SENSORY EVALUATION ON THE ACCEPTABILITY OF THE DIFFERENT LEVEL OF MIRACLE FRUIT (*Croscentia cujete*) IN YOGHURT PRODUCTION

College of Technology and Allied Sciences
BOHOL ISLAND STATE UNIVERSITY
Zamora, Bilar, Bohol

NIEVA MAE M. DALAGDAGAN
RYAN G. LOZANO
JONA MARIE B. RAUT
JAYCILLE M. TAGUBA

APPROVAL SHEET

This thesis entitled, "SENSORY EVALUATION ON THE ACCEPTABILITY OF THE DIFFERENT LEVEL OF MIRACLE FRUIT (*Cresentia cujete*) IN YOGHURT PRODUCTION" prepared and submitted by Nieva Mae M. Dalagdagan, Ryan Lozano, Jona Marie B. Raut, Jaycille M. Taguba in partial fulfillment of the requirements for Bachelor of Science in Industrial Technology Major in Food Preparation Service Management has been examined and recommended for the acceptance and for oral examination.

THESIS COMMITTEE

NELIA Q. CATAYAS, Ph.D.
Chairman

HERBERTO PIOLLO
Statistician

JOHN ANTHONY D. PIOLLO
Editor

VAL VINCENT M. LOSARIA
Internal Expert

NELIA Q. CATAYAS, Ph.D.
Adviser

Approved by the committee on Examining Panel conducted on June 7, 2021 with the grade of 1.7.

EXAMINING PANEL

ARLEN B. GUDMALIN, Ph.D.
Chairman

HERBERTO PIOLLO
Member

VAL VINCENT M. LOSARIA
Member

NELIA Q. CATAYAS, Ph.D.
Member

KEVIN B. GASATAN
Member

Accepted and approved in partial fulfillment of the requirements for Bachelor of Science in Industrial Technology Major in Food Preparation Service Management.

JUNE 7, 2021
Date of Oral Defense

MARIETTA C. MACALOLOT Ph.D.
Campus Director

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A Thesis

Presented to the Faculty of

College of Technology Allied Sciences

BOHOL ISLAND STATE UNIVERSITY

Bilar Campus, Zamora, Bilar, Bohol

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In Partial Fulfillment of the Requirement for the Subject

Bachelor of Science in Industrial Technology

Major in Food Preparation Service Management

_____

Nieva Mae M. Dalagdagan

Ryan G. Lozano

Jona Marie B. Raut

Jaycille M. Taguba

June 2021

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Abstract

The study was conducted at Bohol Island State University-Bilar Campus, Zamora, Bilar, Bohol. The study was conducted to determine the acceptability level of miracle fruit yoghurt, Specifically, it sought to find the profile of miracle fruit yoghurt in terms of ingredients and costing, tools, equipment and procedure, the acceptability level of miracle fruit in yoghurt production in terms of sensory attributes, the significant difference of the sensory preference of miracle fruit in yoghurt in (4) four treatments in terms of color, aroma, mouthfeel and taste. Visual quality evaluation of the most acceptable miracle fruit yoghurt. The tools and equipment used were hacksaw, pan, wooden spoon, mixing bowl, strainer, measuring cup, measuring spoon and incubator. While the constant ingredients were 250 ml of fresh milk and 60 grams of yoghurt starter. Miracle fruit extract vary its quantity per treatment such as Treatment 1, 30 mL of miracle fruit extract; Treatment 2, 60 ml of miracle fruit extract; Treatment 3, 80 ml of miracle fruit extract and Treatment 4, 125 ml of miracle fruit extract. The study used the 9-Hedonic Scale questionnaires provided to (40) forty respondents to rate the sensory attributes of the miracle fruit yogurt. Results revealed in terms of color treatment 1 treatment and 2 got an equal weighted mean scale of 6.05, with the descriptive interpretation of “Like Moderately”. In aroma, treatment 1 had the highest weighted mean of 6.08 with descriptive interpretation of “Like Moderately”. In terms of mouthfeel, treatment 1 had the highest weighted mean scale of 6.30 with descriptive interpretation of “Like Moderately”. While in taste treatment 1 had an average weighted mean scale of 6.47 with the descriptive interpretation of “Like Moderately”. Furthermore, treatment 1 was subjected to visual quality evaluation since it was the most acceptable treatment among others. It was found out that the treatment can only up to 7 days when stored at cool temperature. It was recommended to add flavors to determine the difference in yoghurt’s color, aroma, mouthfeel and taste. Hence, the school may refine and enhance the miracle fruit yoghurt product for entrepreneurial endeavor.

Chapter 1

THE PROBLEM AND ITS SCOPE

Rationale

Miracle fruit are nature's marvelous gift to the humankind; indeed, they are life- enhancing medicines packed with vitamins, minerals, anti- oxidants and many other phytonutrients. Fruit is an absolutely rich source of soluble dietary fiber and used as a low calorie sugar- free sweetener and not just because of its color and flavor, but also because of their unique nutrient profile which aids in human body fitness and illness prevention. The fruit is very rich in high- profile nutrients with its unique flavor, taste and healthy qualities. It contains vitamin B1, vitamin C, calcium, iron, sodium and potassium (Tacio, 2015).

The fruit is beneficial to our health that can help boost our immune system. Wherein the immune system is responsible for protecting us from infection and disease. With the aforementioned, the researcher proposed of utilizing the miracle fruit in innovating a healthy food. Since yoghurt is commonly consumed by most of the adolescent and children, the proponent interestingly innovate yoghurt with this type of fruit.

Miracle fruit yoghurt offers an appropriate potential to convey nutritious ingredients to human diet. Accordingly, yogurt contains probiotic strains of bacteria that can enhance immunity and reduce the incidence of conditions such as cancer, and symptoms of allergy (Vanlou, 2005).

Miracle fruit yoghurt has a potential benefit which include powerful antioxidant and sweetness enhanced due to its novel ability of having a sour taste and sweet. Miracle fruit yoghurt has a unique modifying taste ability and demonstrates a high potential beverage product that provide benefit to human health. In connection to this, the researchers used to optimize miracle fruit yoghurt that can be utilized by the food industry and health care provider to develop clinical remedies or disease prevention strategies (Breslin, 2008).

In order to supply a better product, the research determined to enhance the color, aroma, mouthfeel and taste of miracle fruit yoghurt to consequently make it more nutritious, delicious and able to quenched thirst. Thus, come up with the idea of using miracle fruit as main thrust of the study.

On this regard, the research has the desire to provide healthy drinks/food. And further, perceived that the acceptability of miracle fruit as an ingredient to beverages, particularly in yogurt has not yet been proven. In view thereof, the researchers deemed to create and develop miracle fruit with acceptable quality.

Literature Background

The succeeding statement served as the legal basis which the study is anchored to. According to Republic Act 10611, section 15, Article II of the Philippine Constitution states that:

> An Act to Strengthen the Food Safety Regulatory System in The Country to Protect Consumer Health and Facilitate Market Access of Local Foods and Food Products. Protect from food- borne and to enhance industry and consumer confidence in the food regulatory system; and achieve economic growth and development by promoting fair trade practices.

From the statement above, the government abide the law by giving the assurance of making the product beneficial to the health of all consumers. Particularly into food promotion that would help every consumer to choose the nutritious product and encouraging food processor just like we and other researchers in making existing product which is the yoghurt to be more beneficial and nutritious by adding miracle fruit without the loss of its benefits and nutritive values as well.

Furthermore, section 15 of the Philippine Constitution states that:

> The state shall protect and promote the right to health of the people and instill health consciousness among them and shall protect consumers' system, the state shall maintain food safety regulatory system that ensures a high level of food safety, promotes fair trades and advances the global competitiveness of Philippines food and food products.

From the statement above the government has enforced such bill in order that every manufacturer, food innovations, food enhancement made by any who shall be guided accordingly that in which they must abide this law. In connection to this, we the researchers of this study stringently abide the law by giving the assurance making the product beneficial to the health of all consumers.

In article XIV Section 10 of the Philippines Constitution that:

> Science and Technology are essential for national development and progress. This state shall give priority to research and development, invention, innovation and their utilization, and the science and technology education, training and technological capabilities and their application to the country's productive system and national life.

This explains that one must initiate to innovate and experiment in order to gain knowledge and contribute to advancements in the benefit of the nations and beyond. Hence, the researchers pursue with this creation to employ a study that is timely that meets environmental demands. Thus, study would beneficial to the country's production and national life.

In Republic Act No. 8976 otherwise known as Food Fortification Law, declares;

> State shall protect and promote the right of health of the people and instill health consciousness among them. The state recognizes that food fortification is vital where there is a demonstrated need to increase the intake of an essential nutrient by one or more population groups, as manifested in dietary, biochemical or clinical evidences of deficiency.

This explains that fortification is one of the most important processes for improvement of the nutrients quality and quantity in food and these products will effectively reduce or prevent diseases associated with nutritional deficiencies. Moreover, its defined the main reasons behind carrying out this process are presented and then yogurt production process and a variety of minerals, vitamins, and functional ingredients which are used in the process (Correa,2014).

According to Abraham Maslow's Hierarchy of Needs mentioned the lowest level of the pyramid are made up of the most basic needs in order to attain the first and highest level of man's need to survive. That's the reason why man really needs to earn to buy his necessities and satisfy the needs to meet his expectation. Therefore, food is essential because it's a way for living.

According to Koster and Mojet "Food choice is influenced by many factors in humans". Its multidimensional and complex nature is well recognized, particularly within the sensory and consumer food science field. However, the vast majority of the studies aimed at understanding determinants of food choices, preferences and eating behaviors are affected by important limitations: the limited number of factors that are considered at once and the sample size. Furthermore, sensory and hedonic responses to actual food stimuli, are often not included in such studies.

