

**SENSORY EVALUATION ON DIFFERENT LEVEL OF MALABAR SPINACH
(Basella alba) IN JAM MAKING**

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

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June 2021

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(*Basella alba*) IN JAM MAKING

A Thesis Proposal
Presented to the Faculty of the
College of Technology and Allied Sciences
BOHOL ISLAND STATE UNIVERSITY
Bilar Campus, Zamora, Bilar, Bohol

In Partial Fulfilment
Of the Requirements for the Degree of
Bachelor of Science in Industrial Technology major in
Food Preparation Service Management

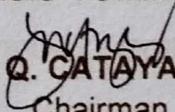
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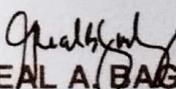
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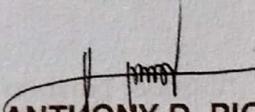
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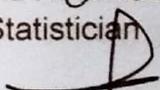
The research study entitled "**Sensory Evaluation on Different Level of Malabar Spinach (*Basella alba*) in Jam Making**", prepared and submitted by Conie A. Busbus, Vicencio C. Dano, Ronila D. Dusal and Annaliza Marie M. Huraño has been checked and is hereby accepted in partial fulfillment of the requirements for the degree in Bachelor of Science in Industrial Technology major in Food Preparation Service Management.

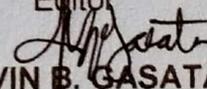
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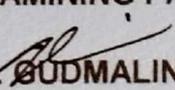

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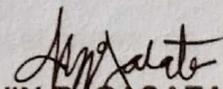

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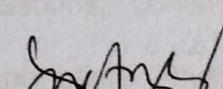
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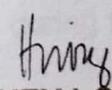
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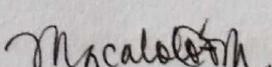

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ABSTRACT

The main purpose of the study was to determine the sensory evaluation on different treatments of Malabar Spinach (*Basella alba*) in jam making in terms of texture, color, aroma, taste and the significant difference among the four treatments. The study used the experimental design employing the modified 5-Hedonic Scale questionnaire as an instrument in gathering data. There were 40 respondents composed of fifteen (15) BSIT- FPSM students, fifteen (15) BSHM students and ten (10) Faculty of the Department of Hotel Management and Industrial Technology (DHMIT) at Bohol Island State University - Bilar Campus. The data were treated using the weighted mean and F- test to determine the difference between the four treatments in terms of texture, color, aroma and taste. The results showed that treatment 2 with $\frac{1}{2}$ cup of blended Malabar Spinach, $\frac{1}{2}$ cup of condensed milk, $\frac{1}{2}$ cup of coconut milk, $\frac{1}{2}$ cup of white sugar and 1 teaspoon of cornstarch was the most acceptable treatment across all attributes. A Techno Guide was distributed to promote the nutritious and affordable Malabar Spinach (*Basella alba*) in Jam Making. Furthermore, it encourages to support the food laboratories in the school for product innovation. This further recommended enhancement and additional flavors to the mixture to further determine the difference in texture, color, aroma and taste of the jam. Finally, this product innovation may be utilized Malabar Spinach (*Basella alba*) in Jam Making as a form of entrepreneurial activity for the benefits of everybody, eventually ensure food security and sustainability.

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Chapter 1

THE PROBLEM AND ITS SCOPE

Rationale

People's lifestyles have altered in these days due to globalization and industrialization. In our ever changing world the demand for ready to eat foods is steadily expanding, several epidemiological studies have revealed that diet has a significant impact on health deficiencies that may contribute to a variety of health problems. Accordingly, diseases of the gastrointestinal tract and the cardiovascular system multiple micronutrient deficits are far more prevalent than single nutrient deficits mostly in poorer countries. There is a need to encourage individuals to eat more green leafy vegetables to combat these micronutrient deficiencies.

Malabar spinach is either red vine or green vine and has a leafy climbing herbs that can be grown as an annual or perennial. The leaves are thick, meaty, pointy at the tip and alternately placed on the vine. Flowers are white, pink, or crimson and appear in small spikes in the leaf axils. *Basella alba* is a popular tropical leafy vegetable that is widely grown as a garden herbs or as a house plant green. The leaves and stems of this plant are consumed and used to prepare a variety of dishes in the Philippines. This vegetable is high in vitamins, minerals and anti-oxidants, all of which help to protect the immune system.

In the tropical lowlands, Malabar Spinach is a high yielding green crop that can be cultivated at home or in a market garden (Sienmonsma and Piluek, 1994). Malabar spinach's heart-shaped, thick, semi-succulent leaves have a moderate flavour and a mucilaginous texture. Eating Malabar spinach on a daily basis has been shown to deliver vitamin A, especially in people at high risk of deficiency.

Moreover, jam is a kind of sweet dessert that is loved by most of the people especially children, young adults and even adolescents due to its character. It can be used for spreading of some pastry product. That is why we researchers opted to utilize the Malabar Spinach into jam as a new variety of dessert.

Aside from its potential as a source of food, giving the importance on the utilization of Malabar Spinach into another product since this kind of vegetable is prevalent anywhere, under-appreciated with no production of sweet out of this kind of vegetable. Therefore, the researchers proposed to had the study on Malabar Spinach in jam making. This innovation could be one of the promising technology in the future in providing food security and sustainability of food to everyone and no one will suffer hunger and malnutrition.

The researchers were deemed to pursue utilizing Malabar Spinach as the new product available in the community. Thus, the utilization of the neglected resource will boost its production to look into its potential in

solving the nutrition problem in the community and also to boost the immune system of people.

Literature Background

The following related readings served as legal bases of this study:

According to the Section 15, Article II of the 1987 Philippine Constitution, declares that the state shall protect and promote the right to health of the people and instil health consciousness among them. Furthermore, it is stated in Section 10 of Article XIV of the Philippine Constitution states that science and technology are vital to national growth and advancement. The State likewise emphasize research and development, invention, innovation and use thereof, an education, training and services. It shall support indigenous, appropriate, and self-reliant scientific and technological capabilities, and their application to the country's productive systems and national life.

The Republic Act No. 10611, otherwise known as the food safety regulatory system in our country provides protection to consumers so they will have access to local foods and food products that have undergone thorough and rigid inspection. Under Section 3 of the Republic Act, the objectives include the: Protection of the public from food-borne and water-borne illnesses and unsanitary, unwholesome, misbranded or adulterated foods. Enhance industry and consumer confidence in the food regulatory system. And achieve economic growth and development by promoting fair

trade practices and sound regulatory foundation for domestic and international trade (Aquino, 2014).

The following related literature provide background information about this study:

Malabar spinach is scientifically named *Basella alba* or locally known as alugbati. This plant is a tropical, indigenous leafy vegetable widely grown for its tender, nutritious, and succulent stems. It contains has a variety of medical property. Its significance is under-estimated, considering its many applications and potential benefit. *Basella alba*, with red or green vines and leaves, is an annual or evergreen climbing herb. The leaves are dense, fleshy, pointed to the tip, and arranged along the vine alternately. It has a high protein content for a plant and is a good source of magnesium, phosphorus, and potassium as well (Gonzaga, 2015).

Two species of *Basella* (*Basella rubra* L. and *Basella alba* L) identified by Carl Linnaeus. Both two species *Basella rubra* L. and *Basella alba* L. are differentiated by their leaf characteristics and stem colours. Malabar spinach belong to the Basellaceae family. The stem of *Basella alba* is green in color with bigger stem than the red-stemmed *Basella rubra* (Deshmukh, 2014).

Basella alba is a fast-growing, soft-stemmed vine that can reach a length of 10 meters (33 feet). Its heart-shaped, thick, semi-succulent

leaves have a moderate flavor and mucaliginous texture. The *Basella alba* has a reddish-purple stem. *Basella alba* thrives in full sunlight in hot, humid conditions and at elevations of less than 500 meters. The plant is indigenous to Asia's tropical regions. Reduced temperatures limit growth, resulting in low yields. During the short-day months of November and December, flowering is induced (Nano, 2016).

Malabar spinach is used to make many type of dishes in many countries like Philippines, Thailand, Chia, Mongolia, India, Sri Lanka and many African countries. In the Philippines, a vegetable dish called utan which is cooked with sardines, onions, garlic and parsley. In Mangalorean Tuluva Cuisine, a coconut-based gravy called gassi is paired with the *Basella* plant, making a delicacy called Basale gassi to be eaten with rice dumplings called pundi soaked overnight in the gravy or with red rice. Soup is made in Chinese cuisine and Vietnam cuisine, Malabar spinach is mixed with crab meat and jute (River walk Nursery, 2019).

According to Chantal A. Diemeleou, (2013) the qualities of seed oil from *Basella alba*, an important tropical leafy vegetable, have piqued our interest in our search for new sources of oil with better attributes.

Malabar Spinach may also be suitable crop for farmers' market consumers, road side stand, especially consumers seeking more unique and ethnic vegetables. The use of this vegetables is very common in terms of making different kind of food or adding it to make the food more

delicious and tastier. One can get many benefits out of this plant. A benefit not only for one's health but also as an additional income upon selling it.

The study had evaluated the sensory attributes and determine the different level of malabar spinach in jam making in terms of texture, color, aroma and taste. The proponent further evaluated the right quantity of spinach that was acceptable by the consumers.

