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Sensory acceptability and characteristics of bottled cream dory (*Pangasianodon hypophthalmus*) in tomato sauce style with different organic flavorings

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Abstract
This study evaluated the sensory characteristics, acceptability, and desirability of the bottled Cream Dory in tomato sauce style with different organic flavorings. There were 4 treatments evaluated in this study: T1 "Control" (no organic flavoring added), T2 with "oregano extracts", T3 with "lemongrass extracts", and T4 with "turmeric extracts". The semantic and hedonic scales were the instruments used to determine the sensory acceptability and desirability of the bottled Cream Dory. There were thirty (30) respondents including ten (10) members each, from the group of students, professionals, and Small-and-Medium Enterprises (SMEs). Moreover, the Acceptability Composite Index (ACI), and Desirability Composite Index (DCI) were used to determine the ranks of each treatment. For hedonic acceptability, T3 and T4 were the most accepted in terms of color. Moreover, with regard to the aroma, T3 was the most preferred. With regards to texture, T2 was the most accepted, and in terms of taste, T1 was the most preferred by the group of panelists. For semantic desirability, the most preferred of the panelists with regard to color was T4. The T2 was the most favored by the panelists in terms of aroma. With regards to texture, T3 was the most preferred; furthermore, T1 was the most liked in terms of taste by the panelists. It was computed that the ROI of T1 is 50%. Furthermore, T2 has a 55% estimated ROI, while T3 and T4 have a higher ROI than T1 and T2, with a 55%, and 66% estimated ROI, respectively.

Keywords: Bottling, plant-based flavouring, cream dory, tomato sauce style

Introduction

Fish are consumed by humans as delicious food and are known as healthy dishes when cooked. They demand high-quality processed foods with minimal changes in nutritional value. Recent techniques in food processing such as handling, packaging, preservation, and storing minimize the same. Food manufacturers develop many processing technologies to reduce undesirable changes in food due to processing (Belcher, 2006).

Cream Dory *Pangasianodon hypophthalmus* is a portion of important fish food, and it is farmed extensively in many parts of the world. It is now slowly being accepted in local markets as consumers enjoy its neutral taste, flavor, texture, and low price. Cream Dory is rich in protein and omega 3, an ingredient that is good for the heart. The Cream Dory is available in public markets, supermarkets, restaurants, and food outlets (Pinoyentre, 2012) [14].

Value-addition can provide another level of safety, increase shelf-life, help maintain a high level of quality, open new market opportunities, and offer a solution for supply issues. Value-added fish and shellfish products usually undergo some level of processing that will inactivate and kill bacteria and pathogens. The inactivation or reduction of bacteria in food generally results in shelf-life extension and can also provide new market opportunities (Morrisey, 2011) [13]. The bottling process is an important value-added process that includes placing foods in jars and heating them to a temperature that destroys microorganisms that could be a health hazard. Also, bottling inactivates enzymes that could cause the food to spoil. On the other hand, bottling provides a shelf life that typically ranges from one to five years (Wilmore *et al.*, 2015; Harris and Soule, 2017) [12].

The use of plant-derived natural compounds such as essential oils, plant extracts, hydrocolloids, phenolic compounds, etc. is very popular in seafood preservation. Their strong antimicrobial and antioxidant activities present great potential for use in the food industry (Einarsson and Lauzon, 1995; Benkeblia, 2004; Chouliara *et al.*, 2007) [4, 8, 10]. Plant extracts and essential oils can be derived from plant petals, leaves, fruits, peels, stems, roots, and xylems, and their antioxidant effects are due to volatile organic compounds, terpenoid, and phenolic components in the plant (Bajpai *et al.*, 2007) [3]. There were three plant flavorings used in this study: oregano *Origanum* vulgare, lemongrass *Cymbopogon citratus*, and turmeric *Curcuma longa*. Oregano is considered a staple herb in many cuisines around the world. It has a strong flavor and brings warmth to dishes, along with a hint of subtle sweetness (Rachael, 2017) [15]. Moreover, lemongrass is a primary culinary herb in several types of Asian cuisine. Thai food in particular makes use of lemongrass in traditional dishes, and it has an elegantly subtle citrus flavor that complements these ethnic foods. It adds a lovely citrus flavor that is light and aromatic when used in almost any dish. The flavor is quite light and does not overpower other flavors in a dish (Cindermint, 2022) [7]. Turmeric has been used for centuries as a spice and coloring agent. It's a spice of India, and the love of this perennial root has been expanding rapidly throughout the world. In cooking, its peppery, slightly bitter flavor is often enhanced with the addition of cumin and citrus (Terri, 2016) [18].

