



RESEARCH PAPER

OPEN ACCESS

Evaluation of the sensorial quality of peppermint (*Mentha piperita*) ice cream

Iriz Klir Austria, Michael Sta. Ana, Marigen E. Toraja\*

Bohol Island State University, Calape Campus, Calape, Bohol, Philippines

**Key words:** Ice cream, Peppermint, *Mentha piperita*

**Received:** February 01, 2026

**Published:** February 15, 2026

**DOI:** <https://dx.doi.org/10.12692/ijb/28.2.177-183>

**ABSTRACT**

The study evaluated the sensorial quality of peppermint (*Mentha piperita*) ice cream as a potential innovative dessert product. Specifically, the research assessed the product in terms of appearance, aroma, color, taste, texture, and overall acceptability using three formulations containing different amounts of peppermint extract: T1 (60 g), T2 (90 g), and T3 (120 g). A descriptive-experimental research design was employed, and data were collected from 30 respondents using a researcher-developed evaluation sheet based on a 9-point Hedonic Scale. The data were analyzed using weighted mean to determine the level of acceptability of each treatment. Results showed that all three treatments were rated “Very much acceptable” across all sensory attributes. Among the formulations, Treatment 2 (90 g peppermints extract) achieved the highest overall acceptability with a mean score of 7.74, indicating a well-balanced sensory profile in terms of appearance, aroma, color, taste, and texture. Although Treatment 3 (120 g) obtained slightly higher ratings in attributes such as color and aroma, its taste score was relatively lower, suggesting that excessive peppermint concentration may reduce palatability. In terms of production cost, Treatment 1 was the most economical, while Treatment 2 offered a more favorable balance between sensory quality and affordability. The findings suggest that peppermint can be successfully incorporated into ice cream formulation, providing a novel, acceptable, and potentially healthier dessert option. The product also shows promise for food innovation, small-scale commercialization, and community-based entrepreneurial initiatives.

\*Corresponding author: Marigen E. Toraja ✉ [marigen.toraja@bisu.edu.ph](mailto:marigen.toraja@bisu.edu.ph)

## INTRODUCTION

Filipinos are known for their love of desserts, which are sweet treats commonly served after meals. In many Filipino gatherings, a meal is considered incomplete without a sweet dessert at the end. One of the most popular desserts in the Philippines is ice cream. In Filipino culture, ice cream is more than a treat; it is a gesture of hospitality, a staple in celebrations, and a sweet expression of togetherness. Since the Philippines is a tropical country, ice cream is one of the most popular and in-demand desserts, especially during hot weather. Children are the biggest fans of ice cream and are the ones who enjoy it the most. Although many people, especially older adults, enjoy ice cream, some choose to avoid it due to well-being concerns, such as diabetes. Thus, to make ice cream healthy and suitable for all ages, this study developed a unique flavored ice cream using peppermint, as it is abundant with numerous nutrients and has potential health benefits.

Peppermint is originally known for its medicinal uses, but it can also be used to create a uniquely flavored ice cream that satisfies consumer taste while promoting a healthy lifestyle. It is abundant with numerous nutrients and has potential health benefits, making it a promising ingredient for food product innovation (Datta & Paul, 2011; Khare, 2008). However, peppermint is not commonly used in the locality, especially in making desserts, and there is limited information on its application in ice cream and its acceptability based on sensory attributes such as appearance, aroma, color, taste, texture, and overall acceptability.

Despite the popularity of ice cream and the known medicinal and nutritional benefits of peppermint, there is a lack of locally developed products utilizing peppermint as a primary ingredient in desserts, particularly ice cream. Moreover, there is insufficient empirical evidence evaluating the sensorial quality and acceptability of peppermint-based ice cream across different formulations. This gap limits the understanding of its potential for commercialization and wider consumer acceptance.

This study aims to produce an ice cream using peppermint that can be a potential benefit for people and can be enjoyed without worrying about health. Furthermore, this study aims to raise awareness and help people understand the benefits and usefulness of peppermint while exploring innovative food products that can contribute to the growth of the food industry and support economic development.

