SENSORY EVALUATION ON THE ACCEPTABILITY OF THE DIFFERENT LEVEL OF GUMAMELA FLOWER (*Hibiscus rosa sinensis*) IN CANDY MAKING

College of Technology and Allied Sciences
BOHOL ISLAND STATE UNIVERSITY
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A Thesis Proposal
Presented to the Faculty of the
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In Partial Fulfillment
Of the Requirements for the Degree of
Bachelor of Science in Industrial Technology major in
Food Preparation and Service Management

Flordelyn S. Gamil
James Jacob R. Ibañez
Windel A. Romero
Marie Joy T. Tuzon

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APPROVAL SHEET

This thesis entitled **"SENSORY EVALUATION ON THE ACCEPTABILITY OF THE DIFFERENT LEVEL OF GUMAMELA FLOWER (*Hibiscus rosa- sinensis*) in CANDY MAKING"**, prepared and submitted by Flordelyn S. Gamil, James Jacob R. Ibañez, Windel A. Romero, Marie Joy T. Tuzon in partial fulfillment of the of the requirements for the degree Bachelor of Science in Industrial Technology major in Food Preparation and Service Management has been examined and recommended for acceptance and approval for oral defense.

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ABSTRACT

The thrust of this study was to determine the sensory evaluation on the acceptability of the different level of gumamela flower (*Hibiscus rosa-sinensis*) in candy making. It identified the acceptability level of gumamela flower candy as perceived by the participants in terms of appearance, aroma, taste, texture; visual quality evaluation level; and the significant difference among the treatments of gumamela flower candy in terms of its attributes. The product testing was participated by purposively selected 40 respondents. The study used the modified 5-Hedonic Scale questionnaires provided to forty (40) respondents consisting with nineteen (19) students, nine (9) housewife, four (4) laborer/ worker, three (3) business worker, and five (5) professional worker from Zamora, Bilar, Bohol who had background and experience related in food preparation to rate the sensory quality of the gumamela candy. The questionnaires were distributed, retrieved and tallied for the analysis and interpretation of data was done using the weighted mean. The data was further processed using F- Test to determine the difference between the four treatments in terms of appearance, aroma, taste and texture. It was found out that most of the respondents were ages 16-27 years old, female, single, and college students. The result of the study revealed that T2 got the highest quality of the product based on its attributes was interpreted as “Extremely Like” in all treatments. For the visual quality evaluation T1 got the highest rank among the treatments as expose to room temperature. T1-composed of 50grams of gumamela flower added to 1 cup of white sugar and ¼ cup of water, 2 Tablespoon lemon and 1 Tablespoon vanilla. The analysis of variance showed that there is no significant difference among the treatments, thus the null hypothesis is accepted. The result of the study extremely recommends that the researcher should advocate the utilization of gumamela flower (*Hibiscus rosa-sinensis*), which can be found almost any place. The researcher would improve their skills by incorporating more flavor into their mixture to further determine the differences in appearance aroma, taste and texture. The study discovered that gumamela flower (*Hibiscus rosa-sinensis*) candy can be kept at room temperature that would lasted for almost a month. The institution may support and improve the gumamela flower candy product as a type of entrepreneurship for the benefit of everybody and provide food security as well.

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THE PROBLEM AND ITS SCOPE

Rationale

Edible flower such as *Hibiscus rosa-sinensis* is also known as either Hibiscus, China Rose, Shoe flower or in some places it is locally called Gumamela. It is a fast-growing evergreen shrub with dark green and glossy leaves with dicot flowers. The flowers of the gumamela can be white, pink, red, yellow, peach and purple. Red flower on its variety is used for medical purposes and is present in some dietary supplements. Gumamela flower contains vital vitamins, mineral, antioxidants and essential compounds like anthocyanin's, and flavonoids that plays a crucial role in protecting human's immune system.

Hibiscus has more than three hundred species distributed in tropical and subtropical regions around the world and are used as ornamental plants. It is edible flower have been utilized for human consumption in various culture. The flower also contains moisture, protein, crude fiber, carotene, carbohydrate, fat vitamin c, mineral such as calcium, potassium, iron, zinc, nitrogen, phosphorus and ascorbic acid. It is very helpful for those who want to lose weight and cancer.