The Department of Agriculture (DA) Bureau of Plant Industry (BPI) promotes the production of Malabar Spinach and other indigenous leafy vegetables in the farms and gardens to contribute to the nutritional intake of Filipinos, especially the youth at its stations in the National Capital Region and in the provinces. The Bureau maintains demonstration gardens that also serve as reliable sources of seeds (Ponce, 2016).

There are good marketing possibilities at smaller volume in wholesale markets, especially restaurants and groceries specializing in seasonal, ethnic and local products. Attributes of Malabar spinach may favour certified organic production, and additional wholesale markets may be available at groceries. Moreover, point of purchase materials like recipes and educational brochures, can help educate customers unfamiliar with Malabar spinach. Product sampling or demonstrations at farmers' market may increase the likelihood of consumers purchasing a less familiar crop (Wright, 2017).

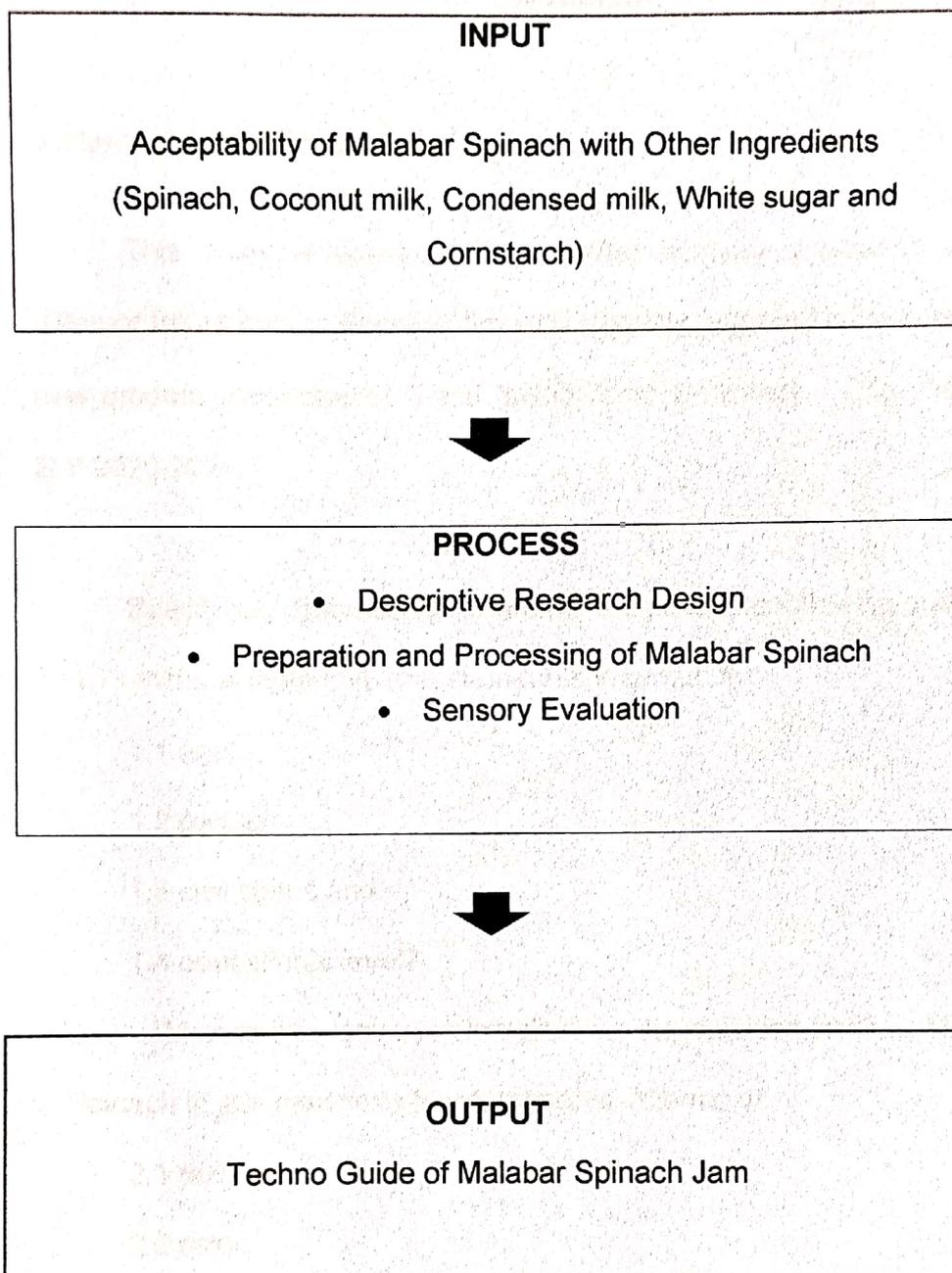


Figure 1. Flow of the Study

THE PROBLEM

Statement of the Problem

This study aimed to determine the sensory evaluation of the different treatments of Malabar Spinach (*Basella alba*) in jam making as a new product conducted at Bohol Island State University – Bilar Campus S.Y 2020-2021.

Specifically, the researcher aimed to answer the following queries;

1. What is the profile of respondents in terms of:
 - 1.1 age;
 - 1.2 gender;
 - 1.3 civil status and
 - 1.4 educational level?
2. What is the sensory evaluation on the different level of Malabar Spinach in jam making in four treatments in terms of:
 - 2.1 texture;
 - 2.2 color;
 - 2.3 aroma and
 - 2.4 taste?
3. What is the visual quality evaluation of the sensory evaluation on different level on Malabar Spinach in jam making?

4. Is there a significant difference among the treatments of Malabar Spinach Jam in terms of texture, color, aroma and taste.

Null Hypothesis

There is no significant difference in sensory evaluation on the different level of malabar spinach in jam making in different treatments in terms of texture, color, aroma and taste.

Significance of Study

The researchers believed that the result of this study would be beneficial to the following individual:

Academe. For BISU – Bilar students, staff and faculties, especially those that are working in the production and marketing area, the result of the study would be useful.

Community. The result of the acceptability of the Malabar Spinach would give a new taste, flavour and give the essentials need to the people.

Consumers. This product would be healthy as part of their diet for it is from natural ingredients. It would be convenient, practical and natural without affecting one's health. Moreover, malabar spinach is not only for teens who loves enjoying dessert but for the consumers to enjoy and appreciate its value as well.

Entrepreneurs. The result of this study would motivate to promote innovation or introduce new product.

Farmers. The result of this study would encourage the farmers to plant more, Malabar Spinach in their farm and boost its supply in the market.

School. The output can be improved in so many ways and malabar spinach would be utilized in providing guide in preparing desserts or preserve further studies.

Students. The study would encouraged student to discover, enrich or enhance the preparation of new foods out from the ingredient's availability in their locality.

Future Researcher. This accomplishment of this study would give them additional idea or area for their research study.

Research Methodology

Design

The researchers used the Complete Random Design (CRD) to determine the Sensory Evaluation on Different Level of Malabar Spinach in Jam Making. The experimental study determined the acceptability level of Malabar Spinach in Jam in different treatments based on its sensory attributes.

Legend:

T₄ = 2 cups of Malabar Spinach

T₁ = 1 ½ cups of Malabar Spinach

T₃ = 1 cup of Malabar Spinach

T₂ = ½ cup of Malabar Spinach

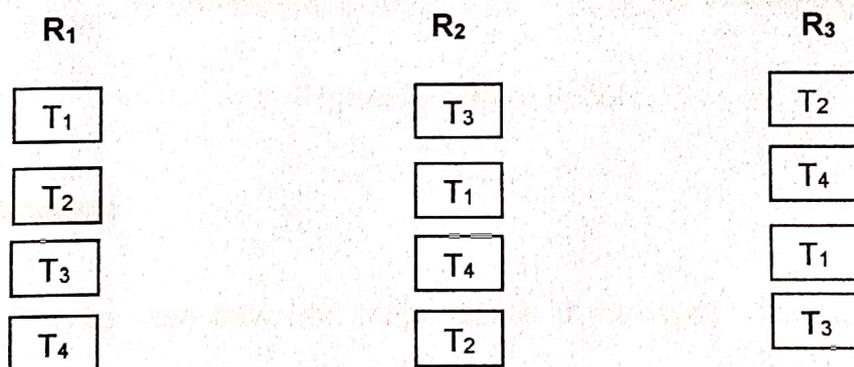


Figure 2. Shows the experimental lay-out using CRD

Environment

The locale of the study was conducted by the students from BSIT major in Food Preparation Service Management at Bohol Island State University-Bilar Campus, Zamora, Bilar, Bohol specifically in Food Technology laboratory room. The institution provided the needed facilities in processing jam and other food products. Moreover, the academe offered curriculum program related food preparation, service and technology that motivated the researchers to had this study.