The study generally aims to determine the acceptability and desirability of bottled Cream Dory in tomato sauce style, flavored with organic plant flavorings such as oregano, lemongrass, and turmeric.

Specifically, it aims to: determine the acceptability and desirability of the finished product by different groups of panelists (student, professional, small-and-medium enterprise SME) using a hedonic scale, semantic scale, Acceptability Composite Index (ACI), and Desirability Composite Index (DCI); determine the acceptability and desirability of the finished product in terms of color, aroma,

texture, and taste using a hedonic scale, semantic scale, ACI, and DCI, and determine the cost and return analysis of each treatment.

Materials and Methods

Study Area

The study was conducted at the Fish Processing Laboratory of the Provincial Institute of Fisheries, Isabela State University - Roxas Campus, located at (Midsite), Barangay Matusalem, Roxas, Isabela.

Research design

The experimental type of research design employed in this study was designed to answer the question of the acceptability and desirability of the bottled Cream Dory in tomato sauce style flavored with oregano, lemongrass, and turmeric extract. The taste test procedure was done by the panelists using a semantic scale and a hedonic scale. The ACI and DCI have also been used to show the rank of acceptability and desirability of the bottled Cream Dory by the different groups of panelists in terms of color, aroma, texture, and taste of each treatment.

Research instrument

The hedonic scale comprises a series of nine verbal categories ranging from "dislike extremely" to "like extremely" and was described as such in various sensory texts (Peryam and Pilgrim, 1957). For subsequent quantitative and statistical analysis, the verbal categories are generally assigned numerical values, ranging from "like extremely" as "9" to "dislike extremely" as "1". This study also obtained a semantic scale for gathering data. The semantic scale has 5-point that has descriptions for each criterion.

Research method

The respondents rated the color, aroma, texture, and taste of the product through sensory evaluation using the hedonic scale, wherein 1 was the lowest rate and 9 was the highest rate of the product. The product was also rated using the semantic scale; herein, it has a 5-point scale that has specific descriptions for each criterion. For the color, it was described as dull, moderately dull, neither dull nor vibrant, moderately vibrant, and vibrant. Furthermore, the aroma was rated as mild, moderately mild, neither mild nor intense, moderately intense, and intense. The texture of the finished product is described as rough, moderately rough, neither rough nor smooth, moderately smooth, and smooth. As for the taste, it was rated as not delicious, moderately not delicious, neither not delicious nor delicious, moderately delicious, and delicious.

Statistical analysis

The data were analyzed using Two-way Analysis of Variance (ANOVA) and the Tukey Honestly Significant Difference (HSD) test, which were also used to determine if the different groups of respondents and treatments significantly affected the product in terms of color, aroma, texture, and taste. All statistical tests were run in the Statistical Package for Social Sciences (SPSS) software version 16.

Result

Color Acceptability and Desirability

The T3 with "lemongrass extract" and the T4 with "turmeric extract" were the most desired and widely accepted treatments across the different groups of panelists, according to the hedonic scale. The T3 and T4 have a rating of 8.07 (LVM), followed by T2 with "oregano extract" with a rating of 8.00, and the least was T1 "control" with 7.97 (LVM). All treatments were described as "Like Very Much" LVM. Furthermore, based on the semantic scale, the most preferred by the panelists was the T4, which got the highest average desirability of 4.27, which is described as "Moderately Vibrant" MV, followed by T2 at 4.20, T3 at 4.17, and the least was T1 at 4.10. All treatments were described as "Moderately Vibrant" MV.

Among the group of students, based on the hedonic score, T3 is the most preferred by the students, which got the highest score of 8.20, followed by T2 and T4, which both had an average score of 8.10, and the lowest was T1 with a score of 8.00. Furthermore, T1, T2, T3, and T4 were all described as "Like Very Much" LVM by the student panelists. With regards to the semantic scale, T3 was noted as the highest among its group with a mean score of 4.10, followed by T2 (3.90), and the least were both T1 and T4 with a rate of 3.80, all described as "Moderately Vibrant" MV by the student panelists.

In terms of the group of professional panelists, with regard to acceptability, the T3 received the highest hedonic score of 8.10, followed by 8.00 for the T1, T2, and T4, respectively. All the treatments were preferred as "Like Very Much" LVM. Furthermore, in the semantic description, T2 and T4 were the most preferred by the professionals, with the highest mean score of 4.40, followed by T1 and T3 with scores of 4.30 and 4.20, respectively. All the treatments were described as "Moderately Vibrant" MV by the professional respondents.

