

**SENSORY EVALUATION OF POMELO (*Citrus maxima*) WAFFLE****CHARLENE EVE L. SALIGUMBA***Bohol Island State University Main Campus, Tagbilaran City, Bohol, Philippines*Email: charleneeve.saligumba@bisu.edu.ph

Abstract

The use of pomelo (*Citrus maxima*) has seen a widespread increase in the realm of food innovation. Its essential components contribute to enhancing flavors, enriching taste, and providing valuable nutrients to food products. This study aims to introduce a novel and distinctive product that offers essential nutrients to consumers. The main thrust of the study was to determine the sensory evaluation of pomelo waffle among the three treatments in terms of aroma, color, taste and texture. Additionally, the study sought to ascertain if any significant differences existed among the three treatments. To achieve these objectives, the researcher employed an experimental-descriptive research design and utilized a self-made modified questionnaire as the main data-gathering tool. The questionnaire employed a 4-point modified Hedonic scale to measure the level of liking among the respondents. Due to pandemic constraints, the study had a limited sample size of 15 respondents, all of whom were gathered through remote data collection via the phone, online and other virtual platforms. On the other hand, the product testing was done through the family members of the researcher. The data collected were analyzed using the weighted mean and ANOVA to identify any notable variations in the respondents' liking for the three treatments. Based on the findings, Treatment 1, which contained 50 ml of pomelo juice, emerged as the most favorable formulation, achieving an average weighted mean of 3.37, indicating a rating of "like very much." This suggests that pomelo waffles could be an excellent choice for breakfast, lunch, or as an afternoon snack, while also presenting a promising opportunity for extension services as a potential income-generating project.

Keywords: pomelo, sensory evaluation, waffle

INTRODUCTION

Fruits are widely accepted as an essential component in making flavors of food, giving it the richness of its taste and its nutrients. Pomelo (*Citrus maxima*) is a common plant in Bohol, especially in the municipalities of Dagohoy, Sierra Bullones, and Jagna. China, Southern Japan, Vietnam, Malaysia, Indonesia, and Thailand are the greatest places to grow pomelo. While in the Philippines specifically in Davao, Pomelos are harvested and is shipped to neighboring places. Pomelo fruit is typically consumed fresh or juiced. Because of the volatiles' potency, the fruit peel has been utilized in traditional medicine for coughs, swellings, and epilepsy.

Moreover, the *Valentine Pomelo* was used in this study has a round with a protruding neck at the stem end, similar in shape to a pear. The rind is dark yellow and easy to peel, while the pulp inside is bright red. The fruit has a moderate number of seeds and is juicy and sweet especially compared with more acidic citrus. In the Philippines, the pomelo fruit is available in the months of

April to June. Other pomelos are a light green color when ripe, but the valentine pomelo is ripe when their rind is a uniform yellow. The valentine pomelo is one of many types of pomelos; it is a combination of mandarin and blood orange. This large fruit is called valentine pomelo because of its red pigmentation resembles a heart when halved lengthwise. This type of pomelo has very low acidity and is extremely sweet with just a hint of slightly tart aftertaste. Its red pigmentation is also a sign that it is loaded with beneficial antioxidants. Some products that utilized pomelo are salads, tea's, jams, pickles, ice creams, and many more.

On the other hand, waffles have been a favorite food for hundreds of years, possibly dating back to the 13th Century. The first waffle irons with the characteristic honeycomb pattern appeared in the 1200s when a craftsman designed and forged cooking irons. Original irons featured a hinged design. Consequently, the batter was poured in, pressed together, and cooked over an open-hearth fire. At this time the word for waffles, which comes from the old French word, *guafre*, translated to old English *wafla*, first appears in print. A waffle is a dish made from leavened batter or dough that is cooked between two plates that have patterns to give a characteristic size, shape, and surface impression of the waffle. It may be eaten as an afternoon snack or breakfast. There are many variations based on the type of waffle iron and the recipe used. People experiment with different flavors to add to the recipe and consider their nutritional value. One must know its nature and its value to utilize its characteristics to its estimated potential. Waffles are cooked until they become golden-brown in color, with a crispy outer texture and a soft interior (Reusen, 2016).

This study aimed to introduce a novel and exclusive product that holds significant advantages for both individuals and the economy. The focus was on creating a product that offers health benefits to consumers. Additionally, the research evaluated the sensory attributes of Pomelo (*Citrus maxima*) waffles by gauging the respondents' preferences across three treatments, specifically in terms of aroma, color, taste, and texture.