Everyone can create and produce a new product out from the nature that can improve the way of living in the society. A product that can provide good effect and can lessen expenses. Hence, the researchers come up with idea of using

gumamela flower in making a new variety of candy because it is inexpensive and it is available in the community.

Candy is also called sweets in British English or lollies in Australian English, New Zealand English, candy is a confection that features sugar as a main ingredient. The category, called sugar confectionery, encompasses any sweet confection, including chocolate, chewing gum, and sugar candy. The researchers came up of an idea of making healthy candy and decide to make gumamela flower candy. Edible flower such as gumamela flower has more than hundred species distributed in tropical and subtropical regions around the world.

Candy is made a thick-combinations of gumamela flower, white sugar, water, lemoncito and vanilla that is softy yet swiftly heated until the gumamela flower thickens and takes on an organic shape while remaining soft and chewy.

In connection to this, the researchers of this study aimed to propose a study utilizing candy that would be beneficial to all consumers to young ones and even adults by utilizing gumamela flower. Also we could obtain the product without spending a lot of money and the consumer may gain from the nutrition and health benefits.

In order to contribute a better product the researchers decided to conduct a study which is sought to accomplish the following precise goals. Make gumamela flower candy nutritious and delicious. Assess the level of acceptance of gumamela flower candy through determining the gumamela flower candy's overall acceptability however, evaluate the sensory attributes of the Gumamela flower as

incorporated with white sugar, water, lemoncito and vanilla as ingredients in the formulation of the different treatment.

The use of this flower is common in terms of making different food. One can get many benefits out of this plant. Benefits not only one's health but also as an additional income upon selling it. Moreover, one can make their own recipe or product using this gumamela flower, on underdeveloped resources.

Literature Background

This study is verified by the following legal basis which include the Article II section 15 of 1987 Philippine Constitution; accordingly, the state shall protect and promote the right to health of the people and instil health consciousness among them. Furthermore, Article XVI Section 9 the state shall protect consumers from trade malpractices and from substandard or hazardous products. Towards these ends, the State shall maintain a farm to fork food safety, promotes fair trade and advances the global competitiveness of Philippine foods and food products.

The study is also anchored on Republic Act No. 8435. Thus, it is hereby declared the policy of the State to enable those who belong to the agriculture and fisheries sectors to participate and share in the fruits of development and growth in a manner that utilizes the nation's resources in the most efficient and sustainable way possible by establishing a more equitable access to assets, income, basic and support services and infrastructure.

Likewise, 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 nutritional deficiency problems in the Philippines, based on nutrition surveys, include deficiency in energy, iron, vitamin C, iodine, thiamin and riboflavin. To a minor extent, the Filipino diet is also deficient in ascorbic acid, calcium and folate.

Food fortification is considered important in the promotion of optimal health and to compensate for the loss of nutrients due to processing and/or storage of food. 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 gumamela flower.

Section 5 states that under the Sangkap Pinoy Seal Program (SPSP), the Department shall encourage food manufacturers to fortify processed foods and food products with essential nutrient at levels approved by the Department of Health (DOH). The seal is a guideline used by consumers in selecting nutritious foods.

The Theory of Food by John S. Allen Ph.D. argued on his book that each humans each have a theory of food that guides how, how much, and what they eat. This theory of food is analogous to theory of mind, the suite of implicit cognitive skills that people use to negotiate the complex, interactive human

social universe. Like language, we have a propensity to acquire a theory of mind, and both develop and become more complex over the course of childhood and adolescence. (Harvard Univ. Press, 2012)

On the other hand, Gumamela is also known as Hibiscus, China Rose and Shoeflower. Hibiscus has more than three hundred species distributed in tropical and subtropical regions around the world and are used as ornamental plants. It is a genus of flowering plants in the mallow family, Malvaceae. In the Philippines, gumamela is cultivated as an ornamental plant. The Hibiscus with five petals noted for its medicinal properties, the flowers are considered astringent. The roots contain a mucilage that is soothing on the mucous membranes of the digestive and respiratory tracts. Hibiscus have a long life, with some lasting more than 50 years. Considered emollient, emmenagogue, anodyne, expectorant, refrigerant. Anti-infectious, anthelmintic, anti-inflammatory, diuretic, antipyretic. Hypotensive, antispasmodic. (Debra Rose Wilson, P.D.)