The study specifically aims to:

1. Determine the sensorial quality of Peppermint Ice Cream in terms of appearance, aroma, color, taste, texture, and overall acceptability using different treatments.
2. Identify if there is a significant difference among the sensorial qualities of Peppermint Ice Cream across the three treatments.
3. Describe the product in terms of cost.
4. Propose an extension program based on the findings of the study.

## MATERIALS AND METHODS

### Design

The researchers used both descriptive and experimental method to determine the sensorial quality of Peppermint Ice Cream in three (3) treatments, such as T<sub>1</sub>- 60 g Peppermint Extract, T<sub>2</sub>- 90 g Peppermint Extract, and T<sub>3</sub>- 120 g Peppermint Extract in terms of its appearance, aroma, color, taste, texture and overall acceptability.

### Environment and respondents

This study was conducted in the Municipality of Calape, Province of Bohol. A total of 30 respondents were selected from Bohol Island State University – Calape Campus, who are the Food Technology teachers, selected BISU instructors, administrative staff, and Food Technology on-the-job trainees (OJTs). They were given enough time to answer the questionnaire after tasting three different treatments of Peppermint Ice cream.

A purposive sampling of experienced respondents was conducted to provide sufficient information. Finally, the data and information gathered by the

researchers were tallied and tabulated to achieve the objective of the study.

### **Instrument**

The researchers utilized the constructed Peppermint Ice Cream Rating Sheet in obtaining the necessary data. The researchers used the 9-point Hedonic Scale for the respondents to evaluate the sensorial quality of the product from extremely acceptable (9) to extremely unacceptable (1). The researchers asked the respondents to rate the Peppermint Ice cream according to its attributes, specifically the appearance, aroma, color, taste, texture, and overall acceptability. They were also asked to give comments and suggestions to improve the study.

### **Procedures**

#### *Approval of the study and preparation of questionnaires to be used*

The researchers asked permission from the Campus Director and the Dean of the College of Technology and Allied Sciences (CTAS) of Bohol Island State University for approval to conduct the study after the pre-oral defense.

The Peppermint Ice Cream rating sheet was constructed by the researchers and finalized with the adviser. Then, a letter of request for the food tasting activity was sent after determining the experience panel.

#### *Preparation of tools and equipment*

The researchers organized the tools and equipment used in making the recipe. The tools and equipment used include a blender, an electric mixer, a mixing bowl, measuring cups, measuring spoons, a rubber spatula, kitchen knife, scissor and small cups.

#### *Preparation of the ingredients*

The researchers prepared the ingredients used in making the recipe. The Peppermint Ice Cream ingredients are mainly fresh peppermint leaves, condensed milk, Nestle cream, and salt.

#### *Steps in making peppermint ice cream*

1. Wash the fresh Peppermint leaves and drain.

2. Blend the Peppermint leaves.

3. Strain using the strainer to get the extract, then set aside.

4. In a medium bowl, mix the 500 grams of cream until it becomes foamy, then gradually add the 300 grams of condensed milk.

5. Pour 60 g, 90 g, and 120 g of peppermint extract with 0.36 g of salt for Treatments 1, 2, and 3, respectively.

6. Mix it thoroughly.

7. Transfer it to a container and freeze for at least 6 hours.

#### *Testing the product for sensorial quality*

After the preparation, the researchers distributed the products with the rating sheet to the respondents for tasting and rating. Each participant was required to rinse their mouth before and after tasting the three different treatments of ice cream. Researchers ensured that the respondents rated all the parameters. The information gathered served as the data in getting the level of acceptability of Peppermint Ice Cream among the respondents.