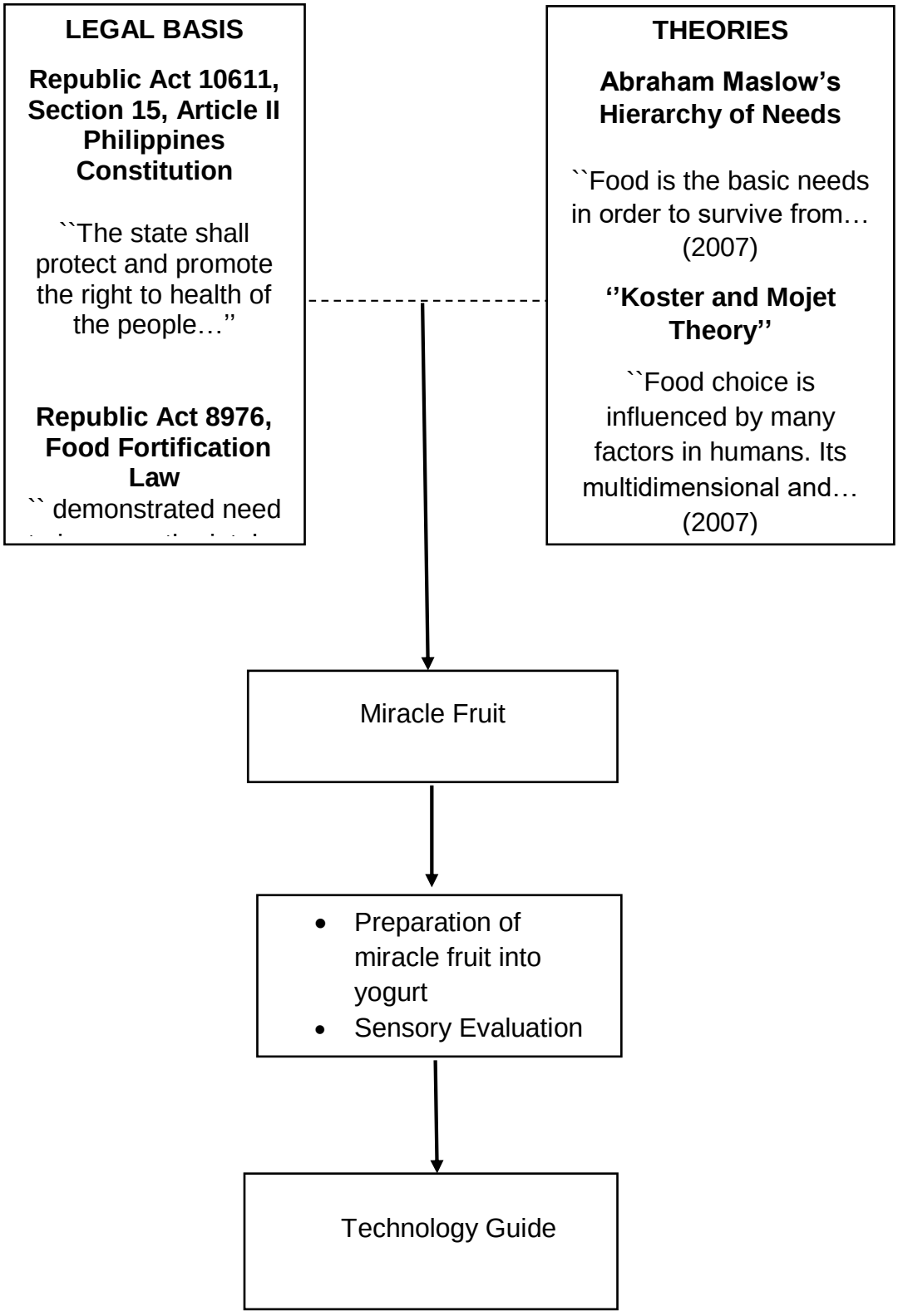

Figure 1. Theoretical and Conceptual Framework

The fruits, also known as ‘calabash’ or ‘gourd’ are highly valued its widely distributed in the Caribbean Region, Mexico, Northern and Southern American and later introduced to tropical Africa from Senegal to Cameroon then to other parts of Africa. In Nigeria, the tree is widely grown in the Northern states but little in other parts of the country. Virtually, all parts of the tree have been found to be useful; the wood is used for tool handles, ribs in boat building and cattle yokes; and the gourd for cups, containers and musical instruments (Bohorquez, 2009).

Miracle fruit was found beneficial to one’s health and compacted with an ample amount of nutrients such as vitamin B, vitamin C, calcium, iron, sodium and potassium. The fruit contain numerous substances such as flavonoids, an anti-oxidant and protector of body cells from free radicals that contribute to various health related problems. Additionally, the product is identified to boost the health condition that contribute to one’s well- being (Ejenolu, 2011).

From the statement mentioned above, it emphasizes the good benefits we can get in drinking a miracle fruit. Such as the vitamins and minerals content of miracle fruit that are highly needed to boost one’s health.

In line to this, the researchers of this study has made a potential source and further studies to make a yoghurt out from a very beneficial fruit which is the miracle fruit.

Miracle fruit is a seasonal fruit that develops after pollination by bats. It appears at the end of dry season, and the fruit is up to 12 to 14 cm in diameter. It is globular with smooth hard green woody shell. It takes about six to seven months

to ripen and eventually falls to the ground. Small flat seeds are embedded in the pulp and the color well become brown (Burkill, 2019).

Miracle fruit or Crescentia cujete tree belongs to the family of Binoniacea. It is also known as the gourd tree. The calabash tree is 6 to 10 m tall with a wide crown and long branches covered with clusters of tripinnate leaves and gourd-like fruit. The branches have simple elliptical leaves clustered at the anode. The greenish flowers arise from the main trunk and blooms at night The fruit is reported to have medicinal application (Gilman, 2004).

According to the Philippine Council for Health Research and Development (PCHRD), a line agency of the Department of Science and Technology (DOST), and leaf extracts contain flavonoids such as quercetin and anthraquinone, the important phytochemicals for antiangiogenic activities, a process that inhibits the growth and development of new blood vessels in the body (Reyes, 2012).

In Central America, where it is native, the leaves are carefully toasted and combined with other ingredients to prepare a drink called horchata. Other edible parts are the shoots and the tendrils. In Africa, it is called Tupperware Tree because of its multifarious uses. The dried fruit shell is used to make various kinds of utensils, ornaments and musical instruments. The dried shells are used to create bowls for drinking and eating or for carrying water (Theis, 2017).

The hard outer shell of the calabash fruit has been used for food containers, bowls, tobacco pipes, and as musical tools. The white spongy pulp inside the shell contains numerous flat seeds. The fruit itself can be mixed with milk, heated, and consumed for treating colds and asthma. Ripe fruit has also been regarded as a laxative. The wood is used in making cattle yokes, wooden wheels and ribs in boat building Krishen, (2006).

Yoghurt is consumed worldwide is a well-known and more common product and has more acceptability as compared to other products in the world. Moreover, is made from fortified skim milk by conventional methods using “Streptococcus thermophiles and Lactobacillus Bulgaricus. It is made by heating milk and combining it with two live cultures. Yoghurt is easily digested (because milk protein, fat and lactose components undergo partial hydrolysis during fermentation), has high nutritional value and is a rich source of carbohydrates, protein, fat, vitamins, calcium, and phosphorus. (Mckinley, 2005).

Yoghurt is the most used medium to incorporate probiotic bacteria in foods and, in this regard, research studies have optimized its sensory qualities to render a palatable product to consumers. The results showed that the appearance, flavor, texture, and overall quality of probiotic 1% fat yogurt were comparable and similar to standard 1% fat yogurt.

The basic production of plain yoghurt is fairly simple milk is heated and combined with a starter yoghurt culture, most often spoonful of batch of yoghurt that is already made. The milk mixture is kept at a warm temperature for at least eight hours, letting those cultures bloom, resulting in creamy yoghurt. The generalized process of yoghurt making is comprised of modifying the original composition of milk, pasteurizing the yoghurt mix, fermentation at thermophilic temperatures (40-45 ºC), cooling and addition of fruits and flavors (Tamime, 2015).

Fermentation is a method that has been used for thousands of years to provide longer shelf life for perishable foods and to increase the flavor and odor of final food products Furthermore, evaluation of vitamins is more difficult since processes like heat treatment, incubation time, temperature and storage conditions change the vitamins content in yogurt (Rao,2015).

Nutritional profile of yoghurt is a highly nutritious and easily digestible dairy product which is a rich source of more than ten essential nutrients in particular, certain minerals and vitamins. the nutritional composition of yoghurt can be varied according to the strains of starter culture used in the fermentation.

Health benefits of yoghurt include providing immune support for fighting against infections or cancer, providing a healthy replacement with good bacteria in the intestinal tract following antibiotic therapy, reducing occurrence of diarrhea in

humans, aiding in lowering cholesterol and improving the symptoms of lactose intolerance.

Moreover, milk is the main ingredient used when making yogurt. It can be cream, whole, low-fat, or skim. Whole milk is used to make full-fat or regular yogurt, low-fat milk is used to make low-fat yogurt, and skim milk is used to make non-fat yogurt. In general, the higher the fat content of the milk, the smoother and creamier the yogurt will taste (Jaworska, 2005).

Cream may be added to adjust the fat content of milk. Non-fat, dry milk powder is used to adjust the content of yogurt solids above the 8.25% minimum to achieve better body and texture. Stabilizers also function to improve body and texture as well as to increase firmness. They help keep fruit uniformly mixed in the yogurt and prevent separation of whey. Examples of stabilizers include alginates, gelatin, gums, pectins, and starch.

In flavoring, sugar, honey, and artificial sweeteners may be used to reduce the naturally sour flavor of yogurt. Fruit, fruit syrups, and pie filling are also optional and can either be mixed in with yogurt or added to the top or bottom of the yogurt (Hossain, 2012).

According to Peryam, showed that longer scales, up to nine intervals, tended to be more discriminating than shorter scales, and there was some indication that a scale with eleven intervals would be even more effective. Hedonic scaling used in study to give further data result of the study.

Additionally, the different study using the 9-point hedonic scaling is the sensory acceptability of strawberry yoghurt. For this purpose, four different brands of strawberry yoghurt were evaluated with regards of different type of scale to express their opinions about the product. According to Duncan's test for the products within each scale, showed satisfactory performance for each since they allow higher discrimination of product and met the assumptions of the analysis of variance (Silva, 2013).

THE PROBLEM

Statement of the Problem

The main purpose of the study was to determine the sensory evaluation on the acceptability level of the different treatment of miracle fruit in yoghurt production.

Specifically, this study sought to answer the following queries:

1. What is the profile of the miracle fruit yoghurt in terms of:
    1.1 ingredients and costing;
    1.2 tools and equipment and
    1.3 procedure?
2. What is the acceptability level of miracle fruit in yogurt production in terms of:
    2.1 color;
    2.2 aroma:
    2.3 mouthfeel and
    2.4 taste?
3. Is there a significant difference in the sensory preference of miracle fruit in yoghurt in four treatments in terms of color, aroma, mouthfeel and taste?
4. What is the visual quality evaluation of the most acceptable miracle fruit yoghurt when stored at cool temperature and room temperature?

Null Hypothesis

There is no significant difference between the sensory preference of Miracle Fruit (*Cresentia cujete)* in yoghurt in the four treatment in terms of color, aroma, mouthfeel, and taste.

Significance of the Study

The results of this study would be beneficial to the following:

Farmers. This study would be useful to the farmers who produced these particular crops. It would be a huge opportunity to the farmers to plant more and become one of the suppliers in industry to our country to enhance their income.

Parents. The results of the study would guide parents in choosing the right snack to compensate the nutrient deficiency of their children and parents, to encourage the health benefits of miracle fruit.

Students. The results of the study would encourage the student to enhance their skills in processing food product that are fortified to develop their competence in producing healthier foods.

Entrepreneur. The result of the study would help the entrepreneurs to innovate and market a healthier processed food.