Gumamela flowers are solitary, axillary, very large.Petals commonly red, obovate, entire, rounded tip, and imbricate. Stamens forming a long staminal tube enclosing the entire style of the pistil and protruding out of the corolla. Ovary 5-celled, styles 5, fused below. The flowers of the gumamela can be white, pink, red, yellow, peach and purple. Gardeners cultivate more than 300 species of the plant worldwide. Hibiscus plants are known for their large, colorful flowers. These blossoms can make a decorative addition to a home or garden, but they also have medicinal uses. It has more benefits than just being a pretty ornamental flower.

The plant contains antioxidants and essential compounds like anthocyanins, and flavonoids which come with many health benefits. Widely consumed all across the world, mostly as a lemony beverage, hibiscus tea has the power to balance your blood pressure, lower your cholesterol level and stabilize blood sugar as well. Hibiscus help in improving the skin complexion and texture. Vitamin C helps in lightening the skin tone while vitamin E moisturizes the skin and improves its complexion. The flowers and leaves can be made into teas and liquid extracts that can help treat a variety of conditions.hibiscus can help with weight loss and cancer. It used as an expectorant in bronchitis, for general coughs, and as a refrigerant drink in fevers. (Master, 2018)

However, Candy is also called sweets in British English or lollies in Australian English, New Zealand English, candy is a confection that features sugar as a main ingredient. The category, called sugar confectionery, encompasses any sweet confection, including chocolate, chewing gum, and sugar candy. Strawberry candy is a classic old time treat with the flavor of your favorite summer time fruit, these candies are the perfect way to indulge a sweet tooth A large, juicy, red berry that is very sweet when ripe and grows on a spreading, stemless plant. (Nuts.com, 1999).

People want to be healthy, but most people have opposite lifestyles from what they wanted to have. In connection, the researchers came up of an idea of making healthy candy and decide to make gumamela flower candy. Edible flower such as gumamela flower has more than hundred species distributed in tropical

and subtropical regions around the world. The flowers of the gumamela can be white, pink, red, yellow, peach and purple but the researchers choose red gumamela flower with single petals because it has many benefits that we can get from it. This flower contains vital vitamins, mineral, antioxidants and essential compounds like anthocyanin's, and flavonoids that plays a crucial role in protecting the immune system.

Gumamela is not just a blossom of beauty but a possible ingredient for good health. A study conducted by Davao Medical School Foundation revealed that Gumamela flower (*Hibiscus rosa-sinensis*is) contains ingredients that maybe used to prevent cancer, by inhibiting mutation of cancer cells in human body. Cancer is a result of genetic mutation when our bodies exposed to carcinogens (cancer causing substances). A single abnormal cell will grow, leading to multiple mutations to form tumors. Tumor cells eventually invade and destroy normal cells. Results showed that gumamela extracts significantly decreased the growth (mutation) of salmonella compare to Mytomycin C and mineral water. In fact, the study highlighted that even with the presence of mutagen (agent that promotes mutation), gumamela extracts have successfully halted the bacteria's growth in most of the trials conducted. According to the study, these effects maybe attributed to the active ingredients in gumamela such as flavanoids and proanthocyanins, the phytochemical components that act as powerful antioxidants and free radical scavengers. Proanthocyanins trap hydroxyl, lipid peroxides and other damaging free radicals and stimulate cells to produce detoxifying enzymes. Meanwhile, flavanoid is one of the few free radical scavengers that protect the body against fat

and water soluble free radicals. With these findings, researchers claimed that gumamela is a potential natural resource that can prevent the development of cancer cell in human body. The study was funded by the Philippine Council for Health Research and Development of the Department of Science and Technology (PCHRD-DOST) through its Regional Research Fund in Region 11.

According to studies, items with a good overall taste perception score have well-balanced taste sensations. A product's success may be harmed by too much of any of these fundamental tastes, and there is a dose optimum that makes flavour composition vital.