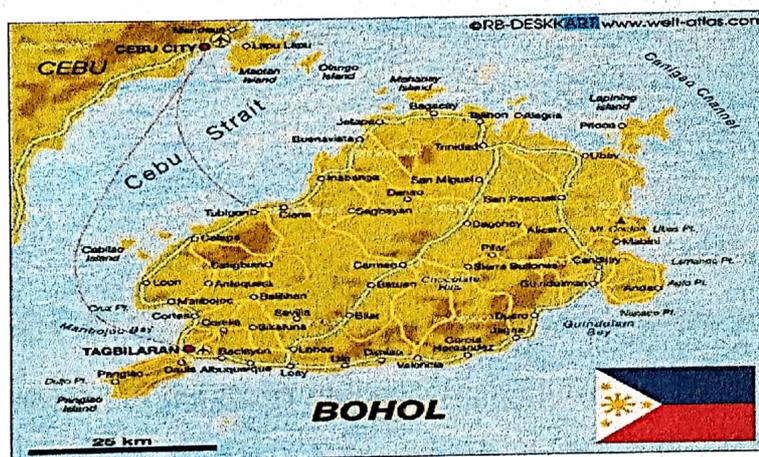


Figure 3. Map of Bohol

Participants

There were forty (40) respondents of the study. It consist of (15) BSIT-FPSM students, (15) BSHM students and (10) Faculty of the Department of Hotel Management and Industrial Technology (DHMIT). The selection of respondents was through purposive sampling. The

respondents were capable of evaluating the products because of their knowledge, skills and attitude possessed.

Instrument

The researchers utilized a prepared questionnaire to determine the participants' acceptability level of Malabar Spinach in Jam Making in terms of different attributes such as texture, color, aroma and taste. Researchers used the modified 5. Hedonic Scale to gathered data. Furthermore, under the direction of the panellist, the tool was revised and clarified. It was chosen as a research tool because it is simple to use and respond to by respondents.

Procedure

Securing Permit from the College. The researchers secured a letter of permission to the Dean of the College of Technology and Allied Sciences (CTAS) and Chairperson for allowing the researcher to conduct the study. The researchers had observed the strict compliance of health protocols to prevent the spread of COVID-19.

Procurement of Ingredients. For accessibility and convenience, the Malabar Spinach was grown and harvested in the backyard, while the other ingredients were purchased at Sierra Bullones Public Market.

Gathering and Assembling of Materials and Equipment. In the preparation of Malabar Spinach Jam in various treatments, ingredients

procedure and tools were used. The tools and equipment in this experimental study were knife, aluminum pan, wooden ladle, airtight jar, blender, strainer, measuring cups, measuring spoon, water heater, mixing bowl and gas range with stove.

Preparation of Malabar Spinach. The Spinach was submerged to the hot water for five minutes. The blanched Spinach were taken from the kettle and placed on a clean aluminum pan. The blanched leaves were blended and placed in a clean bowl.

Prepare ingredients for Jam making. Measure the blanched spinach and set aside and let it cool, blend the blanched spinach, prepare the coconut milk, place in the pan the blended spinach and coconut milk. Heat the stove to medium heat cook until it boils. Add condensed milk, corn starch, sugar is optional and remove the stove from pan over the heat.

Procedure in Making Jam. The ingredients use in making the Malabar Spinach Jam are $\frac{1}{2}$ cup of blended spinach, $\frac{1}{2}$ cup coconut milk, $\frac{1}{2}$ cup condensed milk, $\frac{1}{2}$ cup sugar and 1 tablespoon of corn starch.

Taste Testing/Gathering Data. The prepared and finished jam underwent set-up testing for the respondents. Hence, bottled water, pen, questionnaire, camera, alcohol and tissue are needed in the conduct of the study. A set of treatment was prepared together with the questionnaire for evaluation and observe health protocols during and after the conduct.

OPERATIONAL DEFINITION OF TERMS

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

Aroma. A distinctive, typically pleasant smell.

Blanch. It is a method of putting some hot water to the Malabar spinach in just 2-3 minutes.

Blending. The process of making Malabar Spinach into smaller particles with the use of blender.

Color. It refers to the hue of the object or a visual perception that enables one to differentiate other and identical objects.

Complete Random Design. This pertains to research design without definite pattern of treatments and variables.

Hedonic Scale. The term used in tasting panels where the judges indicate the extent of their like or dislike for the food.

Jam. A sweet sticky food made from boil fruits and sugar that is usually spread on to a bread.

Malabar Spinach. A very fleshy, thick leaves that are juicy and crisp with taste of citrus and pepper.

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

Texture. The feel, appearance or consistency of a surface or substance.

CHAPTER 2

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter displays the presentation, analysis and interpretation of data collected through the questionnaires answered by the forty (40) respondents. The table illustrates the responses of the respondents with regards the profile of respondents in terms age, gender, civil status and educational level. The data was collected last April 2021 in Bohol Island State University – Bilar Campus. Likewise, it presents the sensory evaluation of Malabar Spinach (*Basella alba*) in Jam Making in terms of texture, color, aroma and taste.

Table 1 shows the demographic profile of the respondents in terms to age, gender, civil status and educational level. Majority of the respondents were ages 18 to 28 years with 29 (72.5%) followed by the ages 29 to 39 years old with 8 (20%), then ages 51 to 61 got 2 (5%) and lastly ages 40 to 50 years old obtain the lowest frequency from the respondents with 1 (2.5%).

In terms of gender, 17 (42.5%) were females and 23 (57.5%) were males. Twenty-eight (70%) of the respondents were single while the remaining number of respondents were married and got 12 (30%). With educational level, most of them were BSIT-FPSM and BSHM with the same range of 15 (37.5%) and faculty got 10 (25%).

Table 1
Demographic Profile of the Respondents

	ITEM	FREQUENCY	PERCENTAGE (%)
AGE			
	18-28	29	72.5
	29-39	8	20
	40-50	1	2.5
	51-61	2	5
TOTAL		40	100
GENDER			
	Female	17	42.5
	Male	23	57.5
TOTAL		40	100
CIVIL STATUS			
	Single	28	70
	Married	12	30
TOTAL		40	100
EDUCATIONAL LEVEL			
	BSIT-FPSM	15	37.5
	BSHM	15	37.5
	Faculty	10	25
TOTAL		40	100

Table 2 presents the sensory evaluation of the Malabar Spinach jam. In terms of texture, results reveal, Treatment 2 got the highest weighted mean of (4.22) and interpreted as "Extremely Like" while treatment 4 got the lowest weighted mean of (3.42) and interpreted as "Like". This further implies most of the respondents preferred Treatment 2 since it only contains

½ cup of Malabar Spinach compared to Treatment 4 with 2 cups of Malabar Spinach. According to Dr. Asa Mittman, (2021) texture is the feelings of a surface, real or represented. This might be referring to the roughness or smoothness of actual objects and art media, or to the illusion of these properties.

In terms of Color, table 2 shows that Treatment 2 got the highest weighted mean of 4.42 described as “Extremely Like” followed by Treatment 3 with a weighted mean of 3.74 described as “Very Like”, and Treatment 1 got a rate of 3.27 which described as “Like” and lastly the Treatment 4 has a weighted mean of 3.12 which described as “Like”. Treatment 2 found to be the most preferred treatment in terms of color as reflected in descriptive interpretation “Extremely Like”. According to Airey (2006) that color is energy, and it can have a physical, mental, spiritual, and/or emotional effect on people. He stated that green can make feel refreshment, balance, and harmony but it can also feel boredom and stagnation.

In terms of aroma, Treatment 2 obtained the highest weighted mean of 4.39 interpreted as “Extremely Like”, while Treatment 1 and Treatment 3 interpreted as “Very Like” and Treatment 4 got the lowest weighted mean of 3.51 and interpreted as “Like”. The result shows that in terms of Aroma Treatment 2 has the most preferred treatment of the respondents. Also, figure 6 show the result of the data of treatment 2.

Aroma is the characteristic smell of the food. It is inherent quality of food which consumers learn to discriminate or accept. After catching the sight appeal of the product, respondents' direct drive is the aroma of the product. The product could not be seen, but its smell will attest the melting or disagreeable flavor it contained (Perenio, 2019).

In terms of Taste Treatment 2 obtained the highest weighted mean of 4.52 which is described as "Extremely Like" followed by Treatment 3 with a weighted mean of 3.78 described as "Extremely Like" and Treatment 1 got the weighted mean of 3.29 which clearly described as "Like" and lastly Treatment 4 got the lowest weighted mean of 3.04 that described as "Like". This denotes that Treatment 2 is most preferred by the respondents because an overall melting score was detected by their tongue. Taste is the sensation received by the taste buds on the tongue, according to Karen Eich Drummond, (2004).

In the overall acceptability of Malabar Spinach in Jam, Treatment 2 got the highest weighted mean of 4.39 interpreted as "Extremely Like" across all the sensory attributes.

