and potential health properties make it an attractive ingredient for culinary experimentation.

Additionally, studies examine consumer preferences and market trends, providing insights into the acceptance and demand for unconventional products like tea-based dressings or jams. Literature on tea-based dressings or jams often explores innovative recipes and formulations, showcasing the culinary possibilities that arise from combining diverse ingredients (Lee et al., 2018).

Research also delves into the potential health benefits of teas and their derivatives in dressings, highlighting their antioxidant properties and nutritional value (Goyal et al., 2020). Additionally, studies examine consumer preferences and market trends, providing insights into the acceptance and demand for unconventional products like tea-based dressings or jams (Park et al., 2021). The calamansi-cucumber fusion (applied as tea, jam, and dressing) represent a fusion of culinary concepts, merging the characteristics of tea, jam, and dressing.

This innovative approach aligns with the growing trend of exploring unconventional flavor combinations and creating unique food products. Lee et al. (2018) developed a novel tea-based dressing using tea-infused vinegar, demonstrating the potential for tea to enhance the sensory characteristics and consumer acceptance of dressings.

While the specific fusion of calamansi-cucumber fusion (applied as tea, jam, and dressing) may be relatively new in culinary literature, a review of related sources could yield valuable insights. Studies exploring the sensory aspects, nutritional composition, or consumer acceptance of similar fusion products could provide a foundation for understanding the calamansi-cucumber fusion (applied as tea, jam, and dressing). Additionally, research investigating the synergistic flavors, potential health benefits, or culinary applications of calamansi and cucumber in various contexts could offer valuable perspectives on this unique combination (Coronel-Aguilera et al., 2021). Additionally, research investigating the synergistic flavors, potential health benefits, or culinary applications of calamansi and cucumber in various contexts could offer valuable perspectives on this unique combination (Heredia et al., 2022).

Despite the novelty of the calamansi-cucumber fusion (applied as tea, jam, and dressing), a review of existing literature can provide valuable insights into its sensory characteristics, nutritional composition, and consumer acceptance. Coronel-Aguilera et al. (2021) studied novel tea-based dressings with antioxidant and anti-inflammatory properties, demonstrating the potential for tea-based dressings to offer both flavor and health benefits. Heredia et al. (2022) reviewed the potential health-promoting effects of calamansi, highlighting its nutritional value and potential applications in various culinary contexts.

Calamansi (Citrofortunella Macrocarpa)

Calamansi is a citrus fruit native to Southeast Asia, holds cultural significance in the region due to its unique flavor profile that blends tartness and sweetness (Tamisetti, 2023; De Guzman & Mendioro, 2015). Its scientific name, *Citrofortunella macrocarpa*, reflects its hybrid nature, combining the characteristics of kumquat and mandarin orange (Garcia & De Guzman, 2013). Calamansi is predominantly cultivated in the Philippines, where it is widely used in various culinary applications (Mercado & Garcia, 2015).

Calamansi boasts a rich nutritional profile, comparable to other citrus fruits like lemons, limes, and oranges (Heredia et al., 2022). It is particularly renowned for its high vitamin C content, antioxidants, and various bioactive compounds (Manalo & De Guzman, 2016; Tan & Ismail, 2016). Vitamin C plays a crucial role in immune function, collagen synthesis, and antioxidant defense (Heredia et al., 2022). Antioxidants help protect cells from damage caused by free radicals, while bioactive compounds may contribute to various health benefits (Heredia et al., 2022).

The culinary versatility of calamansi stems from its distinctive taste and acidity (Balagtas & Santiago, 2016). Beyond its role as a refreshing beverage, calamansi finds applications in dressings, marinades, jams, desserts, and even medicinal preparations (De Mesa & Dela Cruz, 2017; Vergara & Garcia, 2015). Its tartness enhances the flavor of various dishes, while its acidity aids in preservation and adds a unique zest to culinary creations (Balagtas & Santiago, 2016; De Mesa & Dela Cruz, 2017).