METHODOLOGY

The study utilized descriptive and experimental research design. The experimental design was used in determining the different formulations of the pomelo waffle namely: Treatment 1- 50 ml Pomelo juice, Treatment 2- 80 ml Pomelo juice and Treatment 3- 110 ml Pomelo juice. While the descriptive design was used with the aid of questionnaire using the 4-point Hedonic Scale to examine the sensory attributes and level of liking in terms of aroma, color, taste and texture and the shelf life of the treatments which differ in the measurement of the three treatments. In picking the valentine pomelo, the researcher chose the ripe ones as it is sweet, fleshy and it got potential health benefits when eaten. (Claudio, et al., 2006). The researcher got the valentine pomelo from Dagohoy, Bohol in a safe place with favorable climate and soil profile and had enough supply of the fruit. After gathering the pomelo, the researcher secured the recipe to be used in the production of the pomelo waffle and bought the ingredients to be used in the local market. The researcher also prepared the needed tools, materials and equipment in making the product. All needed tools, materials and equipment were cleaned, sanitized and in good condition. The researcher formulated and measure the ingredients accurately in three treatments.

The study was conducted at different municipality of the Province of Bohol specifically at Tagbilaran City, Dauis, and Dagohoy, Bohol. The purposive sampling method was used in determining the participants of the study. A total of fifteen (15) participants involved in the study to assess the sensory attributes and level of liking of the three treatments.

RESULTS AND DISCUSSION

This presents the findings, investigation and interpretation of the study based on the methodologies applied and collected data. In observing the shelf life of the pomelo waffle, the researcher secured the waffle in a sealed food container and placed it in a room temperature to observe and identify the changes in the waffle and how long it is safe for food consumption.

Table 1 replicates the shelf life of pomelo waffle in three treatments. At room temperature, Treatment 1 with 50 ml of pomelo juice lasted for two days only with no changes occurred. On the third day, changes occurred as to its texture and odor. Moisture can be seen on the surface of the waffle and it produces a strong unpleasant odor. However, Treatment 2 with 80 ml of pomelo juice and Treatment 3 with 110 ml pomelo juice lasted until the third day. Therefore, the higher the amount of pomelo juice added to the waffle, the longer its shelf life would be. It is because of its natural sweet-sour taste that help prolong the shelf life of the waffle (National Nutrition Council, 2021).

Table 1 Shelf Life of Pomelo (*Citrus maxima*) Waffle when Stored at Room Temperature

Treatment	Number of Days		
	Day 1-2	Day 3	Day 4
T1	No changes occurred	Unpleasant aroma, moisture can be seen on the surface, and not safe for food consumption	Spoiled
T2	No changes occurred	No changes occurred	Unpleasant aroma, moisture can be seen on the surface, and not safe for food consumption
T3	No changes occurred	No changes occurred	Unpleasant aroma, moisture can be seen on the surface, and not safe for food consumption

Table 2 Sensory Attributes of Pomelo (*Citrus maxima*) Waffle in Terms of Aroma, Color, Taste and Texture

Sensory Attributes	Treatment 1		Treatment 2		Treatment 3	
	WM	Description	WM	Description	WM	Description
Aroma	2.87	Mildly Pleasant	3.33	Extremely Pleasant	3.60	Extremely Pleasant
Color	2.07	Brown	2.87	Light Brown	3.47	Golden Brown
Taste	2.20	Slightly Sweet	2.47	Mildly Sweet	2.47	Mildly Sweet
Texture	2.80	Mildly Soft	2.93	Mildly Soft	3.00	Mildly Soft

Table 2 represents the outcome of the sensory attributes of the study in terms of aroma, color, taste and texture. In terms of aroma, Treatment 3 got the highest weighted mean of 3.60 described as “Extremely Pleasant” while Treatment 1 got the least weighted mean which described as “Mildly Pleasant”. It infers that the higher the amount of pomelo juice added to the treatment, the more pleasing the aroma would be since pomelo got that citrusy aroma.

In terms of color, Treatment 3 with 110 ml of pomelo juice got the highest weighted mean of 3.47 described as “Golden Brown” while Treatment 1 with 50 ml pomelo juice got 2.07 described as “Brown”. It inferred that the higher the amount of pomelo juice added to the waffle the nicer its color would appear and pleasing to one’s eye.

In terms of taste, Treatments 2 and 3 got the highest weighted mean of 2.47 described as “Mildly Sweet” and Treatment 1 got the least weighted mean described as “Slightly Sweet”. It concludes that the greater the amount of pomelo juice added to the waffle, the more appetizing it would be. According to Nate Teague (2020), a pomelo fruit tastes a lot like a grapefruit, without the intensity of flavor that many people struggle with. They offer a pleasantly sweet-tasting flesh, but there is no overpowering bitterness and sour punch.