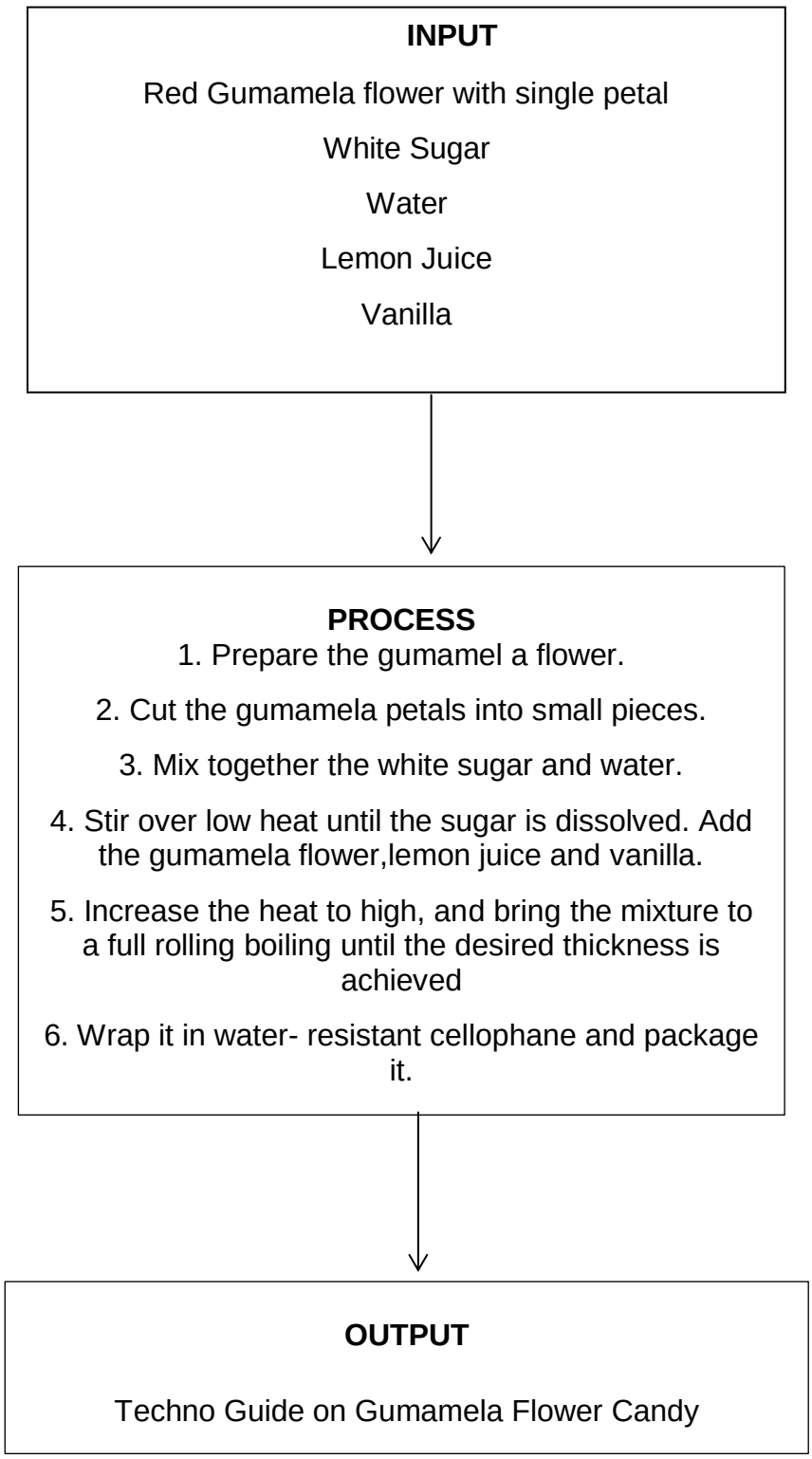


Figure 1. Flow of the Study

THE PROBLEM

Statement of the Problem

This study aimed to determine the sensory evaluation on the acceptability of the different level of gumamela flower (*Hibiscus rosa-sinensis*) in candy production.

Specifically, this study sought to answer the following questions:

1. What is the profile of the respondents in terms of :

   1.1 age;

   1.2 gender;

   1.3 civil status;

   1.4 occupation and

   1.5 educational attainment?

2. What is the acceptability level of gumamela flower candy as perceived by the participants in terms of its:

   2.1 appearance;

   2.2 aroma;

   2.3 texture and

   2.4 taste?

3. Which among of the treatment has the highest visual quality evaluation level?

4. Is there a significant difference among the treatments of Gumamela Flower Candy in terms of appearance, aroma, texture and taste?

