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Guso (*Eucheuma sp.*) Ice Cream Enhanced with Blue ternate

Jessica D. Astillo, Margie V. Avenido, Floramae M. Bantilan, Rezel Jay A. Laroda

Bohol Island State University Clarin Campus, Philippines

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Abstract— *The main thrust of this study was to determine the profile of Guso (Eucheuma sp.) Ice Cream enhanced with Blue ternate in terms of ingredients and costing, tools and equipment, procedure, shelf life, nutritive value, sensory qualities and level of preferences in three different treatments in the aspect of appearance, taste, aroma, and texture. The study utilized experimental design with the aid of a descriptive questionnaire which determined the sensory preferences of the respondents towards the three treatments of the Ice cream in terms of appearance, taste, aroma, and texture. This study was conducted at Bohol Island State University in the six campuses with thirty (30) purposively selected participants who tasted and rated the Ice cream. To obtain the nutritive content samples were sent to the First Analytical Service and Technical Cooperative Laboratories for nutritional content and microbial analysis. After the data were retrieved, these were tabulated and interpreted using the Average Weighted Mean. The Friedman Test was used to obtain the difference in the participants' sensory preferences for the three treatments. Findings revealed that the ingredients and tools in making the Guso (Eucheuma sp.) Ice Cream enhanced with Blue ternate were minimal, less expensive, and available in the local market. The nutritive content of the Guso (Eucheuma sp.) is Iron, Sodium, Calcium, Fats, Calories, Dietary fiber, Vitamin A, Vitamin C, and Vitamin D3 is within the range of recommended daily intake for Filipinos. Shelf life ranged from 2 to 3 months stored at the standard temperature of ice cream, which is 0°F (-18°C) or colder. All treatments of Guso (Eucheuma sp.) Ice Cream enhanced with Blue ternate was liked by the participants in all four attributes. Generally, the result of the study showed that there was a significant difference in the respondents' preferences for Guso (Eucheuma sp.) Ice Cream enhanced with Blue ternate in terms of taste, and texture. Thus, the null hypothesis is rejected. However, data reveals that there is no significant difference in the respondents' preference for Guso (Eucheuma sp.) Ice Cream enhanced with Blue ternate in terms of appearance and aroma. Research findings showed that was a feasible nutritious Ice Cream safe for human consumption. Hence, a proposed technology guide is offered for the dissemination of the research output.*

Keywords— ***dessert, creamy, organic, ice cream***

I. INTRODUCTION

Most Filipinos have a sweet tooth. For special occasions, something sweet must always be on the table, be it desserts or dishes. Ice cream is one of the best desserts that Filipinos are fond of eating. It is consumed mainly by many because of its sweet taste. Ice cream is a popularly known sweet dessert in the world. Ice cream is a frozen dessert made by freezing a pasteurized mix of milk solids, sugar, corn syrup, flavoring, stabilizer, and emulsifier, with or without eggs. In the Philippines, artificially flavored ice cream production became popular because of its appearance and availability. It is in great demand, especially during the summer season. People tend to buy ice cream made with artificial flavorings.

Eucheuma is a species of Seaweed known to be low in calories and high in dietary fiber, antioxidants, vitamins, and minerals such as calcium and potassium. Scientific studies have shown that regular consumption of Eucheuma helps improve bodily functions, including lowering blood pressure, cholesterol, and blood sugar,

preventing cardiovascular diseases, colon cancer, and breast cancer, and promoting anti-aging, brain development, and tissue repair.

Furthermore, Blue ternate *(Clitoria ternatea) is* commonly known as "telang" in the Philippines because of its combined health benefits and its unique aesthetic value. Blue ternate flower received considerable attention from people as potentially valuable sources because it is popular among the communities and more information about the nutrients of the flower. Blue ternate is native and abundant in the Philippines. It provides health advantages and foreseen demands for drinks with helpful benefits. Blueternate flower has the power to heal and offer beneficial enzymes needed by the body that other plants cannot provide (George, 2003).

Today's population increasingly demands and consumes healthy products (Rozycki et al., 2011). The researcher has observed that numerous ice creams with artificial flavorings was known and people are fond of eating not knowing the side effects. The researcher finds possible sources of food that are abundant in the environment and can be made into a nutritious ice cream that can benefit consumers and Guso seaweed farmers. Hence, the researchers will produce ice cream from Guso (Eucheuma sp.) puree enhanced with Blueternate, abundant in the Philippines, specifically in Bohol. Furthermore, the researcher aimed to promote the Guso Ice Cream product if found acceptable.