Future Researchers. The result of this study would serves as basis for future researchers. This study would contribute knowledge to the field of miracle fruit processing a health benefits.

RESEARCH METHODOLOGY

Design

This study employed the experimental research design using the Complete Randomized Design (CRD) for laboratory experiment in order to determine the right quantity of miracle fruit in yogurt production. This is to determine the differences among the four treatment of miracle fruit yoghurt in terms of color, aroma, mouthfeel and taste. The researchers provide the sensory evaluation questionnaire before tasting the product which served as the instrument in the obtaining data.

The succeeding lay-out presents the combination and preparation of the different treatment of miracle fruit yogurt production.

Legend:

T1= 30 ml of miracle fruit added to a 250 ml of fresh milk

T2= 60 ml of miracle fruit added to a 250 ml of fresh milk

T3= 80 ml of miracle fruit added to a 250 ml of fresh milk

T4= 125 ml of miracle fruit added to a 250 ml of fresh milk

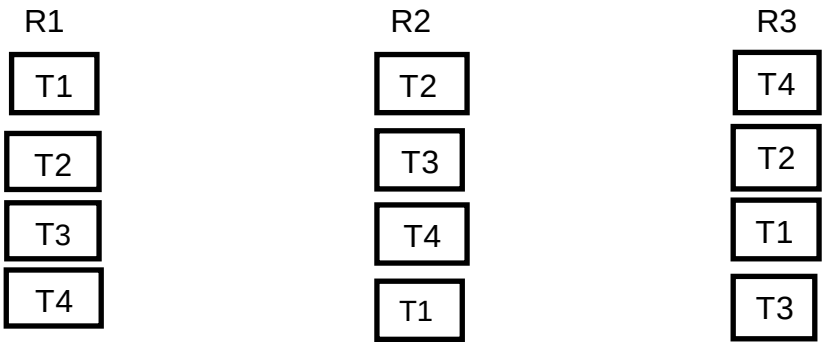

Figure 2. Shows the experimental lay out using CRD

Environment and Participants

The study was conducted in Bohol Island State University- Bilar Campus, located at barangay Zamora Bilar, Bohol specifically in Food-technology laboratory room for processing the miracle fruit yogurt wherein the materials needed are available.

Bilar is an interior town northeast of Loboc which is considered as 5th class municipality. It is situated 40.9 kilometers from Tagbilaran. The town is politically subdivided into 19 barangays. According to the 2007 census, the town has a

population of 17,078 people in 2,967 households spread over an area of 13, 315 hectares.

Figure 3. Map of Bohol

There were forty (40) randomly selected respondents involve in the study. It is composed of ten (10) faculty and staff of the Department of Hospitality Management and Industrial Technology (DHMIT) of the CTAS (twenty) 20 students from Bachelor of Science Industrial Technology major in Food Preparation Service Management, and ten (10) students from Hospitality Management The selection of respondents was based on their knowledge and skills related in food. They are equipped with theories and practical skills on preparation and service processing.

Instrument

The researcher utilized the 9-point hedonic scale questionnaire in determining the acceptability level of miracle fruit yoghurt in different treatment. The most widely used scale for measuring food acceptability developed by David Peryam. Hence, researchers had selected numbers of qualified respondents to test and rate the miracle fruit yoghurt through the observation guide and questionnaire.

The survey questionnaire comprises of the sensory attributes of miracle fruit yoghurt consist of color, aroma, mouthfeel, and taste, which last for about 15-20 minutes to answer the given questions. The following were the numerical rating of with its respectively description. (9) Like Extremely, (8) Like Very Much, (7) Like Moderately, (6) Like Slightly, (5) Neither Like nor Disliked (4) Dislike Slightly (3) Dislike Moderately (2) Dislike Very Much (1) Dislike Extremely. It was used as the research instrument because it is easy and convenient to use.

Procedure

Seeking Permission. The researchers send the letter of request to the Campus Director for the approval to conduct of the study with the recommendation of the Dean of the College of Technology Allied Sciences and notifications of the thesis adviser. Afterwards, another letter was sent to the participants of the study for their consent and participation

Purchasing and Procurement. The miracle fruit was harvested in the researcher's backyard and the other ingredients/materials was procured in Valencia Public Market for ease and convenient.

Gathering and Assembling of Tools and others Needed in the Preparation. In the preparation of miracle fruit yoghurt, in various treatments tools and equipment were used. The tools were the following: aluminum bowl, wooden spoon, pan, measuring cups, measuring spoon, strainer, and equipment was electric incubator.

Processing of Miracle Fruit. The process began after harvesting of the miracle fruit. After harvesting. The flesh was scooped and place in a bowl then in preparation for boiling to minimize the bad odor.

Boiling the Miracle Fruit. Boil the miracle fruit extract in a medium high heat for the period of 30 minutes until the miracle fruit extract until pitch black. Strain the boiled miracle fruit juice and transfer the extract in a clean container.

Procedure in Making Yoghurt. Combine fresh milk and yoghurt starter. Add the previously boiled extract of miracle fruit juice (depends on the amount of extract needed per treatment) and incubate for 6 hours for 45 degree Celsius and

Data Collection. Right after the preparation of the different treatments. Sample of each treatment were set-up with a bottle of water, pencil or pen questionnaire place in an area one to two meters away from each set-up in observance of health protocol. Respondents were assigned to a designated set-up. During the gathering of data, health protocols such as wearing face mask and face shield were also observed. The respondents were asked to supply the necessary feedback after the product tasting. Responses of the participants were kept confidentially.

Visual Quality Analysis. The researchers stored the product inside the chiller at a temperature of medium high for 1 week to determine the visual quality of the product. The products were observed every day to check the changes in color, aroma, mouthfeel and taste until the week ended. After 1 week of storing the product, the researchers determined which of the treatment was easily spoiled, easily damaged and had a longer shelf life.

Statistical Treatment

To find out there is significant difference between consumers' preference of the four treatment of Miracle Fruit Cresentia *Cujete* Yoghurt, the One – Way Analysis of Variance (One-way ANOVA) was used.

$$\text{WMS}=\frac{f}{N}$$

Where:

WMS = Weighted Mean Score

N = Number of Cases

f = Frequency

To determine if there is a difference between the four treatments of Miracle Fruit Yoghurt, One-way Analysis of Variance (ANOVA) will be used.

$$F_c = \frac{MSS_c}{MSS_w}$$

Where:

MSSc = Mean of the sum of squares between columns

MSSw = Mean of the sum of squares within columns

OPERATIONAL DEFINITION OF TERMS

To fully comprehend and ensure thorough understanding of terms used in the study, the following terms were defined operationally.

Acceptability. It refers to the overall preference of the miracle fruit yoghurt in terms of color, aroma, mouthfeel and taste.

Aroma. A noticeable and usually a pleasant smell of the miracle fruit yoghurt.

Consistency. The degree of firmness, density, viscosity, or resistance to movement or operational of constituent particles.

Incubator. The equipment used for fermenting the miracle fruit yoghurt.

Miracle Fruit. Is a tree that bears huge coconut-like fruit. The fruit extract was used to make yoghurt.

Mouthfeel. The feel, appearance or consistency of a liquid or substance.

Taste. The sensation of flavor perceived in the mouth and throat on contact with a substance.

Yogurt. A food produced by bacterial fermentation of milk. The bacteria used to make yoghurt are known was yoghurt cultures.

Chapter 2

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter presents the analysis and interpret the data collected through the questionnaires answered by the forty participants. The table illustrates the responses on the question asked of the study which determine the ingredients and costing, tools and equipment, acceptability level and the significant difference of sensory preference in terms of color, aroma, mouthfeel and taste.

PROFILE OF MIRACLE FRUIT YOGHURT

Table 1 showed the ingredients and costing of the four treatment of miracle fruit in making yoghurt. All treatments contain the same amount of freshmilk and yoghurt starter except the amount of miracle fruit extract. It reflects that T4 got the highest cost because it contains 125 ml of miracle fruit with total cost of Php 116.66. Followed by T3 with a quantity of 80 ml of miracle fruit extract which cost of Php 91.4 Then, T2 cost Php 80.17 which contains of 60 ml of miracle fruit extract. And T1 got the lowest cost of Php63.34 with the lowest quantity of 30 ml of miracle fruit extract.

Table 1.1

Ingredients and Costing of Miracle Fruit Yoghurt in four (4) treatments

Quantity	Unit	Ingredients	Unit Cost	Total Cost			
				T1	T2	T3	T4
240	ml	fresh milk	₱ 80.00/1000ml.	₱ 19.2	₱19.2	₱ 19.2	₱ 19.2
45	ml	yoghurt	₱ 40.00/100g.	₱ 18.00	₱ 18.00	₱ 18.00	₱ 18.00
30	ml	miracle fruit	₱449.00/1000kg	₱ 13.47			
60	ml	miracle fruit	₱449.00/1000kg		₱26.94		
80	ml	miracle fruit	₱ 449.00/1000kg			₱ 35.92	
125	ml	miracle fruit	₱ 449.00/1000kg				₱ 56.13
Cost of Ingredients				**₱ 50.67**	**₱ 64.14**	**₱ 73.12**	**₱93.33**
Labor Cost (10%)				₱ 5.07	₱ 6.41	₱ 7.31	₱ 9.33
Electricity (15%)				₱ 7.60	₱ 9.62	₱ 10.97	₱ 14.00
Total Cost				₱ 63.34	₱ 80.17	₱ 91.4	₱116.66
Yield or Number of Pieces				40	40	40	40
Price per Piece				₱ 1.59	₱ 2.00	₱ 2.29	₱ 2.92

Table 1.2 showed the various tools and equipment used in the preparation of the different treatment of miracle fruit yoghurt. The yoghurt starter was measured using a measuring spoon, while the milk and miracle fruit extract are measuring cups. The miracle fruit yoghurt was stirred with a wooden spoon and mixing bowl was used to combine the ingredients for the miracle fruit yoghurt while strainer was used to strain the boiled miracle fruit. Pan was used for heating method and incubator used for fermenting the miracle fruit yoghurt.

Table1.2

Display the Different Tools and Equipment Used in the Preparation of the Four Treatment

Quality	Unit	Description	Tools and Equipment
1	Set	Measuring Spoon	
2	Sets	Measuring Cup	
1	Piece	Wooden Spoon	
1	Piece	Mixing Bowl	
1	Piece	Strainer	
1	Piece	Pan	
1	Unit	Electric Incubator	

The following are the formulation and Procedure of the Different Treatment in the Preparation of Miracle Fruit

The study used a variety of treatment, with the constant ingredients of milk, yoghurt starter, and the variable ingredient of the amount of miracle fruit extract required for each treatment. Treatment 1 containing of 30 ml of miracle fruit extract,

treatment 2 was composed 60 ml of miracle fruit extract, treatment 3 contains of 80ml of miracle fruit and treatment 4 composed of 125 ml of miracle fruit extract.