Null Hypothesis

There is no significant difference among the treatments on the acceptability level of gumamela flower in making candy in terms of appearance, taste, texture, and aroma.

Significance of the Study

The result of the study would provide an information to the following people who are working on food preparation and processing:

Community. It gives them a new taste and flavor for a candy considering that the gumamela flower mostly grow in the country.

Entrepreneurs and food handlers. It helps them to promote innovation or introduce new product in the market.

Farmer and Agriculturists. The result of this study would encourage the farmers and agriculturists to plant more, aside from that they can raise gumamela flower in their farm and become one of the supplier in the industry in our country. It would further provide a big opportunity for the producers of gumamela flower to increase their income.

Future Researchers. This accomplishment of study would help the future researcher who would like to conduct the same study regarding the utilization of Gumamela flower.

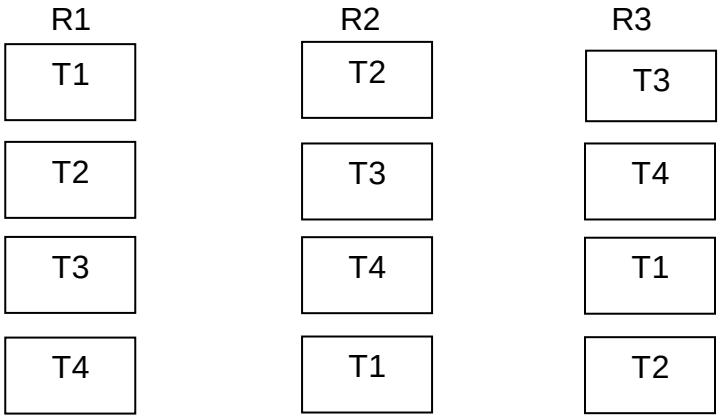
Researchers. The result of the study would benefit not only the researchers but also other like student, and even consumers. The results can serve as to the student and researcher when they come up with related researchers.

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

RESEARCH METHODOLOGY

Design

The research used the Complete Random Design (CRD) in order to determine the acceptability level of gumamela flower in making candy. The researchers conduct this experimental study through trial and error method to come up with the exact measurements of the ingredients in making gumamela flower candy.



Legend:

T1=Candy with 50 grams of gumamela flower added to 1 cup of sugar, ¼ cup water, 2 Tablespoon lemon, and 1 Tablespoon vanilla

T2=Candy with 100 grams of gumamela flower added to 1 cup of sugar, ¼ cup water, 2 Tablespoon lemon, and 1 Tablespoon vanilla.

T3= Candy with 150 grams of gumamela flower added to 1 cup of sugar, ¼ cup water, 2 Tablespoon lemon, and 1 Tablespoon vanilla.

T4=Candy with 200 grams of gumamela flower added to 1 cup of sugar, ¼ cup water, 2 Tablespoon lemon, and 1 Tablespoon vanilla.

Figure 2. Shows the experimental lay-out using CRD

Environment and Participants

The study was conducted at Barangay Zamora, Bilar, Bohol, approximately 43km from the Tagbilaran City. Zamora is situated at approximately 9.7212, 124.0969, in the island of Bohol. Elevation at these coordinates is estimated at 306.2 meters or 1,004.6 feet above mean sea level.

Figure 3. Map of Bohol

Participants

The researchers purposively selected forty (40) respondents which composed of the nineteen (19) students, nine (9) housewife, four (4) laborer worker, three (3) business worker, and five (5) professional worker who had background and experience related in food preparation to rate the sensory survey questionnaire for the gumamela candy.

Instruments

The study utilized the modified sensory evaluation questionnaire on 5-point hedonic scale test with the degree of liking, (5) Extremely Like, (4) Very Like, (3) Like, (2) Dislike, (1) Extremely Dislike as the numerical rating and description. The attributes of the gumamela flower candy were on appearance, taste, texture, and aroma and used to evaluate the acceptability of the product.

Procedures

Securing Permit. The researchers secured permit and approved by the campus director with the recommendation of Dean of the College of Technology and Allied Sciences to conduct research.

Procurement and Purchasing of Ingredients. The gumamela flower were harvested from the backyard and the other ingredients procured in the public market and in convenient store for ease.