II. LITERATURE BACKGROUND

This study is based on existing and prevailing laws, theories, and concepts that emphasize technology development for the benefit of all.

Eucheuma is a species of Seaweed known to be low in calories and high in dietary fiber, antioxidants, vitamins, and minerals such as calcium and potassium. Scientific studies have shown that regular consumption of eucheuma helps improve bodily functions, including lowering blood pressure, cholesterol, and blood sugar, preventing cardiovascular diseases, colon cancer, and breast cancer, and promoting anti-aging, brain development, and tissue repair.

Bohol is a major producer of the Eucheuma spinosum variety, commonly known as Eucheuma cottonii, with about 80 percent of the country's supply coming from the farms. (Garcia-Yap,2014) In 1973, Seaweed's farming started in Hingotanan with only a family-sized culturing. Guso farming is known in Bien Unido Bohol. Presently, more than 2,000 families are benefiting from seaweed farming. Out of the total area of 618,315 hectares potential for seaweed development in the whole province of Bohol, 6,215 hectares or 34 percent are located in Bien Unido. 2,482 hectares or 57 percent out of the total 4,340 hectares that are fully developed, are in Bien Unido. Production-wise, Bien Unido is producing 118,744,539 kilos or 118,744 tons of dried seaweeds per annum.

Through industrial processing of the Seaweed cultivated, many edible and non-edible items can be made. In terms of industrial use, the essential component of Seaweed is a substance called Carrageenan, also commonly known as seaweed flour. From your dried Seaweed, about 25% of the weight is Carrageenan. This can be extracted through a complicated industrial process. In its semi-refined or refined form, Carrageenan is used to manufacture food items, both for human and animal consumption. (Roberto, 1990)

In recent years, with the development of food processing technology and the in-depth study of marine algae resources, researches on food processing technology of eucheuma have been carried out in the country, and the characteristics of soft-elasticity of taste and taste are achieved through acid and alkali treatment, and sodium hypochlorite is used for soaking. Sterilization achieves the purpose of food safety. This processing method can significantly increase the flexibility of Eucheuma.

Ice cream is made from dairy milk or cream and is flavored with a sweetener, either sugar or an alternative, and spice, such as cocoa or vanilla, or with fruit such as strawberries or peaches. It can also be made by whisking a flavored cream base and liquid together. Colorings are sometimes added, in addition to stabilizers. The mixture is cooled below the freezing point of water and stirred to incorporate air spaces and to prevent detectable ice crystals from forming. The result is a smooth, semi-solid foam solid at very low temperatures (below 2 °C or 35 °F). It becomes more malleable as its temperature increases.

Blue ternate *(Clitoria ternatea)* commonly known as "telang" in the Philippines because of its combined health benefits and its unique aesthetic value. The utilization of blue ternate has been limited to herbal tea types, pastry flavoring and food coloring. Matured blue ternate flowers falling from the plant are neglected leaving the flower to get rotten. Blue ternate flower received considerable attention to people as potentially valuable sources because it is popular among the communities and more of information about the nutrients of the flower. Most macaroon products in the market are coconut macaroons, so the researchers decided to utilize blue ternate flower as macaroons since there is no existing blue ternate flower product like Macaroon in the market (Rabeta, 2019).

Blue ternate is native and abundant in the Philippines. It provides health advantages and foreseen demands for drinks with helpful benefits. Blue ternate flower has the power to heal and offer beneficial enzymes needed by the body that other plants cannot provide (George, 2003). The flowers of CT, or the Blue ternate flower, widely used as a natural colorant ranging from drink to food (Patras et al., 2010) industries and it is sensitive to temperature and pH changes. Besides, it was used to color the nasi kerabu blue which is a famous dish in Kelantan. Usually, nasi kerabu (blue-colored rice) is eaten with grilled chicken or fried fish coated with flour, fish crackers, salted egg and other local herbs. The flowers are most famously used to make a traditional welcome tea known as dokanchan, which hotels there frequently serve to travelers upon their arrival (Baird, 2015).

Blue ternate has found its application in baked products, violet cakes, gelatins, ice creams, tea, tarts, bakery and savory products (Rabeta, 2018). Since the macaroons is a popular pastry of most people in different ages, it is best to innovate a new flavor in macaroons with natural flavors and ingredients such as blue ternate. The flower of blueternate contains Nitrogen, Phosphorous, potassium, calcium, magnesium, sodium and ash content.