The T4 color received the highest average score of 8.10, followed by 7.90 from the T1, T2, and T3, respectively. All the treatments were preferred as "Like Very Much" LVM. With regards to the semantic scale, the color of the T4 was the most accepted by the SMEs with the highest mean score of 4.60, which is described as "Vibrant" V. The color of the T2 has a mean score of 4.30, and the T1 and T3 have both a mean score of 4.20 and are all described as "Moderately Vibrant" V.

Color acceptability and desirability

Table 1: Color Acceptability and Desirability of the Bottled Cream Dory in Tomato Sauce Style with Different Organic Flavorings

Treatment	Students		Professionals		SMEs		Mean of Treatments	
	Hedonic	Semantic	Hedonic	Semantic	Hedonic	Semantic	Hedonic	Semantic
1	8.00±.67 LVM	3.80±1.23 MV	8.00±.67 LVM	4.30±.67 MV	7.90±.74 LVM	4.20±.42 MV	7.97±.67 LVM	4.10±.84 MV
2	8.10±.57 LVM	3.90±1.29 MV	8.00±.82 LVM	4.40±.70 MV	7.90±.74 LVM	4.30±.48 MV	8.00±.70 LVM	4.20±.89 MV
3	8.20±.63 LVM	4.10±1.29 MV	8.10±.99 LVM	4.20±.42 MV	7.90±.74 LVM	4.20±.42 MV	8.07±.78 LVM	4.17±.80 MV
4	8.10±.74 LVM	3.80±1.32 MV	8.00±.82 LVM	4.40±.52 MV	8.10±.57 LVM	4.60±.52 V	8.07±.70 LVM	4.27±.91 MV
Mean of Group Respondents	8.10±.63 LVM	3.90±1.24 MV	8.03±.80 LVM	4.33±.57 MV	7.95±.68 LVM	4.33±.47 MV		

LVM = Like Very Much; MV = Moderately Vibrant; V = Vibrant

Aroma acceptability and desirability

Based on the hedonic scale, the T3 with "lemongrass extract" was the most desired and generally approved among the treatments by the various groups of panelists. T3 has a rating of 8.03, followed by T2 with "oregano extract" with a rating of 8.00, and the least was T1 "control and T4 with 7.77 and 7.90, respectively. All treatments were described as "Like Very Much" LVM. Furthermore, based on the semantic scale, the most accepted by the panelists was T2, which got the highest average desirability of 3.20, which was described as "Neither Mild nor Intense" NMNI, followed by T3 at 3.17, T4 at 3.07, and the least was T1 at 2.77. All treatments were described as "Neither Mild nor Intense" NMNI.

Moreover, according to the hedonic score, the aroma of T3 is the most chosen by the students who received the highest score of 8.20, followed by 8.10 for T1, T2, and T4 consecutively. Furthermore, T1, T2, T3, and T4 were all described as "Like Very Much" LVM by the student panelists.

With regards to the semantic scale, T2 was noted as the highest among its group with a mean score of 2.60, followed by 2.40 of the T1 and T2, respectively, and the lowest was the T4 with a rate of 2.30 all described as "Moderately Vibrant" MV by the student panelists. The T2 was semantically described as "Neither Mild nor Intense" NMNI, and the T1, T3, and T4 were semantically described as "Moderately Mild" MM.

Furthermore, in the hedonic score, the aroma of T4 is the most acceptable by the expert respondents, receiving an 8.10, followed by T3 with an 8.00, T2 with a 7.80, and T1 with a 7.50. "Like Very Much" LVM was used to characterize all the treatments. Furthermore, in the semantic description, T3 was noted as the highest among the groups with an average score of 4.50, followed by T2 and T4 with an average score of 4.40, and the least was T1 with a score of 3.20. The aroma of the T3 was semantically described as "Intense" I, T4 was described as 'Moderately Intense" MI, and both the T1 and t2 were described as "Neither Mild nor Intense" NMNI by the professional respondents.

Lastly, the T2 aroma received the highest average score of 8.10 from the SMEs, followed by T3 at 7.90, T1 at 7.70, and T4 at 7.50. All the treatments were preferred as "Like Very Much" LVM. With regards to the semantic scale, the aroma of the T1 was the most accepted by the SMEs with the highest mean score of 2.70 (NMNI), followed by T2 and T3 which both described as "Neither Mild nor Intense" NMNI with an average score of 2.60, and the least was T1 with an average score of 2.50 which also semantically described as "Neither Mild nor Intense" NMNI.