Table 2

Sensory Evaluation on Different Level of Malabar Spinach (*Basella alba*) in Jam Making in Four Treatments

Sensory Attributes	T1		T2		T3		T4	
	WM	DI	WM	DI	WM	DI	WM	DI
Texture	3.50	VL	4.22	EL	3.86	VL	3.42	L
Color	3.27	L	4.42	EL	3.74	VL	3.12	L
Aroma	3.54	VL	4.39	EL	3.78	VL	3.51	L
Taste	3.29	L	4.52	EL	3.78	VL	3.04	L
Overall Acceptability	3.40	VL	4.39	EL	3.79	VL	3.27	L

INDICATORS:	Range	Description
Legend		
4.20 – 5.00	- Extremely Like (EL)	DI = Descriptive
3.40 – 4.19	- Very Like (VL)	
2.60 – 3.39	- Like (L)	
1.80 – 2.59	- Dislike (DL)	
1.00 – 1.79	- Never (N)	

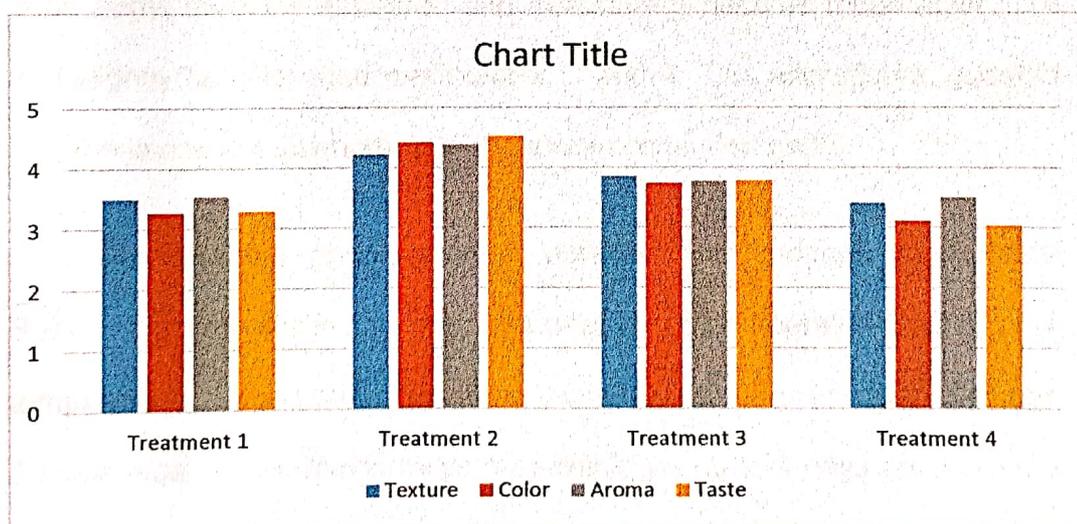


Figure 4. Sensory Evaluation on Different Treatments

Table 3 discusses the visual quality evaluation of the product when stored in room temperature and cool temperature. The visual quality

evaluation on different Malabar Spinach Treatment stored in cool temperature has the ability to last for six (6) days. This is due to the fact that cooling is one way of preserving food product. On the first six days, the cooked Malabar Spinach in Jam showed no changes in terms of color and aroma. Some particles already appeared on the seventh (7) day which denotes it is already spoiled. Thus, the Jam was no longer safe for consumption on its seventh day of storage at cool temperature.

When stored at room temperature, all treatments of the product did not exhibit any changes in color and aroma for 4 days. On its 4th day of observation, the product in every treatment exposed apparent changes in all of its consumer preferences. In terms of color, 4 treatments exhibited some particles appearing on the surface of the jam. Product produced a foul odor, some particles appeared and treatment 1 became moderately hard and slightly hard for triad treatment 2, 3 and 4. This alteration suggested that the jam is not anymore safe for human consumption.

Researchers observed and identified the changes of Malabar Spinach *Basella alba* in Jam Making stored at cool temperature and at room temperature. Expectedly, at room temperature, the Malabar Spinach *Basella alba* in Jam Making was only edible for up to 4 days compared to the treatments being stored in the cool temperature which were able to last 7 days after it was cooked. Truly, any food items that do not undergo with any form of preservation will deteriorate easily.

Table 3

Visual Quality Evaluation of the Malabar Spinach *Basella alba* in Jam Making Stored in the Cool Temperature and Room Temperature

Days	Sensory Attributes	Cool Temperature				Days	Sensory Attributes	Room Temperature			
		Treatments						Treatments			
		1	2	3	4			1	2	3	4
1	COLOR	No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur	1	COLOR	No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur
2		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur	2		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur
3		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur	3		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur
4		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur						
5		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur						
6		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur	4		Some Particles Appeared	Some Particles Appeared	Some Particles Appeared	Some Particles Appeared
7		Some Particles Appeared	Some Particles Appeared	Some Particles Appeared	Some Particles Appeared						
1	AROMA	No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur	1	AROMA	No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur
2		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur	2		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur
3		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur	3		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur
4		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur						
5		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur						
6		No Changes Occur	No Changes Occur	No Changes Occur	No Changes Occur	4		Has a foul Odor	Odd Smell	Odd Smell	Has a foul Odor
7		Smells Odd	Smells Odd	Smells Odd	Smells Odd						

The table 4 presents the difference in respondents' sensory evaluation. The F-value obtained from texture is 12.790 is significant at 0.05 level of significance with df (11) and P-value of 0.002. This states that there is a significant difference in the respondents' sensory preference in terms of texture. Thus, the null hypothesis is rejected.

In terms of color, also revealed that the computed F-value is 30.291 is significant at 0.05 level of significance with df (11) and p-value of (0.0001). Stipulating a significant difference sensory preference in terms of color. Thus, the null hypothesis is rejected.

The aroma manifest the computed F-value of 3.013 which is not significant at 0.05 level of significance with df (11) states that there is no significant difference in the respondents' sensory preference in terms of aroma. Thus, the null hypothesis is accepted.

In terms of taste, the F-value obtained for taste is 26.804 is significant at 0.05 level of significance with df (11) and P-value of 0.0001*. This states that there is a significant difference in the respondents' sensory preference of taste. As a result, the null hypothesis is rejected.

Table 4.

Difference in Respondents Sensory Evaluation among the treatments of Malabar Spinach Jam in terms of texture, color, aroma and taste*

		Sum of Squares	Df	Mean Square	F	p-value
Texture	Between Groups	1.210	3	0.403	12.790	0.002*
	Within Groups	1.318	8	0.165		
	Total	4.169	11			
Color	Between Groups	3.079	3	1.026	30.291	0.0001*
	Within Groups	0.271	8	0.034		
	Total	3.350	11			
Aroma	Between Groups	1.489	3	0.496	3.013	0.094
	Within Groups	1.318	8	0.165		
	Total	2.807	11			
Taste	Between Groups	3.791	3	1.264	26.804	0.0001*
	Within Groups	0.377	8	0.047		
	Total	4.169	11			

*Significant at $p < 0.05$

Table 5 shows the result of the Tukeys' Multiple Comparison of Respondents' Sensory Evaluation on Different Level of Malabar Spinach in terms of texture, aroma and taste.

According to the findings in Table 5 based on Tukeys' Multiple Comparison it is inferred that the sensory evaluation in terms of texture in different treatments reveals that (T1 vs. T2, $p=0.005$, T1 vs. T3, $p=0.125$

and T1 vs. T4, $p=0.961$) for the second column (T2 vs. T3, $p=0.147$ and T2 vs. T4, $p=0.003$) lastly, (T3 vs. T4, $p=0.063$).

The sensory evaluation in terms of color in different treatment shows that (T1 vs. T2, $p=0.002$, T1 vs. T3, $p=0.0539$ and T1 vs. T4, $p=0.7549$) in second column (T2 vs. T3, $p=0.0086$, and T2 vs. T4, $p=0.0001$) lastly, (T3 vs. T4, $p=0.0137$).

The sensory preference in terms of taste in different treatments it shows that (T1 vs. T2, $p=0.0005$, T1 vs. T3, $p=0.0929$ and T1 vs. T4, $p=0.5275$) and for the second column (T2 vs. T3, $p=0.0139$, and T2 vs. T4, $p=0.0002$) lastly, (T3 vs. T4, $p=0.01321$).

Furthermore, the findings in Table 5 based on Tukeys' Multiple Comparison it is inferred that if the p-value is lesser than 0.05, it is statistically significant. Thus, rejected the null hypothesis and if there is a significant difference using ANOVA, we need Post Hoc Analysis to have the multiple comparison among the treatments.

Aroma has no significant difference and it is not included to the table. The result above implies that the sensory evaluation in terms of texture, color and taste has a significant difference because of the three treatments varying consistency due to the different measure of Malabar Spinach.

Table 5

Tukeys' Multiple Comparison of Respondents Sensory Evaluation on Different Level of Malabar Spinach in Terms of Texture, Color and Taste.

Sensory Preference in terms of Texture in different treatments		p-value	95% Confidence Interval	
			Lower Bound	Upper Bound
T1	T2	0.005*	-1.1876	-0.2591
	T3	0.125	-0.8342	0.0942
	T4	0.961	-0.3942	0.5342
T2	T3	0.147	-0.1109	0.8176
	T4	0.003*	0.03291	1.2576
T3	T4	0.063	-0.0242	0.9042

*Significant at $p < 0.05$

Sensory Preference in terms of Color in different treatments		p-value	95% Confidence Interval	
			Lower Bound	Upper Bound
T1	T2	0.0002*	-1.6313	-0.6687
	T3	0.0539	-0.9546	0.0080
	T4	0.7549	-0.3313	0.6313
T2	T3	0.0086*	0.1954	1.1580
	T4	0.0001*	0.8187	1.7813
T3	T4	0.0137*	0.1420	1.1046

*Significant at $p < 0.05$

Sensory Preference in terms of Taste in different treatments		p-value	95% Confidence Interval	
			Lower Bound	Upper Bound
T1	T2	0.0005*	-1.7911	-0.6556
	T3	0.0929	-1.0578	0.0778
	T4	0.5275	-0.3178	0.8178
T2	T3	0.0139*	0.1656	1.3011
	T4	0.0002*	0.9056	2.0411
T3	T4	0.01321*	0.1722	1.3078

*Significant at $p < 0.05$

CHAPTER 3

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATION

This chapter presents the summary of findings, conclusions, and recommendations based on the results of the study.