Emerging research suggests potential health benefits associated with calamansi consumption (Choi et al., 2022; Liu et al., 2022). Its antioxidant and anti-inflammatory properties may contribute to reducing oxidative stress and inflammation, potentially lowering the risk of chronic diseases (Choi et al., 2022). Additionally, studies indicate antimicrobial and immune-boosting effects, suggesting potential applications in combating infections and enhancing overall health (Liu et al., 2022).

Cucumber (Cucumis Sativus)

Cucumber, scientifically known as *Cucumis sativus L.*, has a rich history dating back over 3,000 years, originating in India, and later becoming a staple across the globe. Its versatile nature and cultural significance in Asian and Mediterranean cuisines have earned it various monikers such as gherkin, pickle, and snake gourd (Park et al., 2022).

Renowned for its high-water content, cucumber stands as a hydrating, low-calorie vegetable powerhouse (Liu et al., 2017). Laden with vitamins A, C, K, potassium, magnesium, and phosphorus, it boasts a nutritional profile enriched with dietary fiber essential for digestive health and satiety (Liu et al., 2017). Comparatively, cucumber outstrips lettuce in water content while maintaining a lower calorie count than carrots, positioning it as a favorable choice for hydration and calorie-conscious diets (Liu et al., 2017).

Wang et al.'s 2021 study highlighted significant anti-inflammatory effects of cucumber extract on human macrophages. Recognized for skin hydration and potential anti-inflammatory properties, cucumber extract finds widespread use in various skincare products, including lotions, creams, and face masks (Prasad et al., 2013). Park et al. (2022) study shed light on the anti-inflammatory, antioxidant, and skin-lightening potential of cucumber peel extract.

Current research endeavors focus on refining cucumber cultivars to enhance disease resistance, overall quality, and yield (Xu et al., 2023). Sun et al. (2020) study identified specific cucumber cultivars exhibiting resistance to powdery mildew, a common fungal disease. Consumer inclinations toward cucumber-based products are influenced by health consciousness, convenience, and evolving culinary trends (Martinez et al., 2015). Ali et al. (2023) study emphasized consumers' willingness to pay a premium for cucumbers perceived as healthier and more sustainable, signifying a changing market dynamic.

METHODOLOGY

Research design

This study used a developmental-experimental research design. Developmental research, as opposed to simple instructional development, has been defined as the systematic study of designing, developing, and evaluating instructional programs, processes, and products that must meet criteria of internal consistency and effectiveness.

Locale of the study and respondents

In this study, the respondents comprised a diverse group of individuals consisting of 10 semi-trained panelists and 100 random consumers. These participants were drawn from various segments of the population, including faculty, staff, students, and community members. The locale of the study encompassed both academic and community settings, reflecting a broad cross-section of potential consumers.

The assessment of the product's three distinct treatments—calamansi-cucumber fusion applied as tea, jam, and dressing—was conducted using a Nine-Point Hedonic Scale to measure acceptability. Additionally, a weighted average was computed to quantitatively measure the overall acceptability of the product variants. Through this comprehensive approach to data collection, the researchers gained valuable insights into the general acceptability of calamansi-cucumber tea, jam, and dressing, enhancing the robustness and reliability of the study's findings.

Research instruments

The research instrument used an evaluation sheet prepared by the researcher to evaluate the formulation of calamansi-cucumber fusion (applied as tea, jam, and dressing) with 9-Point Hedonic Scale for the sensory qualities and acceptability of the product. The content of the evaluation sheet was subjected to content validation.

Data analyses procedure

In this study, several statistical tools were employed for the analysis and interpretation of the data collected. The mean was calculated to determine the average scores for the sensory qualities and general acceptability of calamansi-cucumber fusion (applied as tea, jam, and dressing) across three different treatments. By calculating the mean, the researcher was able to gain an understanding of the overall sensory experience and acceptance of the calamansi-cucumber fusion (applied as tea, jam, and dressing).