Aroma Acceptability and Desirability

Table 2: Aroma Acceptability and Desirability of the Bottled Cream Dory in Tomato Sauce Style with Different Organic Flavorings

Treatment	Students		Professionals		SMEs		Mean of Treatments	
	Hedonic	Semantic	Hedonic	Semantic	Hedonic	Semantic	Hedonic	Semantic
1	8.10±.88 LVM	2.40±1.08 MM	7.50±.71 LVM	3.20±1.23 NMNI	7.70±.67 LVM	2.70±1.16 NMNI	7.77±.77 LVM	2.77±1.17 NMNI
2	8.10±.74 LVM	2.60±1.43 NMNI	7.80±.79 LVM	4.40±.84 NMNI	8.10±.57 LVM	2.60±1.26 NMNI	8.00±.70 LVM	3.20±1.45 NMNI
3	8.20±.79 LVM	2.40±1.35 MM	8.00±1.05 LVM	4.50±.71 I	7.90±.74 LVM	2.60±1.07 NMNI	8.03±.85 LVM	3.17±1.42 NMNI
4	8.10±.88 LVM	2.30±1.06 MM	8.10±.88 LVM	4.40±.70 MI	7.50±.71 LVM	2.50±1.188 NMNI	7.90±.84 LVM	3.07±1.36 NMNI
Mean of Group Respondents	8.13±.80 LVM	2.43±1.20 MM	7.85±.86 LVM	4.13±1.01 MI	7.80±.69 LVM	2.60±1.13 NMNI		

LVM = Like Very Much; MM = Moderately Mild; MI = Moderately Intense; NMNI = Neither Mild nor Intense; I = Intense

Texture acceptability and desirability

Among treatments, based on the hedonic scale, T3 with "oregano extract" was the most preferred and generally accepted by the different groups of panelists. T2 has a rating of 8.30, followed by T1 "control" with a rating of 8.20, T4 with a rating of 8.13, and the least was T3 with "lemongrass extract" with a rating of 7.93. All treatments were described as "Like Very Much" LVM. Furthermore, based on the semantic scale, the most accepted by the panelists was T3, which got the highest average desirability of 4.53, which was described as "Smooth" S, followed by T2 and T4, which both got an average desirability of 4.47, and the least accepted was T1 at 4.40. Treatments 1, 2, and 4 were described as "Moderately Smooth" MS.

Among the group of students, based on the hedonic score, the textures of T1 and T4 were the most preferred by the students, which both got the highest score of 8.40, followed by 8.30 for T3, and the lowest was T2 with an average score of 8.20. Furthermore, all the treatments were described as "Like Very Much" LVM by the student panelists. With regards to the semantic scale, T4 was noted as the highest among its group with a mean score of 4.90, followed by 4.80, 4.70, and 4.30 of the T3, T2, and T1, respectively. All the treatments were semantically described as "Smooth" S.

Among the group of professional panelists, in the hedonic score, the textures of T1 and T2 were the most accepted by the professional respondents, which both got the highest score of 8.40, followed by T4 with a score of 7.80, and the lowest was T3 with a score of 7.30. All the treatments were described as "Like Very Much" LVM. Moreover, in the semantic description, T1 was noted as the highest among the group with an average score of 4.60, followed by T2 at 4.50, and the lowest were both the T3 and T4 with an average score of 4.40. The texture of the T1 and T2 were both semantically described as "Smooth" S, and the T3 and T4 were described as 'Moderately Smooth" MS by the professional respondents.

Among the group of SMEs panelists, the texture of T2 was the most accepted by the SMEs with the highest average score of 8.30, followed by T3 and 4 at 8.20, and T1 at 7.80. All the treatments were preferred as "Like Very Much" LVM. With regards to semantic scale, the texture of the T3 was the most accepted by the SMEs with the highest mean score of 4.40 (MS), followed by T1, which was described as "Moderately Smooth" MS with an average score of 4.30, and T2 and T4, with an average score of 4.20 and 4.10, respectively, which were also semantically described as Moderately Smooth" MS.