Summary

The study aimed to determine the sensory evaluation on acceptability level of the different treatments of Malabar Spinach (*Basella alba*) in Jam Making in terms of texture, color, aroma, taste and the visual quality evaluation. The locale of the study was in Bohol Island State University- Bilar Campus during the academic year of 2021-2022. The respondents were fifteen (15) BSIT-FPSM students, fifteen (15) BSHM students, ten (10) Faculty of the Department of Hotel Management and Industrial Technology (DHMIT) and the total of forty (40) respondents.

FINDINGS

After the data were analyzed and interpreted accordingly, the researchers came up with the following findings:

I. Demographic Profile of Respondents

The demographic profile of the respondents taken in terms of age, gender, civil status and educational level. As to age, majority or 29 (72.5%) belong to the 18-28 and most of the respondents were 17 (42.5%) of female.

In terms of civil status, there were 28 (70%) of single and 12 (30%) of married. With regards to educational level, most of them is students at the range of 29 (72.5%) and the teacher got the lowest range at 11 (27.5%).

II. Sensory Evaluation on Different Level of Malabar Spinach in Jam Making

In terms of texture in, Treatment 2 got a weighted mean of 4.22 described as "Extremely Like". In color, Treatment 2 was the most appealing treatment with the weighted mean of 4.42 described as "Extremely Like". In terms of aroma, Treatment 2 got a weighted mean of 4.39 described as "Extremely Like". In terms of taste of the proposed product, Treatment 2 was the most palatable to the respondents because Treatment 2 got a weighed mean of 4.52 described as "Extremely Like".

III. Visual Quality Evaluation

The Malabar Spinach Jam was stored in the room temperature and cool temperature. It was found out that the jam stored in room temperature can only last up to 4 days after it was made. On the other hand, the jam stored inside the refrigerator, lasted up to 1 week after it was made.

Significant Difference in Respondents' Sensory Evaluation of Malabar Spinach (*Basella alba*) in Jam Making

In terms of texture, color and taste, the computed P-value was less than 0.05, indicating that the data is statistically significant. As a result, the

null hypothesis must be rejected, and the aroma revealed a p-value greater than 0.05, suggesting that the result is not significant. As a result in Malabar Spinach in Jam Making, the null hypothesis was accepted.

Conclusions

Based from the findings of the study, the researchers concluded that the Treatment 2, with $\frac{1}{2}$ cup of Malabar Spinach, is revealed as the most preferred treatment based on results. However, all the treatments were still acceptable by the respondents. Thus, spinach leaves are accepted as a mixture to jam to make the jam more nutritious to eat.

Recommendations

Based on findings, the following are recommended:

1. The researchers may enhance the flavors in the mixture to determine the difference of its texture, color, aroma and taste of the jam.
2. The school may improve and enhance the product of Malabar Spinach in Jam Making as a form of entrepreneurial activity for the benefits of everybody and eventually ensure food security and sustainability.



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Zamora, Bilar, Bohol



TECHNOLOGY GUIDE

MALABAR SPINACH

basella alba

JAM MAKING



Rationale

Basella alba or Malabar Spinach is a tropical leafy Basella, indigenous vegetable grown for its succulent, nutritious, and soft steams. It also has a variety of medicinal uses. Despite its numerous applications and potential value, its significance is undervalued. *Basella alba*, the green-stemmed alugbati had significantly bigger stems, greater number and heavier shoots than the red-stemmed *Basella alba*.

People's lifestyles have altered in these days of globalization and industrialization. In our ever changing world the demand for ready to eat foods is steadily expanding, several epidemiological studies have revealed that the diet has a significant impact on health deficiencies in fiber and antioxidants may contribute to a variety of health problems. Diseases of the gastrointestinal tract and the cardiovascular system multiple micronutrient deficits are far more prevalent than single nutrient deficits mostly in poorer countries. There is a need to encourage individuals to eat more green leafy vegetables to combat these micronutrient deficiencies. That is why we the researchers need to promote Malabar Spinach as part of human diets.

The researcher chooses Malabar Spinach as the studies major element because these vegetables are available in the community. Thus, it needs to boost its production that considered as a potential approach to solve the nutrition problem in a more cost-effective manner because it is very easy to cultivate without a lot of inputs.

Objectives

The suggested technology package aims to fulfil the following goals, according to the researchers:

1. To provide Malabar Spinach *Basella alba* in Jam Making to the school and community at an affordable price.
2. To promote the use of locally available resources.
3. Create a new spinach-based jam product.

Mechanics of Implementation

The Bohol Island State University – Bilar Campus Director and the Dean of the College of Technology and Allied Sciences will be presented with the newly released Malabar Spinach *Basella alba* in Jam Making. As soon as it is accepted, the Food Technology instructor will coordinate it.

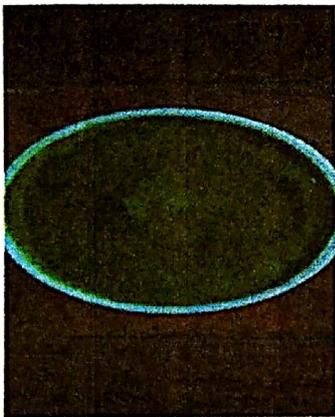
Schedule of Implementation

The proposed techno guide will be implemented in June 2021.

TECHNOLOGY GUIDE IN MAKING MALABAR SPINACH (*Basella alba*) IN JAM MAKING

Cooking of Malabar Spinach *Basella alba* Flavored Jam needs the following ingredients, tools and equipments observing the proven procedural steps

A. Ingredients



Blended Malabar spinach



White Sugar

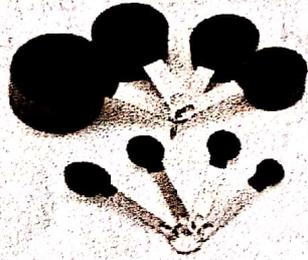


Condensed Milk



Coconut Milk

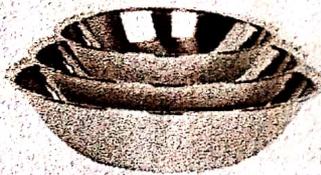
B. Tools and Equipment:



Measuring cups and spoon



Gas range



Aluminum bowl



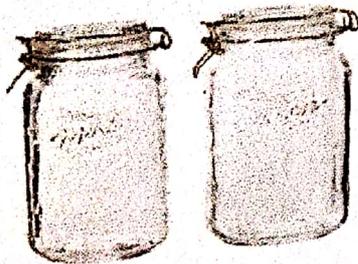
Water heater



Aluminum pan



Knife



Airtight Jar



Strainer



Wooden ladle



Blender

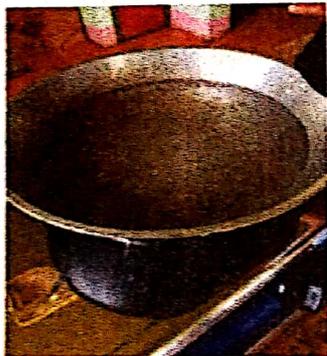
C. Procedure

C.1 Preparation of Malabar Spinach

1. Preparing the Malabar Spinach



2. Boil the water first



3. Submerged the Malabar Spinach into hot water



4. Blend the Malabar Spinach



5. The blended Malabar Spinach



C.2 Preparing the ingredients of Malabar Spinach Basella alba in Jam Making

1. Gather all the ingredients, a cup of blended Malabar Spinach, $\frac{1}{2}$ cup of sugar, $\frac{1}{2}$ cup of coconut milk, $\frac{1}{2}$ cup of condensed milk.



2. The tools and equipment needed.

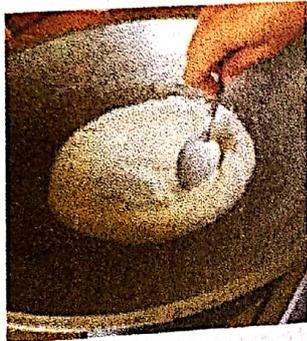


C.3 Cooking of Malabar Spinach *Basella alba* in Jam Making

1. Preheat the pan first setting it into a medium high heat



2. Put the coconut milk in the pan and wait as it boils



3. Add the blended Malabar Spinach and constantly stirring as it boils



4. Add the condensed milk on it while continuously stirring



5. While stirring put down the sugar and wait until the mixture fits the desired texture



6. Wait the exact time until it is thoroughly cooked



7. Let it cool and place it in a clean container



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Appendix A QUESTIONNAIRE



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Mission: BISU is committed to provide quality higher education in arts and sciences as well as in the professionals and technological fields, undertake research and development ad extension services for the sustainable development of Bohol and the country.

Modified 5 Hedonic Scale on Evaluating Malabar Spinach Jam

I. Profile of Respondents: Please provide information sincerely.

Age:

Gender:

Educational Level:

Civil Status:

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

Sensory Preference	Rating Scale	T1	T2	T3	T4
Texture	5				
	4				
	3				
	2				
	1				
Color	5				
	4				
	3				
	2				
	1				
Aroma	5				
	4				
	3				
	2				
	1				
Taste	5				
	4				
	3				
	2				
	1				

Legend:

PE (5) = The respondents Preferred Extremely the product in terms of texture, color, aroma and taste.