FINDINGS AND DISCUSSION

Findings of this study present the the acceptability of calamansi-cucumber fusion applied as tea, jam, and dressing in terms of appearance, taste, aroma, and viscosity. Treatment A, consisting of 20 ml calamansi and 210 ml cucumber, received high mean ratings across all quality attributes. For appearance, the product scored 8.33 for tea, 8.52 for jam, and 8.43 for dressing, highlighting its visually appealing nature. Similarly, the aroma scored 8.36 for tea, 8.45 for jam, and 8.37 for dressing. The taste attributes were rated at 8.45 for tea, 8.60 for jam, and 8.47 for dressing, indicating a highly satisfying flavor profile.

Additionally, the viscosity attributes received ratings of 8.36 for tea, 8.44 for jam, and 8.45 for dressing, suggesting a desirable texture across the board. General acceptability was also consistent, with mean ratings of 8.38 for tea, 8.50 for jam, and 8.43 for dressing, signifying a strong preference and positive reception for this particular formulation of the 3-in-1 calamansi-cucumber product. Regarding the quality attributes, it was all described as Liked Extremely.

Next, Treatment B featured 30 ml calamansi and 200 ml cucumber, also demonstrated favorable ratings across the quality attributes evaluated. In terms of appearance, this treatment scored 8.23 for tea, 8.41 for jam, and 8.47 for dressing, reflecting a visually pleasing product similar to Treatment A. The aroma attributes maintained consistent high ratings, with scores of 8.23 for tea, 8.28 for jam, and 8.23 for dressing, indicating a pleasant and aromatic profile. When it comes to taste, Treatment B received scores of 8.42 for tea, 8.54 for jam, and 8.52 for dressing, showcasing a highly satisfying flavor profile comparable to Treatment A.

Viscosity attributes were also well-rated, with scores of 8.23 for tea, 8.40 for jam, and 8.49 for dressing, suggesting a desirable texture across the different applications. General acceptability remained strong, with mean ratings of 8.28 for tea, 8.41 for jam, and 8.43 for dressing, indicating a consistent preference and positive reception for Treatment B similar to that of Treatment A. Also, all the quality attributes were described as Liked Extremely. These findings suggest that Treatment B maintains the quality and appeal of the calamansi-cucumber product, positioning it as a viable and appealing option for consumers in the food and beverage market.

Lastly, Treatment C utilized 40 ml calamansi and 190 ml cucumber, maintains a high standard across the evaluated quality attributes. In terms of appearance, it received ratings of 8.26 for tea, 8.35 for jam, and 8.49 for dressing, indicating a visually appealing product consistent with Treatments A and B. The aroma attributes also scored well, with ratings of 8.21 for tea, 8.35 for jam, and 8.29 for dressing, highlighting a pleasant and aromatic profile similar to the other treatments.

Regarding taste, Treatment C achieved scores of 8.37 for tea, 8.41 for jam, and 8.36 for dressing, indicating a flavorful and satisfying taste experience akin to Treatments A and B. Viscosity, an important attribute for spreads and dressings, was also rated positively with scores of 8.31 for tea, 8.35 for jam, and 8.50 for dressing, reflecting a desirable texture across the different applications. The general acceptability ratings were consistently high, with mean scores of 8.29 for tea, 8.37 for jam, and 8.41 for dressing, indicating a strong preference and positive reception for Treatment C. All of the quality attributes were described as Liked Extremely as well.

The implications drawn from the findings of the 3-in-1 calamansi-cucumber product formulations were quite promising and offer insights into its general acceptability across various applications. Treatment A, with its balanced proportions of 20 ml calamansi and 210 ml cucumber, demonstrates a highly preferred product based on its favorable ratings across appearance, aroma, taste, viscosity, and general acceptability. The Liked Extremely ratings across all quality attributes signify a strong consumer preference for this formulation, indicating its potential to resonate well with target markets seeking visually appealing, aromatic, flavorful, and texture-consistent products.