The Theory of Food Choice Development states that learning starts even before birth and carries until the latest stages of life (Koster & Mojet,2006) It takes many forms, from completely unconscious conditioning and simple imitation to cognitive learning based on reasoned argumentation.

This means that food choice is a dynamic behavior subject to almost continuous change that can be influenced at very different levels. It varies not only from person to person and from situation to situation but also depends on the type of food products. Condiments or spices vary much more between and varies depending on the eating situation and the frequency of the individual's exposure to the products. Like these could gain preferences among street food eaters available as one street food option in the market.

Accordingly, the Theory of Innovation by Schumpeter (2007) states that innovation has the capacity and imagination to handle the old system and be able to transform theory into reality. When implemented, innovation is a new idea that leads to a more effective process, product, service, or technology. It provides better solutions that meet advanced, unaddressed or existing market needs.

The Philippine Institute of traditional and Alternative Health Care, P.I.T.A.H.C. accelerates the development of traditional and alternative health care fund for other purposes. The law on Traditional and Alternative Medicine of 1997 is also known as the Republic Act 8423 which states that the quality and delivery of health care services to the Filipino people should be improved through the development of traditional and alternative health care delivery system and a legally workable basis should be sought by which indigenous societies would own their knowledge of traditional medicine.

This research study is anchored on Article XIV Section 10 of the 1987 Philippine Constitution which states that:

> Science and Technology is essential for national development and progress. The state shall give priority to research and development, invention, innovation, and their utilization; and to science and technology education, training and services. It shall support indigenous, appropriate, and self-reliant scientific and technological capabilities, and their application to the country's productive system and national life.

Further, Republic Act No. 8659 Sec. 2 states that the college shall primarily provide higher professional, technical and special instruction and promote research extension services, advance studies and progressive leadership in agriculture, fisheries, forestry, industrial Technology, engineering, arts and sciences, and other fields as may be relevant. It shall also give primary consideration to the integration of research/studies for the development of the province of Bohol.

In relation to the above statement, these articles served as a keystone for the researcher to use indigenous materials to invent something new. With the help of technology, the researcher enhances her ingenuity, skills, and abilities by utilizing available natural resources such as Echeuma sp. Through critical, creative thinking, scientific and technological knowledge, it can yield a product that could help boost the country's progress through performing experiments and discoveries.

Objectives of the Study

The primary purpose of this study was to determine the profile, level of sensory preferences, and significant difference of Guso Ice Cream. The study will be conducted at Bohol Island State University Clarin Campus, the Municipality of Clarin Public Market, and the TESDA Provincial Training Center of Bohol, Tubigon.

Specifically, it aimed to answer the following questions:

1. What is the profile of Guso (Eucheuma sp.) Ice Cream in three treatments in terms of:

    1.1 ingredients and costing;

    1.2 tools and equipment;

1.3 procedures;

1.4 nutritional value;

1.5 shelf- life?

2. What are the respondents' sensory qualities and level of preferences on the Guso (Eucheuma sp.) Ice Cream in three treatments in terms of appearance, taste, aroma, and texture.

3. Is there a significant difference in the sensory preferences of the respondents of the Guso (Eucheuma sp.) Ice Cream in three different treatments?

III. METHODOLOGY

An experimental design will be used in this study. It involved a single variable of three treatment groups in determining the sensory preferences of Guso Ice Cream.

The locale of the study was conducted in Bohol Island State University Clarin Campus. The latter environment provides an appropriate avenue for the researcher to field the food samples to gather data on the innovative food's sensory qualities and preference level since it is near the researcher's location. There were 120 respondents who evaluated the product through sensory evaluation, broken down as follows: 50 people of different ages in Bohol Island State University, Clarin, Campus. Faculty members in B.I.S.U. Clarin with Food Technology NCII in Bohol Island State University, as a target consumer and 10 TESDA Cookery assessor from Provincial Training Center of Bohol, Tubigon, will evaluate the product's sensory qualities and product preference level in the aspects of color, flavor, aroma, and texture of the innovated food. The shelf life of Guso Ice cream will be observed and will be rated by the researchers themselves.