PVM (4) = The respondents Preferred Very Much the product in terms of texture, color, aroma and taste.

NLON (3) = The respondents Neither Like It or Not the product in terms of texture, color, aroma and taste.

NPVM (2) = The respondents Not Preferred Very Much the product in terms of texture, color, aroma and taste.

NPE (1) = The respondents Not Preferred Extremely the product in terms of texture, color, aroma and taste.



Appendix B RAW DATA



Republic of the Philippines
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TEXTURE

R.N	T1				T2				T3				T4			
	R1	R2	R3	Average												
1	3	3	3	3%	3	5	3	3.67	3	4	4	3.67	4	2	4	3.33
2	5	3	5	4.33	2	5	2	3	3	3	3	3	4	3	3	3.33
3	5	4	4	4.33	5	5	5	5	5	5	5	5	5	3	5	4.33
4	5	4	5	4.67	5	5	5	5	5	3	5	4.33	4	1	1	2
5	5	4	4	4.33	5	5	5	5	5	4	4	4.33	2	5	2	3
6	4	3	4	3.67	4	4	4	4	5	3	5	4.33	4	2	2	2.67
7	5	3	3	3.67	3	4	4	3.67	5	3	3	3.67	5	1	5	3.67
8	1	4	1	2	5	5	5	5	3	5	5	4.33	4	5	5	4.67
9	4	3	3	3.33	5	4	4	4.33	5	3	5	4.33	3	2	3	2.67
10	5	3	5	4.33	5	5	5	5	5	4	4	4.33	5	3	3	3.67
11	5	4	4	4.33	5	5	5	5	5	4	5	4.67	5	4	5	4.67
12	4	4	4	4	2	5	5	4	4	4	4	4	4	1	1	2
13	5	4	5	4.67	2	3	3	2.67	4	2	2	2.67	3	1	3	2.33
14	5	3	3	3.67	5	5	5	5	5	4	4	4.33	5	4	4	4.33
15	4	3	4	3.67	5	5	5	5	4	3	4	3.67	4	2	4	3.33
16	4	4	4	4	5	5	5	5	4	4	4	4	4	4	4	4
17	3	5	5	4.33	5	4	4	4.33	4	4	4	4	4	4	4	4
18	3	5	3	3.67	3	4	4	3.67	4	5	4	4.33	4	4	4	4
19	2	4	4	3.33	5	5	5	5	4	4	4	4	3	3	3	3
20	1	3	1	1.67	4	5	5	4.67	4	3	3	3.33	2	3	2	2.33
21	3	3	3	3	4	5	4	4.33	3	4	4	3.67	2	2	2	2
22	1	4	1	2	4	4	4	4	3	5	5	4.33	2	5	5	4

23	5	4	4	4.33	5	5	5	5	5	4	5	4.67	5	5	5	5
24	2	4	2	2.67	1	4	4	3	4	3	3	3.33	5	5	5	5
25	5	4	4	4.33	4	3	4	3.67	4	3	4	3.67	3	3	3	3
26	3	4	3	3.33	4	5	5	4.67	3	3	3	3	1	4	4	3
27	3	5	5	4.33	5	4	5	4.67	4	5	4	4.33	2	4	2	2.67
28	3	4	3	3.33	5	5	5	5	2	4	4	3.33	4	4	4	4
29	4	3	3	3.33	5	4	4	4.33	4	4	4	4	4	3	3	3.33
30	3	5	5	4.33	5	5	5	5	3	5	5	4.33	4	4	4	4
31	2	2	2	2	2	4	4	3.33	2	3	2	2.33	3	4	4	3.67
32	1	4	1	2	1	4	4	3	1	4	4	3	5	4	5	4.67
33	3	4	4	3.33	4	5	4	4.33	5	3	5	4.33	2	4	4	3.33
34	2	4	2	2.67	2	5	5	4	4	3	3	3.33	3	3	3	3
35	3	4	4	3.67	3	5	3	3.67	4	5	4	4.33	3	4	3	3.33
36	3	3	3	3	4	5	5	4.67	3	5	5	4.33	3	3	3	3
37	3	3	3	3	1	3	1	4.67	2	3	2	4.33	4	3	3	3.33
38	3	3	3	3	4	4	4	4	5	4	4	4.33	2	3	2	2.33
39	2	5	5	4	5	4	5	4.67	4	5	4	4.33	3	5	5	4.33
40	3	2	3	2.67	5	3	3	3.33	3	3	3	3	2	4	2	2.67

TOTAL AVERAGE:	136.4	TOTAL AVERAGE:	171.4	TOTAL AVERAGE:	156.6	TOTAL AVERAGE:	137
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COLOR

R.N	T1				T2				T3				T4			
	R1	R2	R3	Average												
1	2	4	4	3.33	4	5	4	4	3	3	3	3	3	3	3	3
2	5	4	5	4.67	1	5	5	3.67	4	3	4	3.67	3	4	3	3.33
3	5	4	4	4.67	5	4	5	4.67	5	4	5	4.67	5	5	5	5
4	5	4	5	4.67	5	5	5	5	5	4	4	4.33	4	4	4	4
5	4	5	5	4.67	5	5	5	5	5	5	5	5	4	5	5	4.67
6	5	4	5	4.67	2	4	4	3.33	4	3	4	3.67	3	3	3	3
7	5	1	1	2.33	4	3	3	3.33	5	2	5	4	3	1	1	1.67
8	4	5	4	4.67	4	5	4	4.33	3	5	3	3.67	1	5	1	2.33
9	4	1	1	2	5	4	4	4.33	5	3	3	3.67	3	2	2	2.33
10	4	3	4	3.67	4	5	5	4.67	4	4	4	4	4	4	4	4
11	4	4	4	4	5	5	5	5	4	4	4	4	4	2	2	2.67
12	1	4	1	2	4	5	5	4.67	2	4	2	2.67	1	2	1	1.33
13	5	2	2	3	4	3	3	3.33	3	1	1	1.67	4	1	1	2
14	4	3	4	3.67	5	5	5	5	4	4	4	4	5	3	5	4.33
15	4	3	3	3.33	5	5	5	5	3	3	3	3	2	2	2	2
16	4	4	4	4	4	5	5	4.67	4	4	4	4	4	4	4	4
17	5	3	3	3.67	4	5	4	4.33	5	4	5	4.67	5	3	3	3.67
18	4	5	4	4.33	4	4	4	4	4	5	5	4.67	4	4	4	4
19	2	4	4	3.33	5	5	5	5	4	4	4	4	3	3	3	3
20	2	2	2	2	4	5	5	4.67	3	3	3	3	1	3	1	1.67
21	2	2	2	2	5	5	5	5	3	3	3	3	2	1	1	1.33
22	2	4	2	2.67	4	4	4	4	4	5	4	4.33	1	5	5	3.67
23	5	4	4	4.33	5	5	5	5	5	4	4	4.33	4	5	4	4.33
24	2	3	2	2.33	5	3	5	4.33	5	4	5	4.67	3	4	4	3.67
25	3	2	2	2.33	4	3	3	3.33	4	3	3	3.33	2	4	2	2.67
26	3	4	3	3.67	4	5	4	4.33	4	4	4	4	2	3	3	2.67
27	2	4	4	3.33	5	4	4	4.33	4	4	4	4	1	4	1	2
28	3	5	3	3.67	5	5	5	5	4	5	4	4.33	2	5	5	4
29	2	1	1	1.33	5	2	5	4	3	3	3	3	4	2	2	2.67
30	3	5	3	3.67	4	5	4	4.33	3	5	5	4.33	3	3	3	3
31	1	2	2	1.67	3	2	4	3	2	5	2	3	2	2	2	2

32	1	4	1	2	5	4	5	4.67	1	4	4	3	1	4	1	2			
33	3	4	1	3.67	5	5	5	5	3	3	3	3	2	4	4	3.33			
34	2	4	2	2.67	3	4	4	3.67	5	4	4	4.33	4	4	4	4			
35	4	3	3	3.33	5	5	5	5	3	4	3	3.33	3	4	4	3.67			
36	3	3	3	3	5	5	5	5	4	4	4	4	3	3	3	3			
37	3	3	3	3	3	4	4	3.67	2	3	2	2.33	4	5	5	4.67			
38	4	4	4	4	5	5	5	5	3	4	4	3.67	3	4	3	3.33			
39	2	5	5	4	5	5	5	5	4	5	4	4.33	3	5	5	4.33			
40	3	4	3	3.33	4	5	5	4.67	4	4	4	4	2	3	2	2.33			
TOTAL AVERAGE:				132.68	TOTAL AVERAGE:				176.33	TOTAL AVERAGE:				149.67	TOTAL AVERAGE:				124.67