Treatment B, on the other hand, features slightly adjusted proportions of 30 ml calamansi and 200 ml cucumber, maintains a competitive edge in terms of quality attributes and general acceptability. Despite minor variations, Treatment B aligns closely with the standards set by Treatment A, showcasing visually appealing attributes, pleasant aroma, satisfying taste profile, and desirable viscosity. The Liked Extremely ratings across all quality attributes further reinforce Treatment B's position as a viable and appealing option for consumers seeking a consistent and enjoyable calamansi-cucumber product experience.

Treatment C, with 40 ml calamansi and 190 ml cucumber, also upholds the high standards observed in Treatments A and B. Its strong performance across appearance, aroma, taste, viscosity, and general acceptability reflects a product formulation that maintains consumer interest and satisfaction. The Liked Extremely ratings across all quality attributes underscore Treatment C's ability to deliver a visually pleasing, aromatic, flavorful, and texture-consistent product experience, making it a strong contender within the calamansi-cucumber fusion market.

The findings from the general acceptability of the 3-in-1 calamansi-cucumber product align well with previous research, providing a robust validation of consumer preferences and sensory appeal. Dela Cruz et al.'s (2022) study on banana jam infused with apple and cucumber highlighted the significance of appearance in fusion products, with calamansi and cucumber contributing to a moist and visually pleasing aspect, reminiscent of smoothie-like characteristics. While their fusion ingredients differed, the shared emphasis on sensory appeal and consumer acceptance resonates strongly with the calamansi-cucumber fusion (applied as tea, jam, and dressing). The positive ratings and Liked Extremely descriptions across appearance, aroma, taste, viscosity, and general acceptability in the study reinforce the importance of these sensory attributes in consumer preference and market acceptance.

Thus, based on the sensory evaluations from both studies, calamansi-cucumber products exhibited high general acceptability. The consistent high scores for sensory attributes and general acceptability support the notion that these products are well-received by consumers, affirming their market potential and consumer appeal.

CONCLUSIONS AND RECOMMENDATION

The sensory evaluation identified differences in the visual appearance, taste, smell, and thickness of the three treatments, emphasizing the importance of selecting the right treatment to improve the quality of the product. Consumer preferences exhibited variability, suggesting that variations in treatment considerably impacted the overall acceptability. However, all items received high ratings from assessors. The statistical analysis revealed considerable variations in sensory characteristics between the different treatments, highlighting the crucial role of formulation and processing techniques.

Nevertheless, despite the observed variances, no substantial disparities were found in the overall acceptability of the calamansi-cucumber fusion among the different treatments, indicating that the differences in formulation did not affect the overall level of acceptance. However, it is essential to consider features such as appearance, taste, scent, and viscosity in product development in order to improve consumer preferences.

Given the study's conclusions and findings, we may provide numerous ideas to improve the acceptance of calamansi-cucumber fusion in its several uses. To enhance sensory quality, it is crucial to adopt a complete strategy to sensory evaluations that specifically target variables such as appearance, viscosity, scent, and taste. By establishing uniform evaluation procedures and working closely with specialists in sensory science, it is possible to gain significant knowledge about consumer preferences and use that information to make specific enhancements to product characteristics.

The importance of aroma and taste in determining customer acceptance is well recognized, indicating the need for modern analytical tools and research with natural flavoring agents to create attractive taste profiles. In addition, improving viscosity using rheological techniques and conducting sensory research to identify optimal levels can boost the overall performance of the product.

Additional study is advised to enhance treatment formulas, processing techniques, and constituent choices in order to enhance sensory characteristics. Conducting market research and consumer surveys is recommended to gain insights into specific preferences. Additionally, investigating novel product formats and implementing successful marketing techniques can enhance the attraction of a product and effectively communicate its distinctive features to consumers, ultimately leading to increased acceptability.

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