To start with, prepare all the ingredients, tools/materials and equipment needed. Cut the miracle fruit into halve and scoop. Bring to boil to (medium high heat) for the period of 30 minutes until the miracle fruit extract turn pitch black and remove from fire. Strain the boiled miracle fruit and transfer the miracle fruit extract in a clean container. Combine fresh milk and yoghurt starter then add cool previously boiled miracle fruit extract, depending on the amount needed per treatment. Lastly. incubate the miracle fruit for 6 hours for 45ºC.

ACCEPTABILITY LEVEL OF MIRACLE FRUIT YOGHURT

Table 2 presented the sensory preference of the miracle fruit yoghurt in different treatments.

Color is a phenomenon of light or visual perception that enables one to differentiate. Its indicate that even the same content of each fruit, the greater the concentration of color. It was found that color considered most corresponded to the yoghurt Calvo, (2001).

In terms of color, T1, T2 and T3 were all described as “Like Moderately”. Although they differed in their weighted mean where T1 got the highest weighted mean of 6.05 %, T2 with a weighted mean of 6.04% and T3 of 6.02%. Meanwhile

T4 got the lowest weighted mean of 5.63% and was described as ‘’Like Slightly”. This means that treatments 1, 2 and 3 were accepted by the respondents but T1 was the most preferred as reflected in its weighed mean. To understand more explicitly figure 7 illustrates the result of table 2 in terms of color.

Aroma is the term for a fragrant scent, one that pleases the nose. Aroma it is characteristic smell of the food, but never stinks sensation occurring because of the volatile food components. The product could not be seen, but its smell will attest the melting or disagreeable flavor it contained. According to Tacio, (2015) to that a fruit that has pleasant but not strong smell is best for making yogurt.

In terms of aroma, Table 2 presented that T1 obtained the highest rate of 6.08% followed by T2 with a weighted mean of 6.07% both were described as “Like Moderately”. T3 got a weighted mean of 5.78% while T4 obtained the lowest weighted mean of 5.33%. Both treatments were described as “Like Slightly”. This further implies T1 was the most acceptable by the respondents. To interpret distinctively figure 8 and the result of table 2 in terms of aroma will clearly described more.

Mouthfeel is the sensation created by food or drink in the mouth Jaworska, (2005). The mouthfeel of miracle fruit has a very low containing gum.

Mouthfeel, as displayed in table2 and figure 9, it was found that T1 obtained the highest rate of 6.03% and was described as “Like Moderately”. T2 got the weighted mean of 5.92% followed by T3 obtained the weighted mean of 5.81% and T4 got the lowest weighted mean of 5.16%. All latter treatments were all described as “Like Slightly”. This likewise denotes that T1 was still the most acceptable treatment by the respondents. According to Jaworska, (2005), mouthfeel is the sensation created by food or drink in the mouth.

According to Euros, (2008), taste is the sensation of flavor perceived in the mouth and throat on contact with a substance. Taste value was higher in strawberry yoghurt and texture and mouth feel values was higher in the yoghurt with high percentage of fruit.

In term of taste, T1 obtained the highest rate of 6.47% and T2 got the weighted mean of 6.30% both treatments were described as “Like Moderately”. While T3 and T4 were both described as ‘’Like Slightly” by respondents with a weighted mean of 5.94% and 5.13% respectively. This denotes that T1 was the most preferred treatment by the respondents because an overall melting score was detected by their tongue. To specify more, figure 10 matched with the result of table 2 in terms of taste.

Moreover, T1 ranked first based on the overall acceptability with an average weighted mean of 6.23% was described as “Like Moderately”. With these, the

respondents were able to feel more palatable with the T1 than the other treatments. Although T2 was also described as “Like Moderately” but ranked second and had an average weighted mean of 6.09%. T3 ranked third with an average weighted mean of 5.89% and was described as “Like Slightly” while T4 ranked fourth with the lowest average weighted mean of 5.31% but was still described as “Like Slightly”. As an overall rating of the study, T1 was the most acceptable treatment by the respondents because it contained less amount of miracle fruit that is 30ml of miracle fruit juice added to 250ml of fresh milk which was very much liked by the respondents. Based on the data presented, the amount of miracle fruit can affect the characteristics of the miracle fruit yoghurt. It revealed through the response of the respondents, the higher the amount of miracle fruit juice the more the respondents dislike the product.

Table 2

Sensory Preference of Acceptability of Miracle fruit (Cresentia Cujete) Yoghurt

Sensory Attributes	Treatment 1		Treatment 2		Treatment 3		Treatment 4	
	WM	**Description**	**WM**	**Description**	**WM**	**Description**	**WM**	**Description**
Color	6.05	Like Moderately	6.04	Like Moderately	6.02	Like Moderately	5.63	Like Slightly
Aroma	6.08	Like Moderately	6.07	Like Moderately	5.78	Like Slightly	5.33	Like Slightly
Mouthfeel	6.03	Like Moderately	5.92	Like Slightly	5.81	Like Slightly	5.16	Like Slightly
Taste	6.47	Like Moderately	6.30	Like Moderately	5.94	Like Slightly	5.13	Like Slightly
Overall Acceptability	6.23	Like Moderately	6.09	Like Moderately	5.89	Like Slightly	5.31	Like Slightly
Rank	1		2		3		4	

INDICATORS: **Description**

Legend:

Range	Descriptions		
8.2 – 9	Like Extremely	4.6 – 5.4	Neither Like nor Dislike
7.3 – 8.1	Like Very Much	3.7 – 4.5	Dislike Slightly
6.4 – 7.2	Like Moderately	2.8 – 3.6	Dislike Moderately
5.5 – 6.3	Like Slightly	1.9 – 2.7	Dislike Very Much
		1.0 – 1.8	Dislike Extremely