### **Statistical treatment**

The data gathered from the respondents were analyzed using descriptive statistical methods. The weighted mean was computed to determine the level of sensorial acceptability of peppermint ice cream in terms of appearance, aroma, color, taste, texture, and overall acceptability for each treatment. The weighted mean values were interpreted using the 9-point Hedonic Scale, where higher scores indicate greater consumer preference and acceptability (Table 1). The computed weighted mean values were used to describe and compare the sensory attributes of the three treatments of peppermint ice cream: T1 (60 g peppermint extract), T2 (90 g peppermint extract), and T3 (120 g peppermint extract). These values served as the basis for identifying which treatment obtained the highest level of acceptability among respondents. Descriptive analysis was also used to present the cost comparison of the three treatments, including production cost per recipe, cost per serving, and proposed selling price.

**Table 1.** The 9-point hedonic scale and range guide

Range	Descriptive rating
8.12 – 9.00	Extremely acceptable
7.23 – 8.11	Very much acceptable
6.34 – 7.22	Moderately acceptable
5.45 – 6.33	Slightly acceptable
4.56 – 5.44	Neither acceptable nor unacceptable
3.67 – 4.55	Slightly unacceptable
2.78 – 3.66	Moderately unacceptable
1.89 – 2.77	Very much unacceptable
1.00 – 1.88	Extremely unacceptable

## RESULTS

The results of the study are presented in terms of the sensorial quality and cost of Peppermint Ice Cream

across the three treatments. Table 2 presents the overall acceptability of Peppermint Ice Cream as evaluated by the respondents based on appearance, aroma, color, taste, and texture. The results indicate that all three treatments were rated as “Very much acceptable,” with mean scores ranging from 7.58 to 7.74. Among the treatments, Treatment 2 (90 g peppermint extract) obtained the highest overall mean score of 7.74, followed closely by Treatment 3 (120 g) with 7.73, while Treatment 1 (60 g) recorded the lowest mean of 7.58. These findings suggest that increasing the peppermint extract improves acceptability up to a certain level, with 90 g being the most preferred formulation.

**Table 2.** Overall acceptability of sensorial quality of peppermint ice cream

Indicator	Treatments					
	T1		T2		T3	
	Weighted mean	Descriptive rating	Weighted mean	Descriptive rating	Weighted mean	Descriptive rating
Appearance	7.38	Very much acceptable	7.73	Very much acceptable	7.75	Very much acceptable
Aroma	7.53	Very much acceptable	7.65	Very much acceptable	7.69	Very much acceptable
Color	7.71	Very much acceptable	7.78	Very much acceptable	7.87	Very much acceptable
Taste	7.73	Very much acceptable	7.71	Very much acceptable	7.53	Very much acceptable
Texture	7.54	Very much acceptable	7.86	Very much acceptable	7.85	Very much acceptable
Overall acceptability	7.58	Very much acceptable	7.74	Very much acceptable	7.73	Very much acceptable

T1= 60 grams peppermint extract, T2= 90 grams peppermint extract, and T3= 120 grams peppermint extract.

**Table 3.** The cost in the study of the sensorial quality of peppermint ice cream

Cost	Treatments		
	T1	T2	T3
Color	Light green	Light green	Light green
Weight/serving	103.51 grams	103.51 grams	103.51 grams
Number of servings per recipe	30 pcs	31 pcs	32 pcs
Production cost per recipe	₱354.73	₱372.49	₱390.25
Production cost per serving	₱11.83	₱12.02	₱12.20
Proposed selling price	₱14.19	₱14.42	₱14.63

T1= 60 grams peppermint extract, T2= 90 grams peppermint extract, and T3= 120 grams peppermint extract.

In terms of individual sensory attributes, Treatment 2 consistently performed well across all parameters. It achieved high ratings in appearance (7.73), aroma (7.65), color (7.78), taste (7.71), and texture (7.86), all interpreted as “Very Much Acceptable.” Although Treatment 3 showed slightly higher values in some attributes such as color (7.87) and aroma (7.69), its taste score (7.53) was lower than that of Treatment 2, indicating that excessive peppermint extract may slightly affect palatability. Meanwhile, Treatment 1 showed relatively lower scores across most attributes,

particularly in appearance (7.38) and texture (7.54), though still within the “Very much acceptable” range. Overall, the results in Table 2 demonstrate that Treatment 2 provides the most balanced and desirable sensory characteristics among the three formulations.