Purposive sampling will be utilized in determining the respondents. They will be chosen according to their ability and knowledge to assess the product quality since they are experts in food preparation. On the other hand, the varied age group of respondents will be utilized as participants who rated the product's preference level.

This study used a self-made questionnaire in obtaining the respondents' assessment of the sensory preference of the Guso Ice Cream. This includes the Ice Cream sensory qualities and the level of preference of the product in terms of color, flavor, aroma, and texture. The questionnaire was based on the Hedonic Scale sheet of Gatchalian, where some modifications were made to fit the present study. As a result, the following scoring system is observed: (9)- like Extremely, (8)-like very much, (7)-like moderately, (6)-like slightly, (5)-neither like nor a dislike, (4)-dislike slightly, (3)-dislike moderately, (2)-dislike very much, (1)-dislike extremely.

The respondents will check the Likert Scale corresponding to their perceptions to get the sensory qualities in terms of color, flavor, aroma, and texture.

In gathering the data on shelf life, an observation guide will be used to keep on track of the changes of the product property at room temperature in 1 month. The product samples will be sent to F.A.S.T Laboratories, Cebu City, for product testing on the aspect of nutrition and microbial analysis.

To determine the ice Guso Ice Cream marketability the researcher will display the product at the Municipality of Clarin Public Market.

To ensure the accuracy and substance of each item in the questionnaire, the researcher will seek advice from the research coordinator and submit the draft to the RDE Team.

IV. RESULTS AND DISCUSSION

1.1 Ingredients and Costing

The Guso (*Eucheuma sp.)* ice cream Enhanced with Blue ternate has a cheaper price per serving than the organic ice cream available in the market. It shows viability for consumption since it is cheaper and the ingredients are available in the local market. Moreover, adding *Eucheuma spinosum* as the main ingredient and Blue ternate flower extract flavoring ingredients increases the product cost.

Ingredients	**Quantity**			**Percentage**			**Unit**	**Unit Cost**	**Total Amount per Treatment**		
	T1	T2	T3	T1	T2	T3			T1	T2	T3
Blue Ternate;	19.7	19.7	19.7	1.45%	1.40%	1.36%	g	200.00/1000 g	3.94	3.94	3.94
Eucheuma sp. Puree	50	100	150	3.89%	7.15%	10.35%	g	100.00/ 1000g	5.00	10.00	15.00

All-purpose Cream	500	500	500	37.25%	35.73%	34.49%	g	60.00 /250g	120	120	120.00
condensed milk	300	300	300	21.55%	21.44%	20.70%	g	250.00/ 1000g	37.50	37.50	37.50
Evaporated milk	370	370	370	27.52%	26.44%	25.53%	g	38.00/ 370ml	38.00	38.00	38.00
Refined Sugar; and	100	100	100	7.55%	7.41%	6.90%	g	100.00/1000g	10.00	10.00	10.00
Vanilla	9.8	9.8	9.8	0.79%	0.70%	0.68%	g	16.00/120 ml	1.30	1.30	1.30
Total Grams per treatment	1349.5	1399.5	1449.5	100 %	100%	100%					
Total Cost									215.74	220.74	225.74
Yield:	40	42	45								
Size/ serving	100 g	100 g.	100 g.								
Cost/serving									5.39	5.25	5.00

The tools used in making *Eucheuma spinosum* ice cream comprise a mortar and pestle, a strainer flower, a measuring cup, a measuring spoon, a rubber spatula, and a blender. All tools used in preparing the bilimbi fruit juice are essential kitchen tools and handy to work on. The equipment involved, like a blender and weighing scale, is less expensive.

1.4 Nutritional Value

Samples of the product were sent to the First Analytical Service and Technical Cooperative Laboratories in Cebu City to determine the nutrient content of the Guso(*Eucheuma sp.)* Ice cream Enhanced with Blue ternate.