DI = Descriptive Interpretation

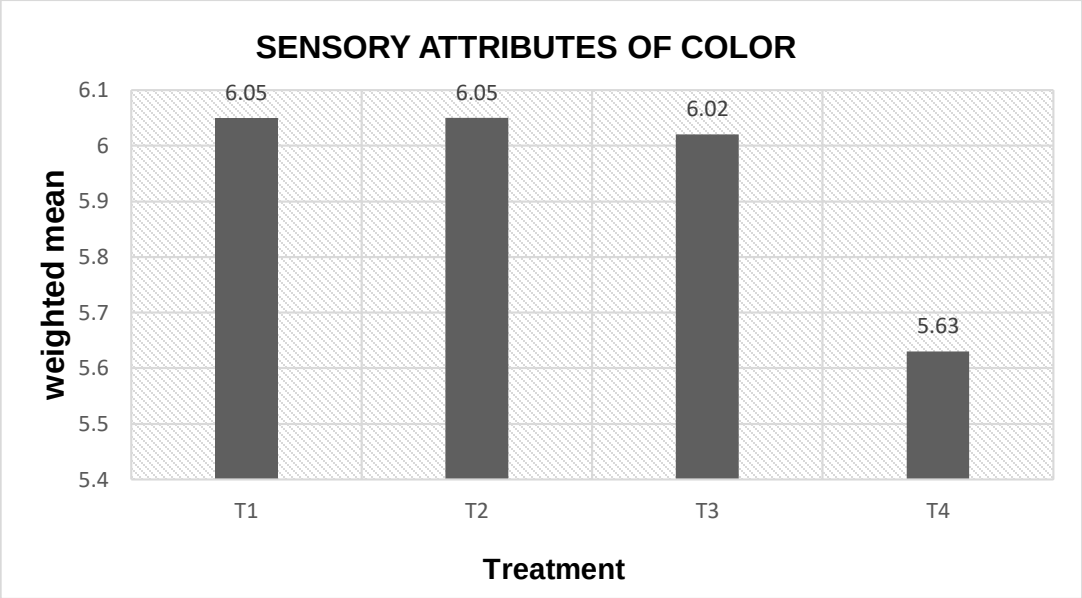

Figure.4 Shows the sensory attributes of color

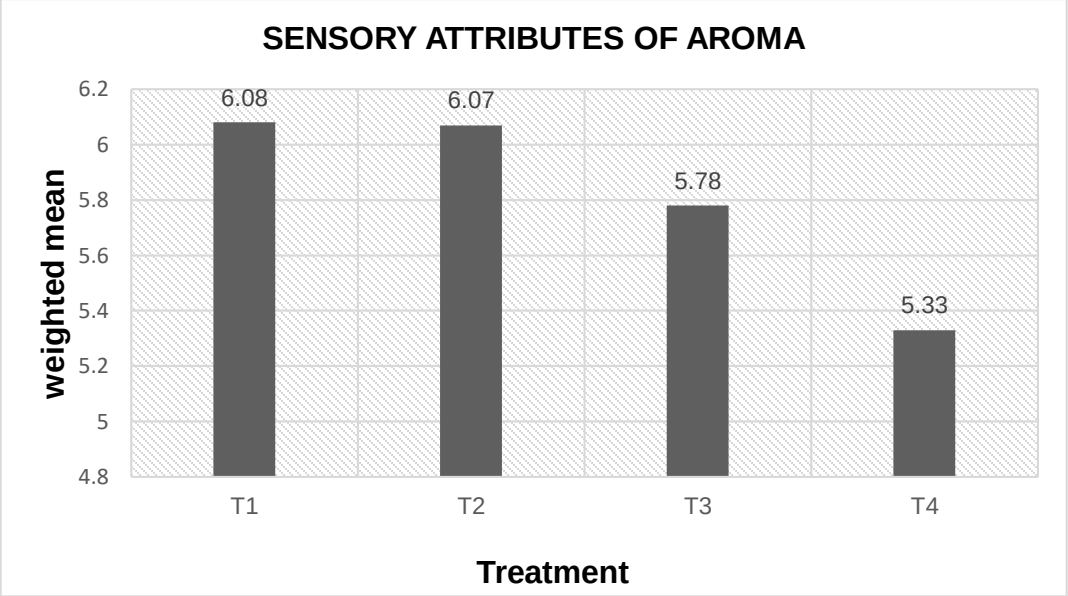

Figure.5 Displays the sensory attributes of aroma

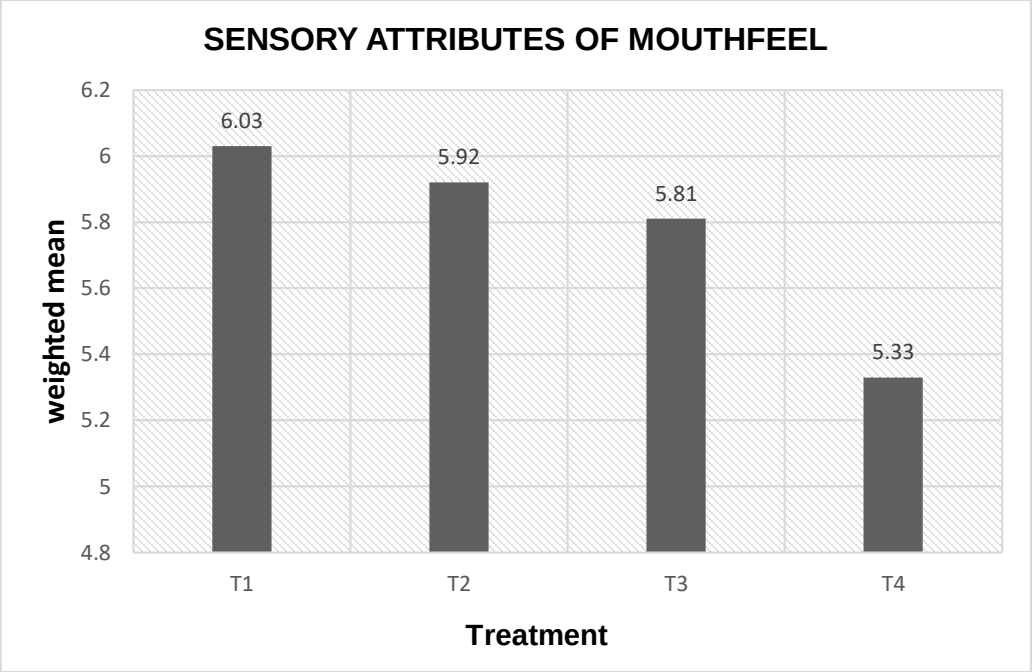

Figure.6 presents the sensory attributes of mouthfeel

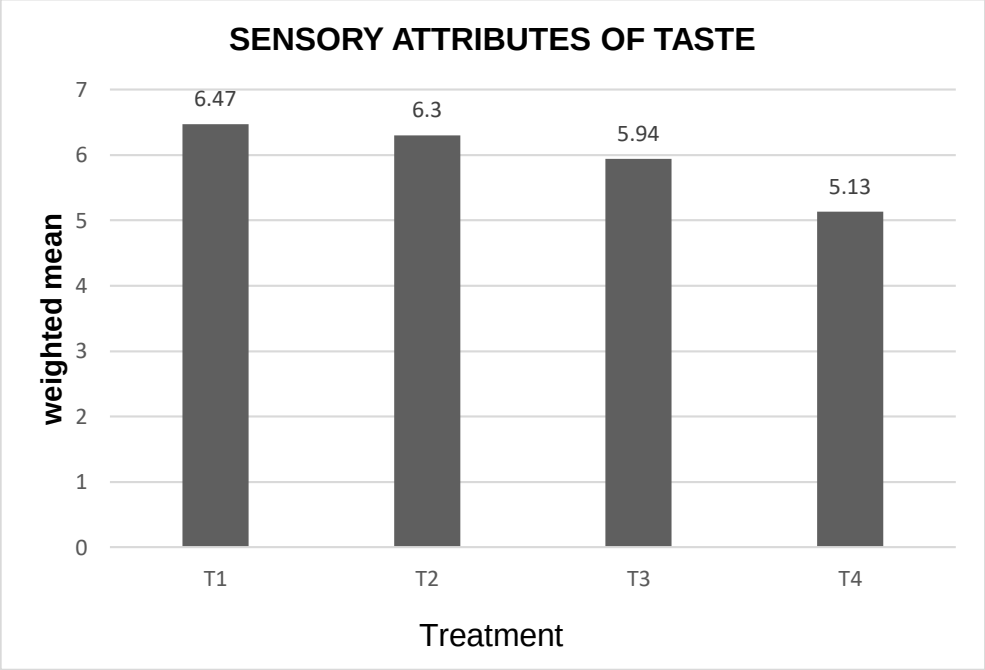

Figure. 7 reveals the sensory attributes of taste

Table 3 presented the F- value obtained from for the color, the F value is 1.934388374 which is significant at 0.05 level of significance with DF (3) and P value of 0.126275882. This means that there is significant difference in the color of miracle fruit yoghurt therefore, null hypothesis is rejected.

Aroma is 5.487684599 which is significant at 0.05 level of significance with Df (3) and P-value of 0.00130603. This means that there is a significant difference in the aroma of miracle fruit yoghurt, therefore the null hypothesis was rejected.

In terms of mouthfeel the computed F-value is 11.90180635 which is significant at 0.05 level of significance with Df (3) and P-value of 4.6283E-07. This means that there is a significant difference in the texture of miracle fruit yoghurt, therefore the null hypothesis is rejected.

For the taste, F value is 9.912003 which is significant at 0.05 level of significance with Df (3) and P value of 5.98028 E-06. This means that there is a significant difference in the taste of miracle fruit yoghurt, therefore the null hypothesis is rejected.

Table 3

Difference in the Acceptability Miracle Fruit Cresentia Cujete in Yoghurt in terms of Sensory Attributes.

n = 40

Sensory Attributes	Degree Of Freedom	Sum of Square	Mean Square	Observe F	P-Value	Description	Interpretation
Color	3	15.112685	5.037561667	5.487684599	0.00130603	Significant	Reject Ho
Aroma	3	27.046055	9.01535167	11.901810635	4.623E-07	Significant	Reject Ho
Mouth-feel	3	5.0782475	1.69274917	1.934388374	0.126275882	Not Significant	Reject Ho
Taste	3	42.525005	14.1750017	9.9129003	5.08028E-06	Significant	Reject Ho

Legend: ns -not significant

Table 4 showed that paired treatments for color (T2 vs. T4) (T1 vs. T4), aroma (T2 vs. T4) (T1 vs. T4) (T3 vs. T4), mouthfeel (T1 vs. T3) (T2 vs. T4) (T1 vs. T4) (T3 vs. T4) and taste (T2 vs. T4) (T1 vs. T4) (T3 vs. T4) have a significant difference. The result below implies that the paired treatments were significant differences in the color aroma, mouthfeel and taste and overall acceptability of Miracle Fruit Yoghurt because of the four treatments varying consistency due to the different quantity used. Meanwhile in terms of color (T1 vs. T2) (T2 vs. T3) (T1 vs. T3) (T3 vs. T4), aroma (T1 vs. T2) (T2 vs. T3) (T1 vs. T3), mouthfeel (T1 vs. T2) (T2 vs. T3) and taste (T1 vs. T2) (T2 vs. T3) (T1 vs. T3) has no significant difference in the respondents' preference.

Table 4

Comparison of Post Hoc Analysis Result in the Acceptability of Miracle Fruit in Yoghurt in Four Treatments in Terms of Sensory Attributes

Post Hoc Analysis for Color

Pairing of treatments	P-Value	Interpretation	Decision
T1 vs. T2	0.970903526	Insignificant	Accept hypothesis
T2 vs. T3	0.88562752	Insignificant	Accept hypothesis
T1 vs. T3	0.910274151	Insignificant	Accept hypothesis
T2 vs. T4	0.038456879	Significant	Accept hypothesis
T1 vs. T4	0.03313945	Significant	Accept hypothesis
T3 vs. T4	0.05302201	Insignificant	Accept hypothesis

Post Hoc Analysis for Aroma

Pairing of treatments	P-Value	Interpretation	Decision
T1 vs.T2	0.947175841	Insignificant	Accept hypothesis
T2 vs. T3	0.145836384	Insignificant	Accept hypothesis
T1 vs. T3	0.162736096	Insignificant	Accept hypothesis
T2 vs. T4	0.000694454	Significant	Reject hypothesis
T1 vs. T4	0.001383576	Significant	Reject hypothesis
T3 vs. T4	0.02531376	Significant	Accept hypothesis

Post Hoc Analysis for Mouthfeel

Pairing of treatments	P-Value	Interpretation	Decision
T1 vs. T2	0.050009568	Insignificant	Accept hypothesis
T2 vs. T3	0.558337753	Insignificant	Accept hypothesis
T1 vs. T3	0.00442345	Significant	Accept hypothesis
T2 vs. T4	0.00034718	Significant	Reject hypothesis
T1 vs. T4	7.05003E-08	Significant	Reject hypothesis
T3 vs. T4	0.00159229	Significant	Reject hypothesis

Post Hoc for Taste

Pairing of treatments	P-Value	Interpretation	Decision
T1 vs. T2	0.483208953	Insignificant	Accept hypothesis
T2 vs. T3	0.208259128	Insignificant	Accept hypothesis
T1 vs. T3	0.050057289	Insignificant	Accept hypothesis
T2 vs. T4	3.89511E-05	Significant	Reject hypothesis
T1 vs. T4	1.02946E-06	Significant	Reject hypothesis
T3 vs. T4	0.005621378	Significant	Reject hypothesis

VISUAL QUALITY EVALUATION

Table 5 revealed the result on the visual quality evaluation of the product stored in cool temperature and room temperature.

T1 as the most acceptable treatment by the respondents was subjected further to visual quality evaluation. Table 5 displayed its results, that there was ‘’no changes occur’’ in aroma, appearance and color as visually observed in the period of seven (7) days when stored at cool temperature.

While miracle fruit stored yoghurt at room temperature showed ‘’no changes occur’’ on the first day. However, the product gradually deteriorates on its aroma, appearance and color on the succeeding days of storage. It has a foul odor in the second (2) day, where some bubbles in the appearance. In the third day to seventh day many bubbles are appeared and emit ‘’odd smell’’ color changes and gradually turned gray from the third to the seventh day. It manifest deterioration of the product and not fit anymore for human consumption this implies that miracle fruit yoghurt must be consumed instantly because storing in room temperature make the product spoil easily. Low temperature storage best applied for this type of product in order to extend its longevity.

Table 5

Visual Quality Evaluation of the Most Acceptable treatment in the Cool Temperature and Room Temperature

		Cool Temperature			Room Temperature
Days	Sensory Attributes		Days	Sensory Attributes	
1	AROMA	No changes occur	1	AROMA	No changes occur
2		No changes occur	2		Has a foul odor
3		No changes occur	3		Odd Smell
4		No changes occur	4		Odd Smell
5		No changes occur	5		Odd Smell
6		No changes occur	6		Odd Smell
7		No changes occur	7		Odd smell
1	APPEARANCE	No changes occur	1	APPERANNCE	No changes occur
2		No changes occur	2		Some bubble appeared
3		No changes occur	3		Many bubble appeared
4		No changes occur	4		Many bubble appeared
5		No changes occur	5		Many bubble appeared
6		No changes occur	6		Many bubble appeared
7		No changes occur	7		Many bubbles appeared
1	COLOR	No changes occur	1	COLOR	No changes occur
2		No changes occur	2		Slightly gray
3		No changes occur	3		Slightly gray
4		No changes occur	4		Moderately gray
5		No changes occur	5		Moderately gray
6		No changes occur	6		Moderately gray
7		No changes occur	7		Moderately gray

Chapter 3

SUMMARY, CONCLUSION, AND RECOMMENDATION

This chapter present the summary finding, interpretation and recommendation.