Texture acceptability and desirability

Table 3: Texture Acceptability and Desirability of the Bottled Cream Dory in Tomato Sauce Style with Different Organic Flavorings

Treatment	Students		Professionals		SMEs		Mean of Treatments	
	Hedonic	Semantic	Hedonic	Semantic	Hedonic	Semantic	Hedonic	Semantic
1	8.40±.70 LVM	4.30±.67 S	8.40±.70 LVM	4.60±.52 S	7.80±.63 LVM	4.30±.82 MS	8.20±.71 LVM	4.40±.67 MS
2	8.20±.63 LVM	4.70±.48 S	8.40±1.26 LVM	4.50±.97 S	8.30±.82 LVM	4.20±.79 MS	8.30±.67 LVM	4.47±.78 MS
3	8.30±.67 LVM	4.80±.42 S	7.30±1.57 LVM	4.40±.70 MS	8.20±.79 LVM	4.40±.52 MS	7.93±1.14 LVM	4.53±.57 S
4	8.40±.52 LVM	4.90±.32 S	7.80±1.62 LVM	4.40±.52 MS	8.20±.79 LVM	4.10±.74 MS	8.13±1.07 LVM	4.47±.63 MS
Mean of Group Respondents	8.33±.62 LVM	4.67±.48 S	7.98±1.37 LVM	4.48±.68 MS	8.13±.76 LVM	4.25±.71 MS		

LVM = Like Very Much; S = Smooth; MS = Moderately Smooth

Taste acceptability and desirability

Among treatments, based on the hedonic scale, the T1 "control" was the most preferred and generally accepted by the different groups of panelists, with a rating of 8.40, followed by T4 with "turmeric extract, T2 with "oregano extract, and T3 with "lemongrass extract", with a rating of 8.37, 8.07, and 8.03, respectively. All treatments were described as "Like Very Much" LVM. Furthermore, based on the semantic scale, the most accepted by the panelists was T1, which got the highest average desirability of 4.57, which was described as "Delicious" D, followed by T4, which got an average desirability of 4.47, T3 with an average score of 4.43, and the least accepted was T2 at 4.33. Treatments 2, 3, and 4 were described as "Moderately Delicious" MD.

Among the group of students, based on the hedonic score, the taste of T3 was the most accepted by the students, which got the highest score of 8.70, described as "Like Extremely" LE, followed by 8.60 (LE) of the T4, 8.20 of the T1, and the least was T2 with an average score of 8.00. Furthermore, T1 and T2 were described as "Like Very Much" LVM by the student panelists. With regards to the semantic scale, T4 was noted as the highest among its group, followed by T3, T1, and T2 with a mean score of 4.70, 4.60, and 4.50, respectively. All the treatments were semantically described as "Delicious" D.

Among the group of professional panelists, in the hedonic score, the taste of the T1 was the most accepted by the professional respondents, which got the highest score of 8.40, followed by T4 with a score of 8.10, T2 with a score of 7.70, and the least was the T3 with a score of 7.40, which was described as "Like Moderately" LM. All the treatments were described as "Like Very Much" LVM. Moreover, in the semantic description, T1 was noted as the highest among the group with an average score of 4.50, followed by T4 at 4.10, and the lowest were both the T2 and T3 with an average score of 4.00. The taste of the T1 was semantically described as "Delicious" D, and the T2, T3, and T4 were described as 'Moderately Delicious" MD by the group of professional respondents.

Among the group of SMEs panelists, based on the hedonic score, the taste of T1 was the most accepted by the SMEs with the highest average score of 8.60, which is described as "Like Extremely" LE, followed by T2 with an average score of 8.50 (LE), T4 at 8.40, and the least, T3 at 8.00. Both the T4 and T3 were preferred as "Like Very Much" LVM. With regards to the semantic scale, the taste of both the T1 and T3 was the most accepted by the SMEs with the highest mean score of 4.60, followed by T2 and T4 with both scores of 4.50. All treatments were all semantically described as "Delicious" D.

Taste acceptability and desirability

Table 4: Taste Acceptability and Desirability of the Bottled Cream Dory in Tomato Sauce Style with Different Organic Flavorings

Treatment	Students		Professionals		SMEs		Mean of Treatments	
	Hedonic	Semantic	Hedonic	Semantic	Hedonic	Semantic	Hedonic	Semantic
1	8.20±1.03 LVM	4.60±.52 D	8.40±70 LVM	4.50±.53 D	8.60±.52 LE	4.60±.52 D	8.40±1.89 LVM	4.57±.50 D
2	8.00±1.89 LVM	4.50±.53 D	7.70±1.25 LVM	4.00±.57 MD	8.50±.53 LE	4.50±.53 D	8.07±1.34 LVM	4.33±.76 MD
3	8.70±.48 LE	4.70±.48 D	7.40±1.71 LM	4.00±.94 MD	8.00±.82 LVM	4.60±.52 D	8.03±1.22 LVM	4.43±.73 MD
4	8.60±.97 LE	4.80±.42 D	8.10±.99 LVM	4.10±.57 MD	8.40±.84 LVM	4.50±.71 D	8.37±.93 LVM	4.47±.63 MD
Mean of Group Respondents	8.38±1.19 LVM	4.65±.48 D	7.90±1.24 LVM	4.15±.80 MD	8.38±.70 LVM	4.55±.55 D		