Analysis	Result	Test Method
Iron, mg/Kg	23.3 (5.29 mg per serving)	Flame AAS
Sodium mg/Kg	1649	
Calcium mg/Kg	3644	
Fat, g/100g	9.71	Maojonnier Extraction
Calories, g/100g	222	By Calculation
Cholesterol, mg/100g	30.08	Gas Chromatography
Dietary Fiber, g/100 g	1.57	Enzymatic – Gravimetry
Vitamin A, µg RE/100g	Less than 25**	High Performance Liquid Chromatography
Vitamin C, mg/100g	Less than 0.8**	
Vitamin D3 (as Cholecalciferol),mg/100g	Less than 0.42**	

Samples of the product were sent to the First Analytical Service and Technical Cooperative Laboratories in Cebu City to determine the nutrient content of the Guso Ice Cream enhanced with Blue ternate . Laboratory results reveal that the product has a content of Iron 23.3 mg/kg. Iron is a mineral that is naturally present in many foods, added to some food products, and available as a dietary supplement. Iron is an essential component of hemoglobin, an erythrocyte (red blood cell) protein that transfers oxygen from the lungs to the tissues. The amount of iron you need is 8.7mg a day for men over 18. 14.8mg a day for women aged 19 to 50. 8.7mg a day for women over 50. The grams

per serving of the product was 100 grams, hence the iron present in the product per serving is 2.33 mg. It implies that the inclusion of this innovative ice cream is a good contributor to intake to satisfy the RDA for Iron in one's diet.

In the aspect of Sodium content, result shows that the product has 1649 mg/ kilogram. The Daily Values are reference amounts of nutrients to consume or not to exceed each day. The Daily Value for sodium is less than 2,300 milligrams (mg) per day.The product has 100 grams per serving, thus the sodium present in the product was 164 mg. One of sodium's main functions is to balance the amount and distribution of water in our bodies, playing a key role in the control of our blood pressure.

Calcium is a mineral and is important for building strong bones and teeth, especially during childhood and adolescence. It is also important for many body processes, such as blood clotting, hormone secretion, muscle contraction, and nervous system function. In the aspect of the Calcium content of the product, laboratory results revealed 3644 mg of calcium content per kilogram. The grams per serving of the product as indicated in the ingredients and cost was 100 g., thus the calcium content of the products is 364.4 mg per serving. Children should eat a variety of foods that are good sources of calcium. The Daily Value for calcium is 700 milligrams (mg) per day for children 1 through 3 years of age and 1,300 milligrams (mg) per day for adults and children 4 years of age and older. Thus, the calcium present in the product is within the Recommended dietary intake developed by FDA.

The product fat content is 9.71 g/100 grams. Men should not consume more than 30g of saturated fat per day, while women should consume no more than 20g. Children should consume less. As a result, the product's fat content is within the recommended dietary allowance. Fat helps the body absorb vitamin A, vitamin D and vitamin E. These vitamins are fat-soluble, which means they can only be absorbed with the help of fats.

Moreover, the amount of Vitamin A present in the product was less than 25 µg RE/100g. The amount of vitamin A adults aged 19 to 64 need is 700 µg a day for men 600 µg a day for women. Vitamin A is important for normal vision, the immune system, reproduction, and growth and development. Vitamin A also helps your heart, lungs, and other organs work properly.

Percent of the recommended amount (%DV) for an average 2,000-calorie diet based on 60 percent energy from carbohydrates, 10 percent from protein, and 30 percent from fats. The Calorie amount of the product was 222 g/100 grams. The product has 100 grams per serving. The product's calorie content is within the Recommended dietary allowance.

The Dietary Fiber Content of Guso Ice Cream Enhanced with Blue ternate 1.57 g/100 grams. In the 2016 ruling, the FDA increased the daily reference value (DRV) for dietary fiber from 25 grams per day to 28 grams per day.

Moreover, the amount of Vitamin A present in the product was less than 25 µg RE/100g. The amount of vitamin A adults aged 19 to 64 need is 700 µg a day for men 600 µg a day for women. Vitamin A is important for normal vision, the immune system, reproduction, and growth and development. Vitamin A also helps your heart, lungs, and other organs work properly.

The Vitamin C content of the product is less than 0.8 mg/100 grams. The recommended daily amount for vitamin C is 75 milligrams (mg) a day for women and 90 mg a day for men. During pregnancy, 120 mg a day is recommended. The upper limit for all adults is 2,000 mg a day.

Lastly, the Vitamin D3 content of the product is less than 0.42 mg/100g.

The data above signify that all the nutritive contents of "Guso (Euchema sp.) Ice Cream Enhanced with Blue Ternate" in the three treatments are within the recommended dietary allowance for Filipinos. 31 Hence it is a good fruit juice drink substitute for existing product in the market.