Summary of Findings

The study was conducted at Bohol Island State University- Bilar Campus. The main purpose of the study to determine the acceptability level of miracle Fruit *Crescentia cujete* in yoghurt production. Specifically, the research sought to find out the profile of miracle fruit yoghurt in terms of ingredients and costing, tools and equipment and procedure. The acceptability level of miracle fruit in terms of color, aroma, mouthfeel, taste, the significant difference in the sensory preference of miracle fruit in yoghurt among four (4) treatments' and its visual quality evaluation. There were forty (40) respondents that is composed of ten (10) for faculty and staff (twenty) 20 for students of Bachelor of Science Industrial Technology major in Food Preparation Service Management, and ten (10) students of Hospitality Management. Prior to product tasting, a letter of request given to the selected respondents for the purpose. They were randomly chosen since the research need to have reliable data and source in order to come up with ideal and reliable output.

Participants were knowledgeable and competent in the field of food preparation and production.

Findings

The succeeding statements are the findings of the study:

The ingredients are miracle fruit extract, milk and yoghurt starter. The amount of basic ingredients for each treatment contains the same amount of freshmilk except on the amount of miracle fruit extract. Hence, the cost in every treatment differs because of the different quality extract of miracle fruit. extract. The findings reveal that out of the four treatments, the T1 has lowest amount of ingredients with Php52.11 since it has the lesser amount of miracle fruit extract 30 ml miracle fruit extract and it implies that T1 has the least cost among all treatments. In making the miracle fruit *Cresentia cujete* yoghurt, the researchers used the same tools and equipment for the four treatment. These tools and equipment are mixing bowl, wooden ladle, measuring cups and spoon, strainer and the tools used is incubator.

The researchers follow the basic procedure in preparing miracle fruit yoghurt with the same proper and prescribed materials. Right measurement of the ingredients is also observed.

The acceptability level of miracle fruit yoghurt in terms of color, it reveals that T1 was the most appealing to the eyes of the respondents because T1 obtain the highest weighted mean of 6.05% and described as “Like Moderately”. With regards to aroma, T1 is the most pleasant with the highest weighted mean of 6.08% and further described as “Like Moderately”. As to the mouthfeel of the product T1 obtain the most fancied having the highest weighted mean of 6.03% and described as “Like Moderately”. With the taste, also T1 is the most palatable with the highest weighted mean 6.47% and described as “Like Moderately”.

The miracle fruit (*Cresentia Cujete)* yoghurt was stored in different storage areas that is at room temperature and cool temperature. Based on the result of visual quality evaluation, miracle fruit yoghurt stored at room temperature can last only in one day after incubation. While, miracle fruit yoghurt stored inside the refrigerator lasted up to 6 days.

Conclusion

Based from the findings of the study, the researchers concluded that treatment 1 with 30 ml of miracle fruit extract, was the most preferred treatment based on the participants’ responses. However, all the treatment was still acceptable by the respondents. Thus, less amount of miracle fruit is accepted as a mixture to yoghurt.

Recommendation

Based on findings, the researcher offered the following recommendations:

1. Further study to enhance and create more flavor to determine the difference in the yoghurt's color, aroma, mouthfeel and taste.
2. Utilizing miracle fruit in to other product to create something unique.
3. Motivate farmers in cultivating and growing miracle fruit for its numerous benefits and can be utilized as flavoring.
4. The school may refine and enhance the miracle fruit yoghurt product as a sort of entrepreneurial activity for extention programs.
5. The packaging suggested were small cups to use for packaging in order to sustain the amount required per person.

Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY
Bilar Campus
Zamora, Bilar, Bohol

PROPOSED TECHNOLOGY GUIDE

MIRACLE FRUIT

PROPOSED TECHO GUIDE FOR MIRACLE FRUIT *Cresentia cujete* YOGHURT

Rationale

Techno guide serves as guidelines or business owners to improve their knowledge of a specific product in order to improve or develop business. We used a Techno Guide to assist and encourage them to the specific product and how relevance the product is. We aimed to create a technological guide that would capture their interest not only to read but also to share and invite others to use the product. In light of this, we proposed introducing miracle fruit yoghurt in the community in information to guide them in their daily lives.

Miracle fruit could be a natural resource in the production of yoghurt. To enhance the current economic condition by adopting recent food technology trends, miracle fruit is used and cooked as a yoghurt for food production opportunities. Moreover, miracle fruit yoghurt was created in order to serve as an evidence that the raw fruit that we have locally turn into good product that is new and has big benefits, an innovation to introduce miracle fruit yoghurt that potential in the field of entrepreneurship.

Objectives:

The objectives of this proposed technology guide are the following.

1. To introduce miracle fruit yoghurt to the school and community.
2. To encourage the community to utilize locally available resources specially miracle fruit crop.
3. To prepare nutritious and money wise yoghurts.
4. To guide students is formulating foods products particularly using miracle fruit
5. To use as one's source of income for economic growth and prosperity.

Mechanics of Implementation

The Bohol Island State University- Bilar Campus and the Dean of the College of Technology and Allied Sciences will be the newly released Miracle Fruit *Cresentia Cujete* in Yoghurt. As soon as it is accepted, the Food Technology instructor will cooperate.

Schedule of Implementation

The proposed techno guide will be implemented in June 2021.

TECHNOLOGY GUIDE IN MAKING MIRACLE FRUIT YOGHURT

Cooking of miracle fruit yoghurt needs the following ingredients, tools and equipment observing the proven procedural steps.

A. Ingredients



B. Tools and Equipment








Procedures:

1. Prepare all the ingredients the tools/materials and equipment needed.


2. Cut the miracle fruit and scoop. Bring to boil to 375 ºF (medium high heat) for the period of 30 minutes until the miracle fruit extract turn pitch black and remove from fire. Strain the bottled miracle fruit and transfer the miracle fruit juice in a clean container.







3 Combine fresh milk and yoghurt starter. Add the previously boiled extract of miracle fruit (depends on the amount of extract needed per treatment) and Incubate for 6 hours for 45ºc and cool down.



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	Color															
	T1				T2				T3				T4			
R	R	R	R	Averag	R	R	R	Averag		R	R	Averag		R	R	Averag
N	1	2	3	e	1	2	3	e	R1	2	3	e	R1	2	3	e
1	6	9	7	7.33	4	8	5	5.66	5	8	7	6.66	3	8	5	5.33
2	6	7	5	6	5	8	5	6	6	6	3	5	5	7	5	5.66
3	5	9	6	6.66	5	8	6	6.33	6	7	5	6	5	6	7	6
4	7	5	6	6	8	3	5	5.33	6	5	6	5.66	6	5	7	6
5	7	5	5	5.66	5	8	4	5.66	6	7	6	6.33	6	4	5	5
6	9	6	5	6.66	8	7	6	7	7	7	5	6.33	6	5	4	5
7	7	7	7	7	8	8	7	7.66	6	8	7	7	7	4	5	5.33
8	9	6	5	6.66	8	8	6	7.33	8	7	7	7.33	8	5	6	6.33
9	5	8	6	6.33	8	7	5	6.66	6	7	5	7	6	6	7	6
10	7	7	5	6.33	6	8	7	7	6	8	7	7	6	6	5	5.33
11	5	6	7	6	5	5	4	4.66	6	6	5	5.66	3	4	5	4
12	6	6	5	5.66	7	5	6	6	6	7	5	6	5	6	7	6
13	6	7	7	6.66	8	6	7	7	8	6	7	7	6	8	6	6.66
14	9	7	5	7	8	7	5	6.66	7	6	5	6	6	6	5	5.66
15	8	7	6	7	6	8	5	6.33	6	8	6	6.66	5	7	6	6
16	7	6	7	6.66	8	7	4	6.33	5	5	7	5.66	4	6	5	5
17	7	4	5	5.33	6	6	3	5	6	3	5	4.66	6	5	8	6.33
18	6	3	5	4.66	4	3	5	4	3	5	4	4	6	5	7	6
19	5	5	5	5	4	6	5	5	3	4	5	4	4	5	6	5
20	3	5	4	4	3	4	7	4.66	5	3	4	4	5	5	7	5.66
21	4	5	5	4.66	6	3	5	4.66	4	6	5	5	5	4	6	5
22	5	5	3	4.33	4	4	5	4.33	4	4	5	4.33	4	4	4	4
23	7	4	3	4.66	5	5	6	5.33	6	5	7	6	4	4	5	4.33
24	8	7	6	7	7	7	5	6.33	7	7	6	6.66	6	7	7	6.66
25	4	6	5	5	4	7	5	5.33	4	5	6	5	4	6	6	5.33
26	5	8	3	5.33	7	8	8	7.66	4	7	5	5.33	5	6	5	5.33
27	7	6	7	6.66	8	4	5	5.66	8	5	5	6	6	3	5	4.66
28	7	8	7	7.33	8	9	7	8	8	9	6	7.66	6	7	6	6.33
29	8	7	6	7	9	8	6	7.66	9	6	7	7.33	7	6	7	6.66
30	8	4	5	5.66	8	6	5	6.33	7	5	6	6	6	4	6	5.33
31	8	7	6	7	7	6	6	6.33	7	8	7	7.33	6	5	6	5.33
32	4	7	5	5.33	6	8	5	6.33	5	6	5	5.33	4	7	4	5
33	6	8	5	6.33	3	8	5	5.33	5	7	6	6	4	6	4	4.66
34	6	4	5	5	7	6	6	6.33	5	8	7	6.66	5	9	5	6.33
35	8	8	6	7.33	7	8	6	7.33	7	7	6	6.66	6	6	6	6
36	8	8	6	7.33	7	7	6	7	6	7	5	6	6	6	6	6
37	6	6	5	5.66	7	7	5	6.33	4	6	5	5	7	7	7	7
38	6	6	3	5	4	8	4	5.33	7	7	8	7.33	5	6	5	5.33
39	6	7	7	6.66	4	8	5	5.66	5	9	6	6.66	7	7	7	7
40	7	6	5	6	6	4	4	4.66	7	6	7	6.66	9	3	8	6.66
				241.87				242.19				240.89				225.23