Gathering and Assembling of Materials and Equipment. In the preparation of gumamela flower candy in various treatments, ingredients, procedure and tools were used. The tools and equipment used were knife, chopping board, stainless, mixing bowl, pan, bowl, measuring cups and spoons, ladle, tray, weighing scale and gas range with stove.

Making of Gumamela Flower. In the preparation of gumamela flower cut the petals into small pieces. In a clean pan, put 1 cup of white sugar then add ¼ cup water. Stir over low heat until the white sugar is dissolved. Add the 100 grams of gumamela flower, 2 tablespoon lemoncito juice and 1tablespoon vanilla. Increase the heat to high, and bring the mixture to a full rolling boiling until the desired thickness is achieved. Wrap it in water- resistant cellophane and pack.

Taste Testing/ Gathering Data. The prepared product was subjected to food tasting. The researchers prepared the set- up for taste testing. The following were secured bottled water, pen or pencil, questionnaires, hand sanitizers or alcohol and most important the different treatment of gumamela flower candy. To ensure health protocols, each set-up was installed one meter away from each other and each respondents required to had their face mask and face shield.

Visual quality evaluation/Shelf life analysis. The researchers stored the product in a clean area exposed to a room temperature for about three weeks. The researchers observed changes of the product every day until the end of the week. Right after storing the product for three weeks, the researchers determined which of the treatments easily spoiled, damaged and have a longer shelf life.

Data Collection. To get the acceptability level of the product, the researchers distributed the survey questionnaire to test the likeness of the gumamela flower candy.

Statistical Treatment

Simple percentage was used to organize the demographic profile of the respondents using the formula:

$$P = \frac{f}{N} x100$$

Where: P= Percentage

f= Frequency

N= Number of respondents

Weighted Mean Score was used to determine the acceptability level of gumamela flower candy in terms of appearance, aroma, taste, and texture

$$\text{WMS}=\frac{5f_5+4f_4+3f_3+2f_2+1f_1}{N}$$

Where: WMS = Weighted Mean Score

f = Frequency

N = Number of Cases

To determine the significant difference among treatments, One-way Analysis of Variance (ANOVA) was 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 understand and ensure thorough understanding of terms, the following terms were defined conceptually and operationally.

Acceptability. The quality of Gumamela flower (*Hibiscus rosa-sinensis*) candy as preferred by the respondents in terms of appearance, aroma, taste and texture.

Appearance. The featured quality of the Gumamela flower *(Hibiscus rosa-sinensis*) candy achieved through visual perception in different treatments.

Aroma. The smell, scent, odor, and fragrance of gumamela flower (*Hibiscus rosa-sinensis*) candy.

Gumamela Flower. It is a genus of flowering plants in the mallow family, Malvaceae.

Hedonic Scale. Refer to the scale or degree used in tasting products by the judges indicate the extent of their like or dislike for the food.

Taste. The sensation of flavour 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 deals with the presentation, analysis and interpretation of the data collected through the questionnaires answered by the selected forty (40) respondents. The study was conducted in the period of May-June 2021.

The result presents the Acceptability Level of Gumamela Flower (*Hibiscus rosa-sinensis)* candy in terms of respondents profile such as age, gender, civil status, occupation and educational attainment. The study will also discuss the different attributes as a result of their evaluation of the product in terms of appearance, aroma, taste and texture.

Table 1 shows the demographic profile of the respondents in terms of age, gender, civil status, occupation and educational attainment. Data reveals that most of respondents were at the ages 16 to 27 years old with the rating of 57.55% followed by 28-39 years old with a rating of 20%. Meanwhile ages 64-75 years old got lowest rating of 25% among the respondents. This implies that majority of the respondents were teenagers and adolescents.

Furthermore, majority of the respondents were female with 28 (70%) and only 12 (30%) were males according to gender. In terms of civil status, most of them were single 25 (62.2%) and 15 (37.5%) were married.

In terms of occupation, the student got the highest percentage with the rate of nineteen 19 (47.5%) and the lowest belong to the business work 3(7.5%). With

regards to educational attainment, most of them is in the college level at the range of 29 (72.5%) and the elementary graduate got lowest range at 1(2.5%).