LE = Like Extremely; LVM = Like Very Much; LM = Like Moderately; D = Delicious; MD = Moderately Delicious

Acceptability composite index (ACI)

The hedonic Acceptability Composite Index (ACI) is the grand mean rating of four criteria (color, aroma, texture, taste) known as general acceptability. The ranking per treatment was also determined based on their grand mean score. Among the group of student respondents, the T3 with "lemongrass extract" was the most accepted. On the other hand, among the group of professional panelists, the T2 with "oregano extract" was the most preferred. Moreover, the T2 was also the most accepted among the group of SME panelists. It indicates that the acceptability level of Cream Dory in tomato sauce style with organic flavorings has the capability for commercialization and will demand good marketing in terms of business ventures.

Desirability composite index (DCI)

From the semantic view, which stated that the description preferences of the products were also determined from Table 17, known as the Desirability Composite Index (DCI), the DCI was the average percentage of each criterion given by the panelists. Among the group of student respondents, the T3 with "lemongrass extract" was the most accepted. Furthermore, among the group of professional panelists, the T4 with "turmeric extract" was the most preferred. Moreover, among the group of SME panelists, the T3 was also the most accepted. It denoted that Cream Dory in tomato sauce style with organic flavorings has the capability for commercialization and gives additional income to the post-harvest industry.

Table 5: Acceptability Composite Index (ACI) Result

Group of Respondents	Treatment	Hedonic Color	Color 22.3%	Hedonic Aroma	Aroma 19%	Hedonic Texture	Texture 19.5%	Hedonic Taste	Taste 39.2%	Total ACI	Rank per Group of Respondent
Students	1	8.00	1.78	8.10	1.54	8.40	1.64	8.20	3.21	8.17	3
	2	8.10	1.81	8.10	1.54	8.20	1.60	8.00	3.14	8.09	4
	3	8.20	1.83	8.20	1.56	8.30	1.62	8.70	3.41	8.42	1
	4	8.10	1.81	8.10	1.54	8.40	1.64	8.60	3.37	8.36	2
Professionals	1	8.00	1.78	7.50	1.43	8.40	1.64	8.40	3.29	7.87	3
	2	8.00	1.78	7.80	1.48	8.40	1.64	7.70	3.02	8.14	1
	3	8.10	1.81	8.00	1.52	7.30	1.42	7.40	2.90	7.65	4
	4	8.00	1.81	8.10	1.54	7.80	1.52	8.10	3.18	8.05	2
SMEs	1	7.90	1.76	7.70	1.46	7.80	1.52	8.60	3.37	8.11	3
	2	7.90	1.76	8.10	1.54	8.30	1.62	8.50	3.33	8.25	1
	3	7.90	1.76	7.90	1.50	8.20	1.60	8.00	3.14	8	4
	4	8.10	1.81	7.50	1.43	8.20	1.60	8.40	3.29	8.13	2

Table 6: Desirability Composite Index (DCI) Result

Group of Respondents	Treatment	Hedonic Color	Color 22.3%	Hedonic Aroma	Aroma 19%	Hedonic Texture	Texture 19.5%	Hedonic Taste	Taste 39.2%	Total ACI	Rank per Group of Respondent
Students	1	3.80	0.85	2.40	0.46	4.30	0.84	4.60	1.80	3.95	4
	2	3.90	0.87	2.60	0.50	4.70	0.92	4.50	1.76	4.05	3
	3	4.10	0.91	2.40	0.46	4.80	0.94	4.70	1.84	4.15	1
	4	3.80	0.85	2.30	0.44	4.90	0.96	4.80	1.88	4.13	2
Professionals	1	4.30	0.96	3.20	0.61	4.60	0.90	4.50	1.76	4.23	3
	2	4.40	0.98	4.40	0.84	4.50	0.88	4.00	1.57	4.27	2
	3	4.20	0.94	4.50	0.86	4.40	0.86	4.00	1.57	4.23	3
	4	4.40	0.98	4.40	0.84	4.40	0.86	4.10	1.61	4.30	1
SMEs	1	4.20	0.94	2.70	0.51	4.30	0.84	4.60	1.80	4.09	2
	2	4.30	0.96	2.60	0.50	4.20	0.82	4.50	1.76	4.04	4
	3	4.20	0.94	2.60	0.50	4.40	0.86	4.60	1.80	4.10	1
	4	4.60	1.03	2.50	0.48	4.10	0.80	4.50	1.76	4.07	3