	Aroma															
	T1				T2				T3				T4			
RN	R17	R2	R3	Average	R1	R2	R3	Average	R1	R2	R3	Average	R1	R2	R3	Average
1	7	7	8	7.33	7	5	6	6	8	7	6	7	7	8	6	7
2	5	8	5	6	5	7	6	6	4	6	5	5	7	8	6	7
3	6	8	7	7	5	7	6	6	5	6	5	5.33	7	8	6	7
4	6	4	5	5	7	5	6	6	6	4	5	5	5	2	4	3.66
5	7	6	6	6.33	5	7	6	6	4	6	5	5	6	6	5	5.66
6	8	4	7	3	7	5	7	6.33	6	5	5	5.33	8	2	5	5
7	8	3	5	5.33	7	4	5	5.33	6	4	6	5.33	8	1	5	4.66
8	7	7	7	7	7	8	6	7	7	8	6	7	7	6	5	6
9	5	8	6	6.33	7	8	6	7	6	7	5	6	4	6	4	4.66
10	8	6	7	7	6	7	5	6	6	6	4	5.33	5	5	4	4.66
11	3	8	5	5.33	4	6	5	5	4	6	5	5	3	2	5	3.33
12	6	6	5	5.66	7	5	6	6	6	5	4	5	6	7	5	6
13	7	7	8	7.33	8	6	7	7	8	6	7	7	6	5	4	5
14	9	7	6	7.33	8	8	7	7.66	8	6	5	6.33	6	6	4	5.33
15	8	6	6	6.66	6	8	6	6.66	6	8	5	6.33	7	5	6	6
16	5	6	5	5.66	6	7	7	6.66	5	7	6	6	5	6	5	5.33
17	8	5	6	6.33	6	3	5	4.66	6	7	5	6	5	6	6	5.66
18	5	4	6	5	4	5	5	4.66	3	7	4	4.66	5	6	5	5.33
19	5	6	4	5	4	5	6	5	6	4	5	5	3	5	4	4
20	4	5	4	4.33	5	4	6	5	7	6	4	5.66	6	3	6	5
21	5	5	6	5.33	4	4	5	4.33	3	7	4	4.66	6	5	6	5.66
22	7	7	8	7.33	5	5	5	5	4	4	5	4.33	4	4	4	4
23	6	2	3	3.66	5	4	6	5	6	5	5	5.33	4	4	5	4.33
24	8	8	8	8	7	7	7	7	8	6	7	7	6	6	4	5.33
25	2	5	5	4	4	7	5	5.33	5	4	6	5	4	5	4	4.33
26	6	9	5	6.66	7	8	6	7	8	7	6	7	5	6	6	5.66
27	7	5	5	5.66	8	3	5	5.33	8	5	7	6.66	7	3	7	5.66
28	7	8	6	7	8	9	7	8	6	8	7	7	8	7	5	6.66
29	4	8	5	5.66	6	7	7	6.66	5	6	5	5.33	4	5	4	4.33
30	7	6	6	6.33	7	4	7	6	6	5	5	5.66	5	4	4	4.33
31	7	9	5	7	8	6	5	6.33	6	8	7	7	5	5	6	5.33
32	7	5	6	6	5	7	6	6	3	8	5	5.33	6	5	5	5.33
33	6	8	5	6.33	3	8	5	5.33	6	8	7	7	4	7	5	5.33
34	7	6	6	6.33	6	7	8	7	5	5	5	5	5	7	5	6.66
35	7	7	6	6.66	8	8	8	8	7	6	5	6	8	7	6	7
36	8	8	7	7.66	7	7	7	7	7	7	6	6.66	6	6	7	6.33
37	7	6	7	6.66	8	7	6	7	5	8	5	6	6	5	5	5.33
38	7	7	5	6.33	4	7	5	5.33	2	8	4	4.66	6	5	6	5.66
39	6	7	6	6.33	7	6	6	6.33	7	5	6	6	6	4	5	5
40	6	6	5	5.66	7	3	5	5	6	7	6	6.33	7	3	5	4.66
				243.54				242.93				231.25				213.2

	Mouthfeel															
	T1				T2				T3				T4			
RN	R1	R2	R3	Average	R1	R2	R3	Average	R1	R2	R3	Average	R1	R2	R3	Average
1	6	8	7	7	7	7	6	6.66	5	6	4	5	4	8	5	5.66
2	6	8	8	7.33	5	6	7	6	3	7	5	5	6	8	7	7
3	5	7	6	6	6	6	6	6	4	5	6	5	5	6	7	6
4	7	3	6	5.33	8	2	5	5	6	5	4	5	5	3	5	4.33
5	7	5	6	6	5	7	6	6	4	6	5	5	6	5	4	5
6	7	6	7	6.33	6	6	6	6	5	4	5	4.66	6	2	5	4.33
7	8	5	7	6.66	6	6	5	5.66	7	7	6	6.66	8	4	5	5.66
8	8	6	8	7.33	7	7	7	7	6	7	5	6	8	4	5	5.66
9	5	7	6	6	8	7	6	7	7	6	5	6	6	5	4	5
10	7	6	5	6	6	8	7	7	7	7	6	6.66	5	5	5	5
11	4	6	6	5.33	5	5	6	5.33	6	6	6	6	3	4	5	4
12	5	6	7	6	6	7	5	6	5	6	4	5	4	5	6	5
13	7	4	7	5	8	7	6	7	6	5	5	5.33	7	4	5	5.33
14	9	6	8	7.66	8	7	5	6.66	7	6	6	6.33	6	7	6	6.33
15	8	7	7	7.33	6	8	6	6.66	5	8	7	6.66	5	6	7	6
16	5	5	6	5.33	7	6	6	6.33	5	5	6	5.33	7	5	6	6
17	7	5	6	6	6	3	5	4.66	7	5	6	6	5	4	5	4.66
18	5	3	7	5	4	3	5	4	6	5	7	6	5	8	5	6
19	6	4	7	5.66	5	3	4	4	4	6	5	5	4	5	6	5
20	3	6	5	4.66	3	5	6	4.66	5	4	4	4.33	8	4	5	5.66
21	4	5	6	5	3	6	5	4.66	5	3	4	4	2	5	3	3.33
22	5	5	7	5.66	5	5	6	5.33	4	4	5	4.33	4	4	4	4
23	6	5	6	5.66	4	5	6	5	6	8	5	6.33	4	4	3	3.66
24	7	8	8	7.66	6	7	5	6	6	7	5	6	6	7	5	6
25	5	7	6	6	5	8	7	6.66	8	6	5	6.33	4	6	4	4.66
26	6	7	8	7	7	8	6	7	7	7	7	7	6	6	5	5.66
27	5	6	7	6	7	4	5	5.33	6	7	5	6	4	5	5	4.66
28	7	7	7	7	8	8	7	7.66	8	7	6	7	6	6	4	5.33
29	6	6	8	6.66	8	5	6	6.33	5	4	4	4.33	6	2	4	4
30	6	6	7	6.33	6	5	5	5.33	6	6	5	5.66	6	4	4	4.66
31	7	7	8	7.33	7	5	6	6	7	7	6	6.66	7	5	6	6
32	6	7	8	7	4	6	5	5	5	7	5	5.66	7	5	5	5.66
33	7	7	7	7	5	7	6	6	6	7	5	6	3	7	4	4.66
34	7	6	8	7	8	5	7	6.66	6	7	6	6.33	5	5	7	5.66
35	7	7	8	7.33	6	8	7	7	7	7	7	7	6	8	7	7
36	7	8	6	7	7	8	6	7	7	8	6	7	7	7	6	6.66
37	6	7	5	6	4	8	5	5.66	7	7	6	6.66	4	5	5	4.66
38	7	6	5	6	5	8	6	6.33	6	8	7	7	3	5	5	4.33
39	6	5	7	6	7	3	7	5.66	6	7	5	6	4	3	5	4
40	7	6	7	6.66	6	3	5	4.66	7	5	6	6	6	3	4	4.33
				252.24				236.89				232.25				206.54

	Taste															
	T1				T2				T3				T4			
RN	R1	R2	R3	Average	R1	R2	R3	Average	R1	R2	R3	Average	R1	R2	R3	Average
1	8	7	7	7.33	6	7	7	6.66	5	8	6	6.66	7	8	6	7
2	8	6	7	7	6	8	7	7	8	7	6	7	5	5	6	5.33
3	5	8	6	6.33	4	7	7	6	3	5	5	4.33	2	6	5	4.33
4	9	2	5	5.33	8	3	6	5.33	7	2	5	4.66	1	6	3	3.33
5	9	7	7	6.66	6	6	5	5.66	5	5	5	5	5	4	3	4
6	8	3	5	5.33	7	4	6	5.66	5	5	5	5	6	2	3	3.66
7	6	4	5	5	8	6	7	7	7	7	7	7	5	4	3	4
8	8	5	6	6.33	6	7	7	6.66	5	8	8	7	7	5	6	6
9	5	9	7	7	9	8	9	8.66	6	7	8	7	7	6	5	6
10	8	7	6	7	8	8	8	8	7	8	7	7.33	5	8	6	6.33
11	3	8	5	5.33	5	4	6	5	5	7	7	6.33	3	5	4	4
12	5	6	7	6	7	7	7	7	4	5	6	5	5	3	4	4
13	8	9	7	8	8	7	7	7.33	9	5	8	7.33	6	3	5	4.66
14	9	7	9	8.33	8	7	8	7.66	7	5	6	6	5	6	6	5.66
15	8	8	8	8	6	8	7	7	5	8	6	6.33	5	7	6	6
16	5	6	7	6	6	8	7	7	4	7	7	6	4	8	5	5.66
17	8	5	7	6.66	8	2	5	5	7	5	6	6	5	3	5	4.33
18	5	6	7	6	3	7	5	5	7	7	7	7	7	6	6	6.33
19	3	6	5	4.66	5	4	6	5	4	6	5	5	5	5	5	5
20	4	5	6	5	3	5	5	4.33	7	4	5	5.33	7	5	6	6
21	5	4	6	5	3	6	5	4.66	6	4	5	5	4	6	5	5
22	6	6	6	6	3	3	5	3.66	2	2	2	2	1	1	1	1
23	5	3	5	4.33	4	4	5	4.33	5	5	5	5	3	4	2	3
24	8	7	7	7.33	7	6	6	6.33	7	5	6	6	6	5	7	6
25	3	5	6	4.66	3	9	5	5.66	5	7	6	6	4	4	7	5
26	5	8	7	6.66	7	8	6	7	7	7	7	7	6	5	4	5
27	6	6	7	6.33	8	4	5	5.66	7	6	8	2	6	7	6	5.33
28	7	7	7	7	8	8	8	8	6	9	7	7.33	7	7	7	7
29	6	7	7	6.66	7	8	7	7.33	8	6	7	7	6	4	6	5.33
30	7	8	9	8	7	5	5	5.66	6	3	5	4.66	4	6	6	5.33
31	8	7	7	7.33	7	5	5	5.66	6	7	5	6	4	6	6	5.33
32	8	8	8	8	6	9	7	7.33	4	7	5	5.33	3	6	5	4.66
33	7	8	6	7	5	7	6	6	3	6	5	4.66	5	5	5	5
34	7	6	5	6	8	6	7	7	6	8	6	6.66	6	5	5	5.33
35	7	7	7	7	8	8	8	8	9	8	7	8	7	6	6	6.33
36	8	8	8	8	7	8	7	7.33	7	6	5	6	6	6	6	6
37	8	7	7	7.33	7	8	8	7.66	6	6	6	6	7	7	7	7
38	6	8	5	6.33	3	9	5	5.66	7	9	6	7.33	4	7	7	6
39	5	7	6	6	3	8	6	5.66	6	9	6	7	3	5	4	4
40	9	6	5	6.66	9	4	6	6.33	9	7	6	7.33	9	4	5	6
				258.91				251.87				237.6				205.56

Modified 9- Hedonic Scale on Evaluating Miracle Fruit in Yoghurt

I. Profile of the Respondents

Age: Gender:

Educational Attainments: Civil Status:

- Direction. Please read the following items and fill up each in the table and put the check mark (/) in order to gather information.