1.6 The Shelf-life of Guso *(Eucheuma sp.)* Ice cream Enhanced with Blue ternate

Sensory Qualities	Treatments	Desirable Quality	W1	W 2	W 3	W4	W 5	W 6	W 7	W 8
Color	T1	Light Blue green	**No Changes**							
	T2	Medium Blue green								
	T3	Bue green								
Aroma	T1	No Odor	**No Changes**							
	T2	No Odor								
	T3	No Odor								

Taste	T1	Sweet and Creamy	**No Changes**
	T2	Moderately Sweet and Creamy	
	T3	Slighlty Sweet and Creamy	
Texture	T1	Smooth	**No Changes**
	T2	Slightly Smooth	
	T3	Crystallized	

Shelf life is the period for which food will remain safe and fit for use, provided that it is kept in defined storage condition (Dominic Man,2015). It is interrelated to food safety since the freshness of the food is essential in making 31 a good quality product. Good product quality ensures customer satisfaction and good sale in return. Raw fruit/ or vegetable juice will keep well in the freezer for two to three months (Sindhu, R.,2018). Shelf-life of Guso (*Eucheuma sp.)* in ice cream all treatments were observed within the span of 2 months. Observation data showed that at the onset of 2 months, the color, flavor, aroma, and texture of the three treatments remained the same. Therefore, the shelf life of the Eucheuma ice cream expires more than 2 months after being stored at the standard temperature of ice cream, which is 0°F (-18°C) or colder.

Acceptability Level of Guso Ice Cream in terms of Color, Taste, Aroma and Texture

Treatments	SENSORY ATTRIBUTES	WM	DV	Rank	SENSORY ATTRIBUTES	WM	DV	Rank	SENSORY ATTRIBUTES	WM	DV	Rank	SENSORY ATTRIBUTES	WM	DV	Rank
Treatment 1		7.56	LVM	2		7.76	LVM	2		7.76	LVM	2		7.36	LVM	3
Treatment 2	APPEARANCE	7.83	LVM	1	TASTE	7.96	LVM	1	AROMA	8.06	LVM	1	TEXTURE	8.03	LVM	1
Treatment 3		7.56	LMV	2		7.23	LVM	3		7.60	LVM	3		7.40	LVM	2

The table shows that the three treatments are acceptable in terms of color, taste, aroma, and texture, with respondents describing them as "like very much." In terms of appearance, taste, aroma, and texture, the respondents prefer all of the Guso(*Eucheuma sp.)* Ice Cream Enhanced with Blueternate. In terms of numbers, all treatments achieve the highest average weighted mean. As a result, Guso Ice Cream Enhanced with Blueternate will be the market's alternative ice cream.

The difference in the sensory preference of the respondents on the three treatments of Guso *(Eucheuma spinosum)* Ice Cream Enhanced with Blueternate

Variables	*df*	*α*	Friedman Chi-Squared Test	*p-value*	Result	Decision
Treatments & Appearance	2	0.05	1.5556	0.45	Not Significant	Accepted
Treatments & Taste	2	0.05	8.3333	0.01	Significant	Rejected
Treatments & Aroma	2	0.05	2.0769	0.35	Not Significant	Accepted
Treatments & Texture	2	0.05	8.4902	0.01	Significant	Rejected

There is no significant difference on the appearance of the three treatments, $F_r(2) = 1.56, p = .459$.There is no significant difference on the aroma of the three treatments, $F_r(2) = 2.08, p = .354$.There is a

significant difference on texture among the three treatments, $F_r(2) = 8.49,\ p = .014$. The pairwise comparisons using Wilcoxon signed rank test with Bonferonni correction of $\alpha = \frac{0.05}{3} = 0.017$ showed that t1 & t2 and t2 & t3 are statistically significant with $p = .004$ and $p = .006$, respectively. There is a significant difference on texture among the three treatments, $F_r(2) = 8.33,\ p = .016$. The pairwise comparisons using Wilcoxon signed rank test with Bonferonni correction of $\alpha = \frac{0.05}{3} = 0.017$ showed that t1 & t2 and t2 & t3 are statistically significant with $p = .004$ and $p = .006$, respectively.

V. CONCLUSION

Based on the findings of the study, the Guso *(Eucheuma sp.)* Ice Cream Enhanced with Blue ternate in different treatments is acceptable. It contains food nutrients that are within the recommended dietary value. Treatment 2 was most preferred among the three Variants. Hence, Guso *(Eucheuma sp.)* Ice Cream Enhanced with Blueternate is a feasible nutritious organic Ice Cream produced for consumption and commercialization.