Table 1
Demographic Profile of the Respondents
N=40

	ITEMS	FREQUENCY	PERCENTAGE
AGE	16-27	23	57.5
	28-39	8	20
	40-51	3	7.5
	52-63	5	12.5
	64 -75	1	2.5
Total		40	100
GENDER	Female	28	70
	Male	12	30
Total		40	100
CIVIL STATUS	Single	25	62.5
	Married	15	37.5
Total		40	100
OCCUPATION	Student	19	47.5
	Housewife	9	22.5
	Laborer Worker	4	10
	Business Worker	3	7.5
	Professional worker	5	12.5
Total		40	100
EDUCATIONAL ATTAINMENT	Elementary Graduate	1	2.5
	High School Level and Graduate	10	25
	College Level and Graduate	29	72.5
Total		40	100

Table 2.1 shows the Acceptability Level of Gumamela Flower Candy in terms of appearance. The appearance of food entices customers to buy or eat the

food. Data reveals that most of the respondents preferred Treatment 2 with the highest weighted mean of 4.28 interpreted as “Extremely Like”, followed by Treatment 4 with the weighted mean of 4.16; Treatment 3 with the weighted mean of 4.08 and Treatment 1 with 3.96 mean and all were interpreted as “Very Like”

Table 2.1
Acceptability level on the Appearance of Gumamela Flower Candy

Treatment	Total Score	No. of Respondents	WM	Descriptive Interpretation
T1	158.55		3.96	Very like
T2	171.17	40	4.28	Extremely like
T3	163.21	40	4.08	Very like
T4	166.54	40	4.16	Very like
		40		

Table 2.2 should the findings on the Acceptability Level of Gumamela Flower Candy in terms of aroma. Data shows that Treatment 1 got the highest weighted mean of 4.28 interpreted as “Extremely Like”. Moreover, Treatment 2 and Treatment 3 were also preferred by the respondent as reflected in the interpretation in the collected data from the respondents. Yet, both treatment were described as “Extremely Like” with the weighted mean of 4.26 and 4.22 respectively, while treatment 4 got the lowest weighted mean of 4.14 and was interpreted “Very Like”.

Table 2.2
Acceptability level on the Aroma of Gumamela Flower Candy

Treatment	Total Score	No. of Respondents	WM	Descriptive Interpretation
T1	171.2		4.28	Extremely like
T2	168.88	40	4.22	Extremely like
T3	170.55	40	4.26	Extremely like
T4	165.54	40	4.14	Very like
		40		

Table 2.3 shows the findings on the Acceptability Level of Gumamela Flower Candy in terms of taste. The ability to detect fundamental taste sensations is based on the detection of chemical signals on the tongue.

Data reveals that T2 got the highest weighted mean of 4.34 with descriptive interpretation of “Extremely Like” followed by T1 with the weighted mean 4.31 and T3 with rate of 4.22 and both were described as “Extremely Like”. Only T4 had the description of “Very Like” with the rate of 4.13. Although T1, T2 and T3 were favoured by the respondents described as “Extremely Like”. But T2 was the most preferred.

Table 2.3
Acceptability level on the Taste of Gumamela Flower Candy

Treatment	Total Score	No. of Respondents	WM	Descriptive Interpretation
T1	172.53		4.31	Extremely like
T2	173.53	40	4.34	Extremely like
T3	168.86	40	4.22	Extremely like
T4	165.18	40	4.13	Very like
		40		

Table 2.4 shows the findings on the Acceptability Level of Gumamela Flower Candy in terms of texture. Data revealed that T2-100 grams of Gumamela flower added to 1 cup of sugar, ¼ cup water, 2 Tablespoon lemon, and 1 Tablespoon vanilla got the highest weighted mean of 4.22 with descriptive interpretation of “Extremely Like” followed by T3 with the weighted mean 4.03 next is T1 which rate is 3.99 and T4 with rating of 3.96 all were described as “Very Like”.

Table 2.4
Acceptability level on the Texture of Gumamela Flower Candy

Treatment	Total Score	No. of Respondents	WM	Descriptive Interpretation
T1	159.86		3.99	Very like
T2	168.87	40	4.22	Extremely like
T3	161.2	40	4.03	Very like
T4	158.54	40	3.96	Very like
		40		

Table 2.5 shows the findings on the overall acceptability of Gumamela flower. The overall acceptability refers to the sum total score of the product in terms of its appearance, aroma, taste and texture.