Attributes	Rating Scale	T1	T2	T3	T4
COLOR	9				
	8				
	7				
	6				
	5				
	4				
	3				
	2				
	1				

Attributes	Rating Scale	T1	T2	T3	T4
AROMA	9				
	8				
	7				
	6				
	5				
	4				
	3				
	2				
	1				

Attributes	Rating Scale	T1	T2	T3	T4
MOUTHFEEL	9				
	8				
	7				
	6				
	5				
	4				
	3				
	2				
	1				

Attributes	Rating Scale	T1	T2	T3	T4
TASTE	9				
	8				
	7				
	6				
	5				
	4				
	3				
	2				
	1				

Table 1. Questionnaire use in survey

LE (9) = The respondents Like Extremely the food represented in terms of aroma, consistency and texture, color and taste.

LVM (8) = The respondents Like Very Much the food represented in terms of aroma, consistency and texture, color and taste.

LM (7) = The respondents Like Moderately the food represented in terms of aroma, consistency and texture, color and taste.

LS (6) = The respondents Like Slightly the food represented in terms of aroma, consistency and texture, color and taste.

NLNDL (5) = The respondents Neither Like nor Dislike the product in terms of aroma, consistency and texture, color and taste.

DL (4) = The respondents Dislike the product in terms of aroma, consistency and texture, color and taste.

DLM (3) = The respondents Dislike Moderately the products in terms of aroma, consistency and texture, color and taste.

DLVM (2) = The respondents Dislike Very Much the products in terms of aroma, consistency and texture, color and taste.

DLE (1) = The respondents Dislike Extremely the products in terms of aroma, consistency and texture, color and taste

APPENDIX A.1
Letters

Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY
Zamora, Bilar, Bohol

MARIETTA C. MACALOLOT, Ph.D
College Director
BISU- Bilar Campus

Madam:

In partial fulfillment of the requirements for the degree of Bachelor of Science Industrial Technology (BSIT) major in Food Preparation Service Management the researcher is asking permission from your good office to conduct a study entitled "**FORMULATION AND ACCEPTABILITY LEVEL OF MIRACLE FRUIT** (**CRESCENTIA CUJETE) IN YOGHURT PRODUCTION".**

We are anticipating for a kind approval and consideration regarding this request.

Sincerely yours,

(sgd) Nieva Mae M. Dalagdagan

(sgd) Ryan G. Lozano

(sgd) Jona Marie B. Raut

(sgd) Jaycille M.Taguba

THE RESEARCHERS

Noted:

(sgd) NELIA Q. CATAYAS
Thesis Adviser

Recommending approval:

(sgd) ARLEN B. GUDMALIN,Ph.D
Dean,CTAS

Approved:
(sgd) MARIETTA C. MACALOLOT, Ph.D

APPENDIX A.2

Republic of the Philippines

BOHOL ISLAND STATE UNIVERSITY

Zamora, Bilar, Bohol

Date: May 11, 2021

To Respondents:

We would like to ask permission and give as enough time to answering to the following questions for the success of our study entitled **"FORMULATION AND ACCEPTABILITY LEVEL OF MIRACLE FRUIT (CRESCENTIA CUJETE) IN YOGHURT PRODUCTION"** in the year 2020-2021 as a requirement of Bachelor of Science Industrial Technology (BSIT) major in Food Preparation Service Management.

We would like to give an importance to the trust you give to us and we rest assured that utmost courtesy that we would keep it confidentially the information that we gather.

We hope your kind consideration.

Sincerely yours,

Nieva Mae M. Dalagdagan

Ryan G. Lozano

Jona Marie B. Raut

Jaycille M. Taguba

The Researcher

APPENDIX A.3

Application for Proposal Hearing
Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY
Bilar Campus, Zamora, Bilar, Bohol

Vision: *A premier S & T university for the formation of a world – class and virtuous human resource for the sustainable development in Bohol and the country.*

Mission: *BISU is a committed to provide quality higher education in the arts and sciences, as well as in the professional and technological fields; undertake research and development of Bohol and the country.*

COLLEGE OF ALLIED AND SCIENCES (CTAS)

February 01, 2021

ARLEN B. GUDMALIN. Ph. D

Dean, College of Allied and Sciences

BISU- Bilar Campus

Zamora, Bilar, Bohol

Madam:

The undersigned would like to request your office to set a proposal hearing of our research entitled, **"FORMULATION AND ACCEPTABILITY LEVEL OF MIRACLE FRUIT** (**CRESCENTIA CUJETE) IN YOGHURT PRODUCTION"** with the research committee on February 01, 2021 at HRST Room.

Anticipating for your favorable action and approval on this request.

Thank you and more power!

Respectfully yours,

Nieva Mae M. Dalagdagan

Ryan G. Lozano

Jona Marie B. Raut

Jaycille M. Taguba

The Researchers

APPENDIX A.4

Application for Oral Defense
Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY
Bilar Campus, Zamora, Bilar, Bohol

Vision: *A premier S & T university for the formation of a world – class and virtuous human resource for the sustainable development in Bohol and the country.*

Mission: *BISU is a committed to provide quality higher education in the arts and sciences, as well as in the professional and technological fields; undertake research and development of Bohol and the country.*

COLLEGE OF ALLIED AND SCIENCES (CTAS)

ARLEN GUDMALIN. Ph. D June 07, 2021

Dean, College of Allied and Sciences

BISU- Bilar Campus

Zamora, Bilar, Bohol

Madam:

The undersigned would like to request your office to set a proposal hearing of our research entitled, **"FORMULATION AND ACCEPTABILITY LEVEL OF MIRACLE FRUIT** (**CRESCENTIA CUJETE) IN YOGHURT PRODUCTION"** with the research committee on February 01, 2021 at HRST Room.

Anticipating for your favourable action and approval on this request.

Thank you and more power!

Respectfully yours,

Nieva Mae M. Dalagdagan

Ryan G. Lozano

Jona Marie B. Raut

Jaycille M. Taguba

The Researchers Documentation

APPENDIX D

Computation on the One-Way Analysis of Variance

AROMA

Anova: Single Factor

SUMMARY

Groups	Count	Sum	Average	Variance
T1	40	243.54	6.0885	1.213351538
T2	40	242.93	6.07325	0.892284038
T3	40	231.25	5.78125	0.688026603
T4	40	213.2	5.33	0.878241026

ANOVA

Source of Variation	SS	DF	MS	F	P-value	F crit
Between Groups	15.112685	3	5.03756167	5.487684599	0.00130603	2.662568549
Within Groups	143.20425	156	0.9179758			
Total	158.31691	159				

Significant

TEXTURE

Anova: Single Factor

SUMMARY

Groups	Count	Sum	Average	Variance
T1	40	252.24	6.306	0.657024615
T2	40	236.89	5.92225	0.829315321
T3	40	232.25	5.80625	0.728290705
T4	40	206.54	5.1635	0.815279744

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	27.046055	3	9.015352	11.90180635	4.628E-07	2.662568549
Within Groups	118.166505	156	0.757478			
Total	145.21256	159				

Significant
COLOR
Anova: Single Factor
SUMMARY

Groups	Count	Sum	Average	Variance
T1	40	241.87	6.04675	0.880740449
T2	40	242.19	6.05475	1.031133269
T3	40	240.89	6.02225	0.997628141
T4	40	225.23	5.63075	0.590827628

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	5.0782475	3	1.692749	1.934388374	0.126275882	2.662568549
Within Groups	136.51285	156	0.875082			
Total	141.591097	159				

Significant

TASTE

Anova: Single Factor

SUMMARY

Groups	Count	Sum	Average	Variance
T1	40	258.91	6.47275	1.100133269
T2	40	251.87	6.29675	1.396196859
T3	40	237.6	5.94	1.765717949
T4	40	205.26	5.1315	1.457772051

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	42.525005	3	14.175	9.9129003	5.08028E-06	2.662568549
Within Groups	223.072985	156	1.429955			
Total	265.59799	159				

Researchers' Biodata

I. **Personal Background**

Name : NIEVA MAE M. DALAGDAGAN

Address : Omjon, Valencia, Bohol

Date of Birth : November 16 1996

Father's Name : Wilfredo Dalagdagan

Mother's Name : Felicidad Dalagdagan

II. Educational Background

Elementary Omjon Elementary School 2011- 2012

Secondary: Mayor Pablo O. Lim Memorial High School 2018- 2019

College Bohol Island State University – Bilar Campus

III. **SEMINARS, TRAINING & WORKSHOP**

Safety Awareness in the Food

BISU-Bilar Campus

October 24, 2018

Nutri-Dish Cooking Contest

BISU-Bilar Campus

July 27,2018

NCII in Cookery

Tesda, Cal Lim Baclayon

May 04,2019

Researchers' Biodata

I. Personal Background

Name : RYAN G. LOZANO

Address : April 12, 2000

Date of Birth : Villa Suerte Bilar, Bohol

Father's Name : Hilario N. lozano

Mother's Name : Eugenia G. lozano

II. Educational Background

Elementary Villa Suerte Elementary School 2011- 2012

High School Canhayupon National High School

College Bohol Island State University- Bilar Campus

III.SEMINARS, TRAINING & WORKSHOP

NCII in Cookery

Tesda, Cal Lim Baclayon

May 04,2019

Safety Awareness in the Food

BISU-Bilar Campus

October 24, 2018

Researchers' Biodata

I. Personal Background

Name : JONA MARIE B. RAUT

Address : Macalingan, Lila, Bohol

Date of Birth : April 25, 2000

Father's Name : Jose P. Raut

Mother's Name : Bernadette B. Raut

II. Educational Background

Primary Lila Central Elementary School 2011-2012

Secondary Lila National High School 2018-2019

College Bohol Islands State University-Bilar Campus

III.SEMINARS, TRAINING & WORKSHOP

NCII in Cookery

Tesda, Cal Lim Baclayon

May 04,2019

NCII in Bread and Pastry

Tesda, Jagna Bohol (2018)

Safety Awareness in the Food

BISU-Bilar Campus

October 24, 2018

Researchers' Biodata

I. Personal Background

Name : JAYCILLE M. TAGUBA

Address : Omjon, Valencia, Bohol

Date of Birth : January 14, 2000

Father's Name : Narciso Y. Taguba

Mother's Name : Alice M. Taguba

II. Educational Background

Primary Omjon Elementary School 2011- 2012

Secondary Mayor Pablo O. Lim Memorial High School 2018- 2019

Tertiary Bohol Island State University Bilar Campus

III.SEMINARS, TRAINING & WORKSHOP

NCII in Cookery

Tesda, Cal Lim Baclayon

May 04,2019

Safety Awareness in the Food

BISU-Bilar Campus

October 24, 2018

Nutri-Dish Cooking Contest

BISU-Bilar Campus

July 27,2018