AROMA

R.N	T1				T2				T3				T4			
	R1	R2	R3	Average												
1	3	2	3	2.67	4	5	5	4.67	4	1	4	3	3	1	3	2.33
2	5	3	5	4.33	2	5	5	4	4	2	4	3.33	3	1	3	2.33
3	5	4	5	4.67	5	5	5	5	5	4	5	4.67	4	4	4	4
4	5	4	5	4.67	5	5	5	5	5	4	5	4.67	4	4	4	4
5	5	4	5	4.67	4	3	4	3.67	5	4	5	4.67	2	4	4	3.33
6	5	2	5	4	3	2	3	2.67	4	2	4	3.33	3	1	3	2.33
7	5	2	5	4	5	2	5	4	5	2	5	4	5	1	5	3.67
8	1	5	5	3.67	5	5	5	5	4	5	4	4.33	3	5	5	4.33
9	4	2	4	3.33	5	4	4	4.33	4	3	3	3.33	3	2	3	2.67
10	5	3	5	4.33	5	3	5	5	5	4	5	4.67	5	4	5	4.67
11	5	4	5	4.67	5	5	5	5	5	3	5	4.33	5	2	5	4
12	2	3	3	2.67	5	5	5	5	4	4	4	4	1	2	2	1.67
13	5	3	5	4.33	4	5	4	5	4	2	2	2.67	4	2	4	4.67
14	4	4	4	4	5	5	5	5	5	3	5	4.33	5	3	5	4.33
15	3	4	4	3.67	4	5	5	4.67	4	3	4	3.67	2	2	2	2
16	4	5	4	4.33	4	3	3	4.33	4	3	3	3.33	5	4	4	4.33
17	3	4	3	3.33	4	5	4	4.33	2	5	2	3	3	5	5	4.33
18	3	5	5	4.33	4	4	4	4	5	5	5	5	4	4	4	4
19	2	5	2	3	5	5	5	5	4	5	4	4.33	3	5	3	3.67
20	1	3	1	1.33	5	5	5	5	4	4	4	4	2	3	3	2.67
21	2	3	2	2.33	3	5	5	4.33	2	4	4	3.33	2	2	2	2
22	2	4	4	3.33	4	4	4	4	3	5	5	4.33	1	5	5	3.67
23	5	5	5	5	5	5	5	5	5	4	4	4.33	5	4	4	4.33
24	1	1	1	1	4	4	4	4	3	3	3	3	2	4	4	3.33
25	3	3	3	3	4	4	4	4	4	2	2	2.67	3	2	3	2.67
26	4	4	4	4	4	4	4	4	3	4	3	3.33	2	3	3	2.67

27	2	4	4	3.33	5	5	5	5	4	4	4	4	3	4	3	3.33
28	3	4	4	2.67	5	1		2.33	4	2	4	3.33	2	5	5	4
29	4	1	1	2	5	2	5	4	3	2	3	2.67	1	2	1	1.33
30	4	4	4	4	5	5	5	5	4	4	4	4	4	3	3	3.33
31	2	2	2	2	5	4	5	4.67	3	4	3	3.33	2	4	4	3.33
32	1	3	3	2	5	5	5	5	3	4	4	3.67	1	3	3	2.33
33	3	3	3	3	5	4	5	4.67	4	3	4	3.67	2	2	2	2
34	3	4	4	3.67	2	4	4	3.33	4	4	4	4	3	4	3	3.33
35	5	4	5	4.67	4	5	5	4.67	3	4	4	3.67	3	4	3	3.33
36	4	3	4	3.67	5	5	5	5	3	4	4	3.67	3	3	3	3
37	2	4	4	3.33	3	2	3	2.67	2	3	3	2.67	4	5	5	4.67
38	3	4	4	3.67	5	4	5	4.67	4	5	5	4.67	2	4	4	3.33
39	2	4	4	3.33	5	4	5	4.67	4	4	4	4	3	4	4	3.67
40	4	4	4	4	5	5	5	5	4	4	4	4	2	3	3	2.67

TOTAL AVERAGE:	140	TOTAL AVERAGE:	176.68	TOTAL AVERAGE:	151	TOTAL AVERAGE:	131.65
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TASTE

R.N	T1				T2				T3				T4			
	R1	R2	R3	Average												
1	4	3	3	3.33	5	5	5	5	2	3	2	2.33	3	3	3	3
2	5	3	3	3.67	2	5	5	4	4	3	4	3.67	4	3	4	3.67
3	5	4	4	4.33	5	5	5	5	5	5	5	5	4	4	4	4
4	5	3	3	3.67	5	5	5	5	5	4	4	4.33	4	1	1	2
5	4	4	4	4	4	4	4	4	5	4	4	4.33	1	4	1	2
6	4	2	2	2.67	4	3	4	3.67	5	2	2	3	4	1	1	2
7	5	1	1	2.33	4	3	4	3.67	3	2	2	2.33	3	1	3	2.33
8	4	5	4	4.33	5	5	5	5	3	5	3	3.67	2	5	2	3
9	3	3	3	3	5	4	5	4.67	5	3	5	4.33	3	2	2	3.33
10	4	3	3	3.33	5	5	5	5	4	4	4	4	4	3	4	3.67
11	4	4	4	4	5	5	5	5	4	3	3	3.33	4	3	3	3.33
12	4	4	4	4	4	5	5	4.67	5	3	5	4.33	3	2	3	2.67
13	5	2	2	3	3	3	3	3	5	2	5	4	2	2	2	2
14	3	4	4	3.67	5	5	5	5	5	3	5	4.33	5	4	4	4.33
15	2	4	2	2.67	3	5	5	4.33	4	3	3	3.33	2	2	2	2
16	4	5	5	4.67	5	5	5	5	4	4	4	4	4	4	4	4
17	4	4	4	4	5	5	5	5	3	5	3	3.67	4	4	4	4
18	4	5	4	4.33	5	5	5	5	5	4	4	4.33	4	4	4	4
19	2	4	2	2.67	5	5	5	5	3	4	4	3.67	4	4	4	4
20	1	3	1	1.67	4	5	5	4.67	4	4	4	4	1	4	1	2
21	3	3	3	3	5	5	5	5	3	4	3	3.33	1	2	1	1.33
22	2	4	2	2.67	4	4	4	4	3	5	3	3.67	1	5	5	3.67
23	5	5	5	5	5	5	5	5	5	5	5	5	4	4	4	4
24	2	1	2	1.67	2	3	2	2.33	2	5	5	4	4	5	4	4.33
25	4	4	4	4	5	5	5	5	5	4	4	4.33	2	5	2	3
26	4	4	4	4	5	5	5	5	4	4	4	4	2	3	2	2.33

27	3	5	3	3.67	5	5	5	5	4	5	4	4.33	2	4	2	2.67
28	2	1	1	1.33	5	5	5	5	3	3	3	3	1	4	4	3
29	4	1	4	3	5	2	2	3	5	3	3	3.67	4	3	4	3.67
30	4	5	4	4.33	5	3	5	4.33	4	1	4	3	4	3	3	3.33
31	2	5	2	3	4	5	5	4.67	3	2	3	2.67	3	2	2	2.33
32	1	4	1	2	5	5	5	5	1	4	4	3	4	4	4	4
33	3	3	3	3	5	4	4	4.33	4	3	3	3.33	2	4	4	3.33
34	1	4	1	2	2	5	5	4	4	5	5	4.67	3	5	3	3.67
35	3	4	3	3.33	4	5	5	4.67	2	5	5	4	2	4	2	2.67
36	3	4	4	3.67	5	5	5	5	3	5	3	3.67	2	3	2	2.33
37	3	5	3	3.67	4	4	4	4	2	3	2	2.33	5	3	3	3.67
38	3	3	3	3	5	4	5	4.67	4	5	4	4.33	2	3	2	2.33
39	2	5	2	3	4	4	4	4	5	5	5	5	3	5	3	3.67
40	3	3	3	3	5	5	5	5	4	4	4	4	1	4	1	2

TOTAL AVERAGE:	131.68	TOTAL AVERAGE	180.68	TOTAL AVERAGE	151.31	TOTAL AVERAGE:	122.66
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**Appendix C
LETTER REQUEST**



**Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY
Bilar Campus
Zamora, Bilar, Bohol 6317**

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

Greetings!

In partial fulfilment of the requirements of Bachelor of Science and Industrial Technology major in Food Preparation Service Management, we the student in the subject Research 2 in the S.Y. 2021-2022, conducted a research entitled "**SENSORY EVALUATION ON DIFFERENT LEVEL OF MALABAR SPINACH (*Basella alba*) IN JAM MAKING**"

In this regard we would like to ask permission from your humble office to allow us to distribute and to gather the data necessary in this study. We the researcher assures that these undertakings will follow the health protocols set upon by the university in the distribution and retrieval of the data for safety purposes for both parties.

We would greatly appreciate your consent about the request.

Very truly yours,
Conie A. Busbus
Vicencio C. Dano
Ronila D. Dusal
Annaliza Marie M. Huraño
The Researchers

Noted by:

(Sgd) HERBERTO PIOLLO
Adviser

Recommending Approval:

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

Approved by:

(Sgd) MARIETTA C. MACALOLOT, Ph.D.
Campus Director



Appendix D
Approval Letter



Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY
Bilar Campus
Zamora, Bilar, Bohol 6317

COLLEGE OF TECHNOLOGY AND ALLIED SCIENCES

TO WHOM IT MAY CONCERN:

Good day!

We are a third-year college student taking up Bachelor of Science in Industrial Technology Major in Food Preparation Service Management at Bohol Island State University, Bilar Campus, Zamora Bilar, Bohol presently conducting the thesis entitled, "**SENSORY EVALUATION ON DIFFERENT LEVEL OF MALABAR SPINACH (*Basella alba*) IN JAM MAKING**" as a requirement for OJT and graduation.