Table 3 shows the cost analysis of the Peppermint Ice Cream across treatments. The findings reveal that Treatment 1 had the lowest production cost per recipe at ₱354.73, followed by Treatment 2 at ₱372.49, and

Treatment 3 at ₱390.25. Similarly, the cost per serving increased with the amount of peppermint extract used, from ₱11.83 in Treatment 1 to ₱12.20 in Treatment 3. The proposed selling prices also followed this increasing trend, ranging from ₱14.19 (T1) to ₱14.63 (T3). Despite having a slightly higher cost than Treatment 1, Treatment 2 offers a balance between affordability and higher acceptability, making it a practical option for production and potential commercialization.

The results indicate that while all treatments are acceptable, Treatment 2 (90 g peppermint extract) provides the best combination of sensory quality and reasonable cost, as supported by the data presented in Tables 2 and 3.

## DISCUSSION

The findings of this study demonstrate that Peppermint Ice Cream was generally well accepted across all three treatments, with all formulations falling under the descriptive rating of “Very much acceptable.” This suggests that peppermint, though not commonly used in local dessert preparation, can be successfully incorporated into ice cream without negatively affecting consumer perception. The strong acceptance across treatments supports the idea that innovative flavors, when properly formulated, can align with consumer expectations for both enjoyment and quality.

Among the three treatments, Treatment 2 (90 g peppermint extract) emerged as the most acceptable overall. While Treatment 3 (120 g) obtained slightly higher scores in certain attributes such as color and aroma, its taste rating was slightly lower than that of Treatment 2. This pattern indicates that sensory balance is critical in flavored ice cream formulation. An excessive concentration of peppermint extract may intensify flavor beyond the preferred threshold, affecting palatability. Sensory science literature emphasizes that consumer acceptance is often determined not by the strongest sensory intensity but by optimal balance among attributes (Lu, 2013). In this study, the 90 g formulation appears to have achieved that balance.

Appearance and color were rated highly across treatments, with all samples described as light green. Visual appeal plays a crucial role in food acceptance, often forming the first basis for judgment before tasting occurs (Hutchings, 2017). The light green color likely reinforced consumer expectations associated with peppermint flavor, contributing positively to overall perception. The consistency in high ratings for appearance and color indicates that peppermint extract did not produce undesirable visual effects, an important factor for product commercialization.

Aroma scores also showed strong acceptability. Peppermint is widely recognized for its refreshing scent and cooling sensation (Datta and Paul, 2011; Khare, 2008). The pleasant aroma likely enhanced the sensory experience and supported positive taste perception. However, the slightly higher extract concentration in Treatment 3 may have intensified the aroma beyond the optimal level, which could explain the minor decline in taste rating despite strong aroma and color scores. This aligns with findings in flavored dairy product research where increasing herbal or spice concentrations improves aroma but may reduce taste preference when the flavor becomes overpowering (Gabbi *et al.*, 2018).

Texture was another important determinant of acceptability. Treatment 2 obtained the highest texture rating, suggesting that the level of peppermint extract did not interfere with the structural properties of the ice cream base. Ice cream quality depends significantly on fat content, air incorporation, and ingredient interactions (Deosarkar *et al.*, 2016). The balanced proportion of peppermint extract in Treatment 2 may have preserved the smooth and creamy texture that consumers expect from ice cream, while excessive extract in Treatment 3 may have slightly influenced mouthfeel perception.

From an economic perspective, Treatment 1 was the most economical; however, its sensory ratings were consistently lower than Treatment 2. Although Treatment 3 achieved comparable overall acceptability, its higher production cost may limit practicality for commercialization. The results

therefore suggest that Treatment 2 offers the most favorable balance between quality and affordability. For small-scale entrepreneurs and institutional settings such as schools, this balance is essential for sustainable product development.