Cost and return analysis of bottled cream dory in tomato sauce style

The return on investment (ROI) is the money an investor in a business earns for the injection of financial capital. Any return is from the net profit the business makes and is a mark of the efficiency of investing capital in the venture. Table 18 shows that T1 has a 50% estimated ROI, T2 has a 55% estimated ROI, T3 has a 60% estimated ROI, and T4 has a 66% estimated ROI.

Table 7: Cost and Return Analysis of Bottled Cream Dory in Tomato Sauce Style

Ingredients	Treatment 1	Treatment 2	Treatment 3	Treatment 4
Cream Dory Fillet	160g @ 50	160g @ 50	160g @ 50	160g @ 50
Tomato Sauce	40g @ 20	40g @ 20	40g @ 20	40g @ 20
Tomato Paste	10g @ 15	10g @ 15	10g @ 15	10g @ 15
Salt	1.2g @ 1	1.2g @ 1	1.2g @ 1	1.2g @ 1
Hot Pepper	9g @ 5	9g @ 5	9g @ 5	9g @ 5
Vegetable Oil	0.7ml @ 8	0.7ml @ 8	0.7ml @ 8	0.7ml @ 8
Oregano Extract	0ml	10ml @ 10	0ml	0ml
Lemongrass Extract	0ml	0ml	10ml @20	0ml
Turmeric Extract	0ml	0ml	0ml	10ml @ 30
Bottle	50	50	50	50
Total Expenses	149	159	169	179
Unit Price	45	45	45	45
Retail Price	75 x 6 bottle	75 x 6 bottle	75 x 6 bottle	75 x 6 bottle
Total Selling	75.00/bottle x 6 bottle	75.00/bottle x 6 bottle	75.00/bottle x 6 bottle	75.00/bottle x 6 bottle
Profit = Total Selling-Total Expenses	450 – 149	450 - 159	450 - 169	450 - 179
Net income	301	291	281	271
ROI	149 x 100 301	159 x 100 291	169 x 100 281	179 x 100 271
ROI	50%	55%	60%	66%

Formula for ROI – Total Expenses/Net Income * 100

Discussion

Hedonic Acceptability and Semantic Desirability

The flavor may have the largest impact on acceptability and desire to consume a product. However, the color of the food may affect the perception of the flavor; hence, when the color is not vibrant in the eyes, there is a stepping back in consuming it. In this study, the color of the bottled Cream Dory enhanced with both lemongrass and turmeric extracts got the highest acceptability amongst treatments. With regards to aroma, the bottled Cream Dory enhanced with lemongrass extract received the highest acceptability among treatments. The olfactory perception of the panelists may have a great impact on the taste enhancement of the product. Lemongrass is often sold in stem form and has been used in

cooking. It adds a satisfactory citrus flavor that is light and aromatic when used in almost any dish. The flavor of lemongrass, when used as a food enhancer, is quite light and does not overpower other flavors in a dish (Cindermint, 2022) [7]. In addition, turmeric color also serves as a good food enhancer and has been used for centuries for spice, coloring agents, and medicinal purposes due to the distinctive flavor of foods and because of the components contained in the turmeric, such as sugar, protein, resin, and volatile oils such as turmerone, atlantone, and zingiberene. The yellow pigment called curcumin is the most prevalent among many bioactive ingredients in turmeric, which makes up 60% to 70% of crude turmeric extracts (Brennan, 2020) [5].

It can be noted that the texture of the bottled Cream Dory with oregano extract had the highest acceptability among treatments. Brune *et al*., (1989) [6] reported that oregano inhibits iron absorption, and the effect is caused by its galloyl substances, and the inhibition is in proportion to its content of galloy1 groups. Oregano also has a relatively modest energy and fat content (66 kcal/100 g and 2 g fat/100 g, respectively). According to Gray *et al*., (1997) [11], the concentration of oregano in food can increase or reduce its palatability and intake compared with an unseasoned control food. It is also used in many foods and beverages in the food industry; meat sauces, canned foods, vinegar, vermouths, and bitters are often seasoned with oregano. It increases aroma in such vegetable dishes as pea soup and other pea dishes, squash, and stews made from mixed vegetables, mushrooms, and asparagus.