VI. RECOMMENDATIONS

1. The researcher may improve the appearance and aroma to make it more distinctive and appealing to smell.

2. The administration may provide financial assistance for further production of ice cream as an Income Generating Enterprise of the university.

3. Community immersionists may adopt this Organic Ice Cream for innovation to augment the Ice Cream market value in the community.

4. Entrepreneurs may consider this Guso (*Eucheuma sp.)* Ice Cream Enhanced with Blueternate production as one of their business ventures.

5. The administration may collaborate with various extension linkages in promoting the Guso (*Eucheuma sp.)* Ice Cream Enhanced with Blueternate innovation to the community and the market as well.

6. Farmers may consider cultivating more Guso and Blueternate to support the raw material demand when the product is mass-produced for commercialization.

7. The researcher may secure the intellectual property protection of the product by patenting its process and composition.

8. Future researchers who wish to undertake a parallel study may try other flavors and ingredient

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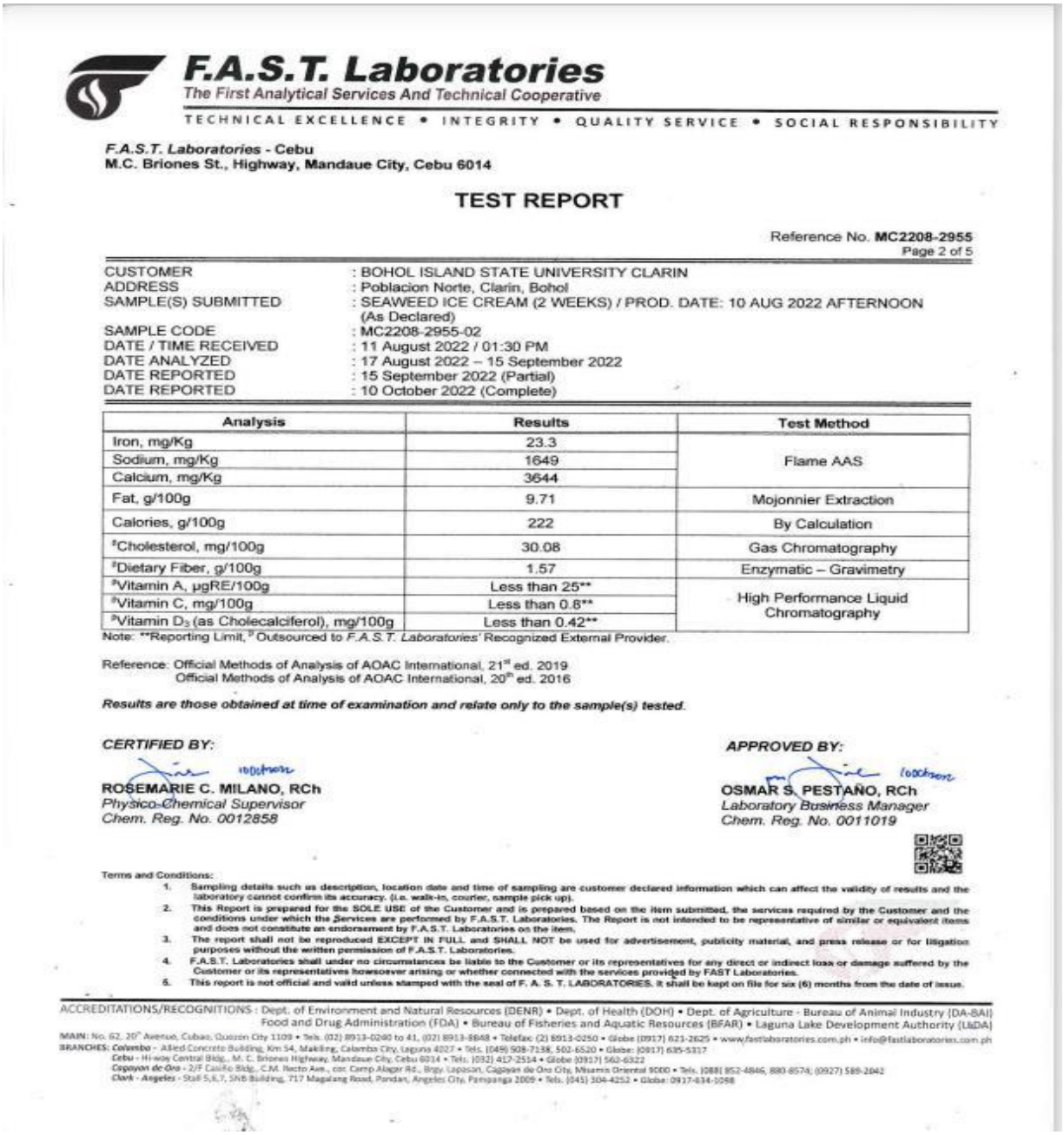
Areas of Concern	**Objectives**	**Strategy**	**Persons Involved**	**Time Frame**	**Budget Allocation**	**Outcomes**
1.Secure Permit to Conduct the Study.	To write a letter of permission to conduct the study	Send letter of permission to the administration and the honorable mayor of Municipality of Clarin	● Researcher ● Faculty ●Administrative staff	October 2021	P1,000.00	The researcher will be permitted to conduct the study with the support of the administration
2. Conduct the experiment per treatment, nutritional, and microbial analysis.	To be able to gather the data needed in the study	1.Conduct product testing 2. distribute fliers of the product 3. conduct product nutritional and microbial analysis 4. determine the marketability	● Researcher ● A resident of the Municipality of Clarin ● R.D.E. staff	December 2021	P 80,000.00	Product Tasting was done, data will be gathered, nutritional value, microbe and toxicology in the product was analyzed
3. Present the product to the market for marketability purposes	To determine the marketability of Guso Ice Cream	1. display the product at the municipality of Clarin Public Market	• Researcher • A resident of the Municipality of Clarin • R.D.E. Staff	January 2022	P 20,000.00	Introduced and developed the product through its product marketability
4. Extension Program	To transfer the Technology to the community (Technology Guide)	1.establish community linkage through the extension project of the university 2. conduct seminar- training on preparing for Guso Ice Cream	● School ● Community ● Researcher ● R.D.E. Staff	February 2023s	P20,000.00	Increase production of Guso Ice Cream from the extension.