The study highlights that peppermint, traditionally known for medicinal applications (Tucker and Naczi, 2007), can be effectively utilized in dairy-based desserts. The findings support the potential for product innovation using locally available herbal ingredients. However, further studies may evaluate additional physical properties, consumer segmentation, shelf-life stability, and nutritional profiling to strengthen commercialization potential.

### CONCLUSION

The study concludes that Peppermint Ice Cream is a highly acceptable product across all formulations, as all three treatments were rated “Very Much Acceptable” in terms of appearance, aroma, color, taste, texture, and overall acceptability. This indicates that peppermint can be effectively incorporated into ice cream as a novel and appealing flavor while maintaining desirable sensory qualities.

Among the treatments, the formulation containing 90 g of peppermint extract (Treatment 2) emerged as the most preferred. It achieved the highest overall acceptability and demonstrated a balanced combination of sensory attributes, including appealing appearance, pleasant aroma, refreshing color, palatable taste, and smooth, creamy texture. While increasing the amount of peppermint extract enhanced certain attributes such as aroma and color, excessive levels slightly affected taste, highlighting the importance of optimal formulation.

In terms of cost, although Treatment 1 was the most economical, its sensory performance was comparatively lower. Treatment 2, on the other hand, provided a practical balance between affordability and superior sensory quality, making it the most suitable option for production and potential commercialization.

The findings suggest that peppermint has strong potential as an innovative ingredient in ice cream product development. Its successful utilization in this study supports its application in promoting healthier dessert alternatives, encouraging product diversification, and creating opportunities for entrepreneurship and community-based food initiatives.

### RECOMMENDATIONS

Based on the findings of the study, the following recommendations are proposed:

The formulation containing 90 g of peppermint extract (Treatment 2) should be adopted for production and possible commercialization, as it demonstrated the best balance of sensory quality and cost.

Product improvement may be considered by incorporating minced peppermint leaves to enhance visual appeal and provide a more distinctive texture, as suggested by respondents.

Adjustment of ingredient proportions, particularly reducing the amount of cream, may be explored to further enhance the peppermint flavor and improve overall taste perception.

Entrepreneurial and product development initiatives using peppermint ice cream may be introduced in schools and communities as income-generating activities, promoting innovation and local enterprise.

Extension programs and awareness campaigns should be conducted to promote the use of peppermint in food products, highlighting its potential health benefits and versatility.

Future research is recommended to evaluate additional quality parameters such as physicochemical properties, nutritional composition, shelf-life stability, and consumer preference across different age groups and markets. Further studies may also explore other formulations, flavor combinations, or processing techniques to optimize the product and expand its commercial potential.

## REFERENCES

- Datta AK, Paul R.** 2011. Updated overview on peppermint (*Mentha piperita* L.). International Research Journal of Pharmacy **2**(8), 1–10.
- Deosarkar SS, Kalyankar SD, Pawshe RD, Khedkar CD.** 2016. Ice cream: Composition and health effects. In: Caballero B, Finglas P, Toldra F (Eds.). Encyclopedia of Food and Health **3**, 385–390. Academic Press, Oxford.
- Gabbi D, Bajwa U, Goraya R.** 2018. Physicochemical, melting, and sensory properties of ice cream incorporating processed ginger (*Zingiber officinale*). International Journal of Dairy Technology **71**, 190–197.
- Hutchings J.** 2017. The importance of the visual appearance of food to the food processor and consumer. Retrieved from: [www.researchgate.net/publication](http://www.researchgate.net/publication)
- Khare CP.** 2008. Indian medicinal plants: An illustrated dictionary. Springer Science and Business Media.
- Lu R.** 2013. Instrumental assessment of food sensory quality: a practical guide. Woodhead Publishing.
- Tucker AO, Naczi RFC.** 2007. Mentha: An overview of its classification and relationships. In: Lawrence BM (Ed.). Mint: the genus Mentha, 1-40. CRC Press, Boca Raton.