It can be distinguished that the treatment without organic flavoring (control) was the most accepted by the group of panelists in terms of the taste of the bottled Cream Dory. The most important sensory property is taste in foods, which have relatively low flavor intensity. Moreover, given the fact that the multidimensional evaluation of the palatability of foods is strongly influenced by properties requiring physical measurement, they proposed the introduction of a new concept, physical taste, for making effective evaluations of food palatability. More quantitative texture studies related to food quality are required, as is research on the traditional four or five basic tastes (Tadashi and Kohmei, 1985) [17].

ACI and DCI

The study used ACI and DCI to evaluate the acceptability and desirability of the bottled Cream Dory through the data gathering instruments, which are hedonic and semantic scales. Based on ACI, among the group of student respondents, the bottled Cream Dory enhanced with lemongrass extracts (T3) was the most accepted, and among the group of professionals and SMEs, the oregano extracts (T2) got the highest score, which made it rank one. DCI also revealed that T3 was the most accepted by students and SMEs. Furthermore, the T4 with "turmeric extract" was the most preferred by the professionals. In industrial processes, synthetic antioxidants are mainly used to prolong the preservation of nutrients; however, many researchers point out that some synthetic antioxidants used in food processing for a long time have carcinogenic and teratogenic effects on living organisms. Based on the ACI and DCI results, consumers generally prefer natural antioxidants over synthetic ones. Hence, spices and natural aromatic herbs that are used as additives to increase the properties of nutrients such as smell and taste have become increasingly important. The antioxidant effect of phenolic compounds found in the structures of organic plants derives from their properties such as cleaning free radicals, compounding with metal ions, and preventing the formation of single oxygen. Some of these herbs and spices have been proven to have more antioxidant capacities than synthetic antioxidants. Because of the flavors and aromas peculiar to them and their antimicrobial and antioxidant properties, herbs and spices that have a wider bioactivity profile are natural antioxidant substances that can be used as an alternative in the food industry. Prevention of lipid oxidation in foods with such natural substances is very important for the producer and consumer (Altun *et al*., 2004) [2].

Cost and return analysis

It is unreasonable to expect all new products to be successful and profitable. Looking at the aggregate return reflects the importance of having strong performers compensate for the shortcomings of products that don't meet profit hurdles or don't make it past the development stage and into the market (David, 2012). Table 22 shows that T1 has a 50% estimated ROI, T2 has a 55% estimated ROI, and T3 and T4 have a 60% and 66% estimated ROI, respectively. The estimated ROI got higher and higher from T1 to T4 because the estimation was based on the price of each ingredient per treatment, given that there are different extracts that were used. In that context, the value of an investment in innovation can't be measured by the originality of an idea or the net sales it may produce. Return on innovation investment may, in fact, involve many missteps along the way, and the value gained from these activities in terms of knowledge and experience may make it possible to achieve a greater return on investment further down the line (Adam *et al*., 2021) [1].

Conclusion

The study was conducted to determine the acceptability, desirability, and characteristics of the bottled Cream Dory in tomato sauce style with different organic flavorings. The characteristics of the product were determined through sensory evaluation in terms of color, aroma, texture, and taste using the hedonic, semantic, ACI, and DCI scales. The results of the four treatments with regard to acceptability and desirability were based on a hedonic scale with a 9-point scale and a semantic scale for a connotative description of the finished product. On the hedonic scale, based on mean score, with regards to color, T3 and T4 were the most accepted by the panelists. The most accepted treatment in terms of texture was T2. With regards to taste, T1 was most highly accepted. For the semantic scale, based on the mean score, the most preferred with regard to color was the T4. The T2 was the most favored in terms of aroma. In terms of texture, T3 was the most preferred; furthermore, T1 was the most preferred in terms of taste. In the ACI result, among the group of student respondents, T3 was the most accepted, and among the group of professionals and SMEs, T2 was most preferred. The DCI also revealed that T3 was the most accepted by students and SMEs. Furthermore, the T4 was the most preferred by the professionals. In the ANOVA for Treatment vs. Group of Respondents, the treatment and group and their interaction do not significantly affect the hedonic color, aroma, texture, and taste of the product. However, based on semantics, the

group of respondents significantly influenced the aroma, texture, and taste. This means that treatment does not significantly impact the product, the same as with their interaction in the semantic view. Based on the computation of the ROI, it was computed that T1 has a 50%, T2 has a 55%, T3 has a 60%, and T4 has a 66% estimated ROI.

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