5.Mass Production/ commercialization of the product	To generate income out from research output	1. protect intellectual property through patenting 2. conduct a market survey for a low-cost ingredient to produce affordable and quality product 3.produced capital for the people of the community	● Dean ● Faculty ● Researcher ● R.D.E. Staff ● Community	Year-round	P100,000.00	Mass-produced Guso Ice Cream and sell it.



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TEST REPORT

Reference No. **MC2208-2955**
Page 2 of 5

CUSTOMER	: BOHOL ISLAND STATE UNIVERSITY CLARIN
ADDRESS	: Poblacion Norte, Clarin, Bohol
SAMPLE(S) SUBMITTED	: SEAWEED ICE CREAM (2 WEEKS) / PROD. DATE: 10 AUG 2022 AFTERNOON (As Declared)
SAMPLE CODE	: MC2208-2955-02
DATE / TIME RECEIVED	: 11 August 2022 / 01:30 PM
DATE ANALYZED	: 17 August 2022 – 15 September 2022
DATE REPORTED	: 15 September 2022 (Partial)
DATE REPORTED	: 10 October 2022 (Complete)

Analysis	Results	Test Method
Iron, mg/Kg	23.3	Flame AAS
Sodium, mg/Kg	1649	
Calcium, mg/Kg	3644	
Fat, g/100g	9.71	Mojonnier Extraction
Calories, g/100g	222	By Calculation
[3]Cholesterol, mg/100g	30.08	Gas Chromatography
[3]Dietary Fiber, g/100g	1.57	Enzymatic – Gravimetry
[3]Vitamin A, µgRE/100g	Less than 25**	High Performance Liquid Chromatography
[3]Vitamin C, mg/100g	Less than 0.8**	
[3]Vitamin D_3 (as Cholecalciferol), mg/100g	Less than 0.42**	

Note: **Reporting Limit, [3] Outsourced to *F.A.S.T. Laboratories'* Recognized External Provider.

Reference: Official Methods of Analysis of AOAC International, 21st ed. 2019
Official Methods of Analysis of AOAC International, 20th ed. 2016

Results are those obtained at time of examination and relate only to the sample(s) tested.

CERTIFIED BY:
ROSEMARIE C. MILANO, RCh
Physico-Chemical Supervisor
Chem. Reg. No. 0012858

APPROVED BY:
OSMAR S. PESTAÑO, RCh
Laboratory Business Manager
Chem. Reg. No. 0011019

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