In terms of texture, Treatment 3 got the highest weighted mean of 3.00 described as “Mildly Soft” while Treatment 1 got the least weighted mean of 2.80 described as “Mildly Soft”. It means that the greater the amount of pomelo juice added to the waffle the softer and fluffy it would be since it balances well the other ingredients of the waffle.

Table 3 Level of Liking of Pomelo (*Citrus maxima*) Waffle

Sensory Attributes	Treatment 1		Treatment 2		Treatment 3	
	WM	Description	WM	Description	WM	Description
Aroma	3.47	Like Very Much	3.47	Like Very Much	3.40	Like
Color	3.53	Like Very Much	3.60	Like Very Much	3.53	Like Very Much
Taste	3.07	Like Very Much	2.93	Like	2.93	Like
Texture	3.40	Like Very Much	3.20	Like	3.13	Like
AWM	3.37	Like Very Much	3.30	Like Very Much	3.25	Like Very Much

Table 3 reveals the level of liking of the pomelo waffle among the three treatments. It discloses that Treatment 1 got the highest average weighted mean of 3.37 which described as “Like Very Much” in terms of aroma, color, and texture because of its pomelo juice content (50 ml) which stabilizes and enhances the sensory attributes of the waffle compared to treatments 2 (80 ml) and 3 (110 ml).

Table 4 Difference on the Level of Liking of Pomelo (*Citrus maxima*) Waffle in Three Treatments

Difference on the Level of Liking of the Pomelo Waffle in Three Treatments	Computed F-value	Tabular F-Value	Interpretation	Decision
	At 5% Level of Significance			
	0.18	3.22	Insignificant	Accept the Null Hypothesis

Table 4 discloses the result of the one-way ANOVA. As revealed in the table, the computed F-value is lesser than the tabular F-value at 0.05 level of significance. There is no significant difference in the respondent's level of liking towards the three treatments of the pomelo waffle in terms of aroma, color, taste and texture. Therefore, it implies that the three treatments have no big modification of pomelo juice added to the ingredients of waffle.

CONCLUSION

Based on the findings drawn from the study, the researcher came up with the following generalizations and conclusion, the pomelo waffle has a longer shelf life if greater amount of pomelo juice is added to the waffle.

Based on statistical result in the level of liking of Pomelo (*Citrus maxima*) Waffle shows that Treatment 1 with 50 ml of pomelo juice. It means that the respondents of the study extremely satisfied on the overall sensory attributes of Treatment 1. Lastly, the result reveals that there was no significant difference in the level of liking of the pomelo waffle in three treatments, therefore, it suggests that the three treatments had no big difference in terms of its sensory attributes eventhough they have different measurement of pomelo juice added to the waffle.

REFERENCES

- Alvarez, A. (2020) The Problem and It Background Retrieved February 7, 2021
<https://bit.ly/3xNn2RK>
- Majhen, Ivan. (2020) Food Theory retrieved March 11, 2021 from. <https://bit.ly/3NLXTMW>
- Jarawee Looyrach, et al. (2015) Pomelo (*Citrus maxima*) Peel-Inspired Property for Development of Eco- Friendly Loose-Fill Foam. Retrieved February 7, 2021 from. <https://bit.ly/3NXfqSE>
- Betney, Kim (2015), All about the citrus family. Retrieved February 6, 2021 from. <https://bit.ly/3mLkc9D>
- Melissa, The Freshest Ideas of Produce, Retrieved February 20, 2021 from. <https://bit.ly/3aVzG8m>
- NDTV Food. (2014) All Purpose Flour Retrieved March 1, 2021 from. <https://bit.ly/3NQOmnu>
- Official Gazette of the Republic of the Philippines, retrieved THE 1987 CONSTITUTION OF THE REPUBLIC OF THE PHILIPPINES – ARTICLE XIV. Retrieved January 11, 2021 from. <https://bit.ly/2zNMvfQ>
- Reusen, Bram (2015) Waffles Around the World that Will Make You Drool. retrieved March 1, 2021 <https://bit.ly/3MPE3z1>
- Republic of the Philippines, National Nutrition Council (June 08, 2021). 4 Reasons Why You Should Eat Pomelo retrieved September 1, 2022 from <https://www.nnc.gov.ph/regional-offices/mindanao/region-xi-davao-region/5397-4-reasons-why-you-should-eat-pomelo>
- Sabelli, Hector (2008) The Innovation Journal: The Public Sector Innovation Journal, Volume 13. retrieved March 2, 2021 from. <https://bit.ly/3OcAaVV>
- Tanaka, Tim. (2017) Dietary Tradition, Nutritional Theories and Science, retrieved March 20, 2021 from <https://bit.ly/3QjIt4c>
- Teague, Nate (202) What Does Pomelo Taste Like? Retrieved September 1, 2022 from <https://tastylicious.com/what-does-pomelo-taste-like/>