In this connection, we would like to request you to be one of our respondents and your presence during the taste tasting of the product as output of the study in this month of June. We really believe that your presence and responses make the study more meaningful. Moreover, your feedbacks deem very important as useful data and information needed for the study. Thank you and more power.

CONIE A. BUSBUS
VICENCIO C. DANO
RONILA D. DUSAL
ANNALIZA MARIE M. HURANO
Student Researchers

Noted:

(Sgd) HERBERTO PIOLLO
Thesis Adviser

Recommending Approval:

(Sgd) NELIA Q. CATAYAS, Ph.D.
Chairperson

Approved by:

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



Appendix E
Visual Quality Evaluation



Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY
Bilar Campus
Zamora, Bilar, Bohol 6317

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

Mission: BISU is committed to provide quality higher education in arts and sciences as well as in the professionals and technological fields, undertake research and development ad extension services for the sustainable development of Bohol and the country.

Visual Quality Evaluation of the Malabar Spinach *Basella alba* In Jam Making
Stored in the Cool Temperature and Room Temperature

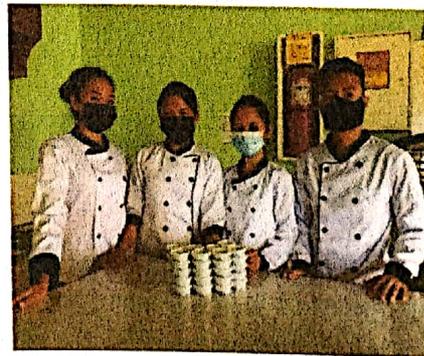
Days	Sensory Attributes	Cool Temperature				Days	Sensory Attributes	Room Temperature			
		Treatments						Treatments			
		1	2	3	4			1	2	3	4
1	C O L O R					1	C O L O R				
2						2					
3						3					
4											
5											
6						4					
7											
1	A R O M A					1	A R O M A				
2						2					
3						3					
4											
5											
6						4					
7											



Appendix F DOCUMENTATION

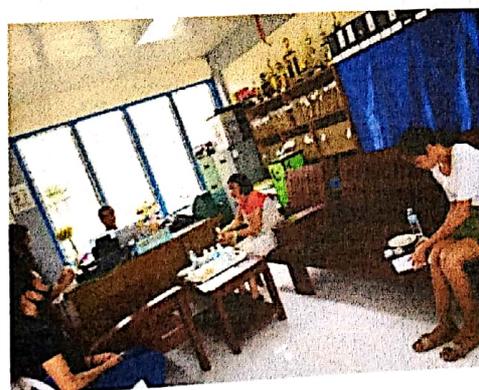
Republic of the Philippines
BOHOL ISLAND STATE UNIVESITY
Bilar Campus
Zamora, Bilar, Bohol 6317

Preparation in making Malabar Spinach (*Basella alba*) In Jam Making

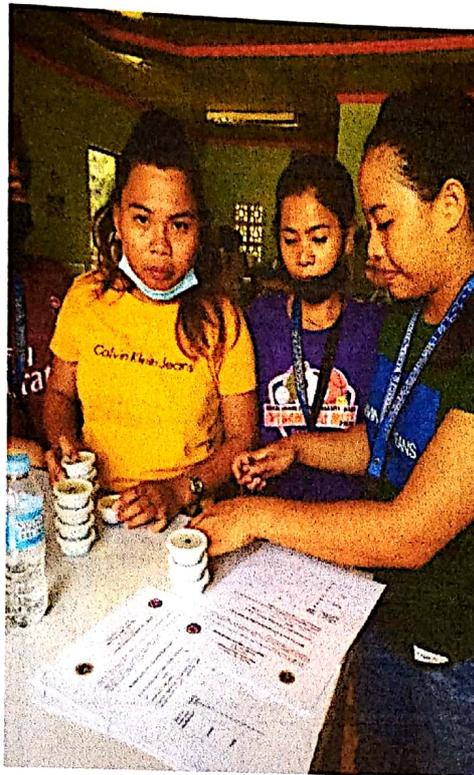


Randomly picking some people on campus to taste our finish product

Faculty and Staff



BISU- Bilar Students





Appendix G COMPUTATIONS



Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY
Bilar Campus
Zamora, Bilar, Bohol 6317

COMPUTATION FOR THE CHARACTERISTICS LEVEL OF MALABAR SPINACH (*Basella alba*) IN JAM MAKING

Texture
One Way ANOVA

Descriptives

Texture Replications

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
1.00	3	3.4967	.16073	.09280	3.0974	3.8959
2.00	3	4.2200	.29462	.17010	3.4881	4.9519
3.00	3	3.8667	.07638	.04410	3.6769	4.0564
4.00	3	3.4267	.08737	.05044	3.2096	3.6437
Total	12	3.7525	.36455	.10524	3.5209	3.9841

ANOVA

Texture Replications

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.210	3	.403	12.790	.002
Within Groups	.252	8	.032		
Total	1.462	11			

Significant

AROMA
One Way ANOVA

Descriptives

Aroma Replications

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
1.00	3	3.5433	.23159	.13371	2.9680	4.1186
2.00	3	4.3900	.20518	.11846	3.8803	4.8997
3.00	3	3.7800	.21794	.12583	3.2386	4.3214
4.00	3	3.5133	.71822	.41466	1.7292	5.2975
Total	12	3.8067	.50518	.14583	3.4857	4.1276

ANOVA

Aroma Replications

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.489	3	.496	3.013	.094
Within Groups	1.318	8	.165		
Total	2.807	11			

Not Significant

TASTE
One Way ANOVA

Descriptives

Taste Replications

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
1.00	3	3.2967	.30139	.17401	2.5480	4.0454
2.00	3	4.5200	.10149	.05859	4.2679	4.7721
3.00	3	3.7867	.04041	.02333	3.6863	3.8871
4.00	3	3.0467	.29297	.16915	2.3189	3.7745
Total	12	3.6625	.61560	.17771	3.2714	4.0536

ANOVA

Taste_Replications

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	3.791	3	1.264	26.804	.000159
Within Groups	.377	8	.047		
Total	4.169	11			

Significant

RESEARCHERS BIODATA

Name: Conie A. Busbus

Nickname: Conielaii

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Date of Birth: December 06, 1999

Address: Del Pilar, Pilar Bohol

Citizenship: Filipino

Civil Status: Single

Religion: Roman Catholic

Father: Dioscoro L. Busbus Sr.

Mother: Nerissa A. Busbus

**Educational Background**

Elementary: Del Pilar Elementary School

: Del Pilar, Pilar, Bohol

Secondary: Sierra Bullones Technical Vocational High School

: Salvador, Sierra Bullones, Bohol

Tertiary: Bohol Island State University Bilar Campus

: Zamora, Bilar, Bohol

Course: Bachelor of Science in Industrial Technology
Major in Food Preparation Service Technology

Motto: "Believe in yourself a little more"

RESEARCHERS BIODATA

Name: Ronila D. Dusal

Nickname: Ron

E-mail: roniladusal40@gmail.com

Date of Birth: March 25, 1999

Address: Purok 1 Upper Salta San Agustin Sierra Bullones, Bohol

Citizenship: Filipino

Civil Status: Single

Religion: Roman Catholic

Father: Rodrigo A. Dusal

Mother: Norma D. Dusal

**Educational Background**

Elementary: Sierra Bullones Central Elementary School
: Poblacion Sierra Bullones, Bohol

Secondary: Sierra Bullones Technical Vocational High School
: Salvador Sierra Bullones, Bohol

Tertiary: Bohol Island State University Bilar Campus
: Zamora, Bilar, Bohol

Course: Bachelor of Science in Industrial Technology
Major in Food Preparation Service Management

Motto: "If you pray it you can get it".

RESEARCHERS BIODATA

Name: Vicencio C. Dano

Nickname: Dano

E-mail: vicenciodano935@gmail.com

Date of Birth: April 10, 1999

Address: Purok 7, Poblacion Concepcion, Sierra Bullones, Bohol

Citizenship: Filipino

Civil Status: Single

Religion: Roman Catholic

Father: Vicente G. Dano

Mother: Rosalita C. Dano

**Educational Background**

Elementary: Concepcion Elementary School

: Poblacion Concepcion, Sierra Bullones, Bohol

Secondary: Sierra Bullones Technical Vocational High School

: Salvador, Sierra Bullones, Bohol

Tertiary: Bohol Island State University Bilar Campus

: Zamora, Bilar, Bohol

Course: Bachelor of Science in Industrial Technology
Major in Food Preparation Service Management

Motto: "Success is beyond in my control"

RESEARCHERS BIODATA

Name: Annaliza Marie M. Huraño

Nickname: babykulot

E-mail: annalizamariehurano@gmail.com

Date of Birth: August 10, 1999

Address: Purok 6, Anibongan, Sierra Bullones, Bohol

Citizenship: Filipino

Civil Status: Single

Religion: Roman Catholic

Father: Edwin M. Huraño

Mother: Maricres M. Huraño



Educational Background

Elementary: Anibongan Elementary School
: Anibongan, Sierra Bullones, Bohol

Secondary: Sierra Bullones Technical Vocational High School
: Salvador, Sierra Bullones, Bohol

Tertiary: Bohol Island State University Bilar Campus
: Zamora, Bilar, Bohol

Course: Bachelor of Science in Industrial Technology
Major in Food Preparation Service Management

Motto: "Stay lowkey and be humble"