In the overall acceptability of Gumamela Flower Candy, based on calculation T2 got the highest rate of 4.27 described as “Extremely Like” followed by T3 with a weighted mean of 4.15 described as “Very Like” and T1 with the rate of 4.14 described as” Very Like”. T4 gained the least rating among the four treatments with a rate of 4.10 and described as "Very Like”. This denotes that T1 was the most acceptable by the respondents.

Table 2.5
Overall Acceptability Level of Gumamela Flower Combined with the White Sugar, Water, Lemon and Vanilla in Making Candy

Sensory Attributes	T1		T2		T3		T4	
	WM	DI	WM	DI	WM	DI	WM	DI
Overall Acceptability	4.14	VL	4.27	EL	4.15	VL	4.10	VL
Rank		3		1		2		4

Table 3 shows the data in determining the visual quality of the different treatment of gumamela flower (*Hibiscus rosa-sinensis*) candy. It revealed that T1 with the composition of 50 grams of Gumamela flower added to 1 cup of white sugar and ¼ cup of water, 2 Tablespoon Lemoncito and 1 Tablespoon vanilla got the highest level of visual quality as observed daily for the period of 21 days (3 weeks) in room temperature. This implies that the sugar content of the product facilitate the extension of the storage life of the product and further proved that sugar is a preserving agent.

Table 3

Visual Quality Evaluation of Gumamela Flower Candy
ROOM TEMPERATURE

No. of Days	T1	T2	T3	T4
1.	Pleasant	Pleasant	Pleasant	Pleasant
2.	Pleasant	Pleasant	Pleasant	Pleasant
3.	Pleasant	Pleasant	Pleasant	Pleasant
4.	Pleasant	Pleasant	Pleasant	Pleasant
5.	Pleasant	Pleasant	Pleasant	Pleasant
6.	Pleasant	Pleasant	Pleasant	Pleasant
7.	Pleasant	Pleasant	Pleasant	Pleasant
8.	Pleasant	Pleasant	Pleasant	Pleasant
9.	Pleasant	Pleasant	Pleasant	Pleasant
10.	Pleasant	Pleasant	Pleasant	Pleasant but slightly sugary
11.	Pleasant	Pleasant	Pleasant	Pleasant but slightly sugary
12.	Pleasant	Pleasant	Pleasant but slightly sugary	Pleasant but slightly sugary
13.	Pleasant	Pleasant	Pleasant but slightly sugary	Pleasant but slightly sugary
14.	Pleasant	Pleasant	Pleasant but slightly sugary	Pleasant but slightly sugary
15.	Pleasant	Pleasant	Pleasant but slightly sugary	Pleasant but slightly sugary
16.	Pleasant	Pleasant	Pleasant but slightly sugary	Pleasant but sugary
17.	Pleasant	Pleasant but slightly sugary	Pleasant but slightly sugary	Pleasant but sugary
18.	Pleasant	Pleasant but slightly sugary	Pleasant but slightly sugary	Pleasant but sugary
19.	Pleasant	Pleasant but slightly sugary	Pleasant but sugary	Pleasant but sugary
20.	Pleasant	Pleasant but slightly sugary	Pleasant but slightly sugary	Pleasant but sugary
21.	Pleasant but slightly sugary	Pleasant but slightly sugary	Pleasant but sugary	Pleasant but sugary

Analysis of Variance on the Acceptability Level of Gumamela Flower Candy Using Different Treatment

One way - Analysis of Variance (ANOVA) was used to test the significant difference among the four treatments.

As shown in Table 4 the F- value obtained from appearance is 3.957 which are significant at 0.05 level of significance with df (3) and P-value of 0.0094. This means that there is a significant difference in the aroma of gumamela flower candy, therefore the null hypothesis was rejected.

In terms of aroma the computed F-value is 1.095 which are significant at 0.05 level of significance with df (3) and P-value of 0.353. This means that there is a no significant difference in the texture of gumamela flower candy, therefore the null hypothesis is accepted.

Table 4 manifests the F value is 1.884 which are significant at 0.05 level of significance with dF (3) and P value of 0.135. This means that there is no significant difference in the taste of gumamela flower therefore, null hypothesis is accepted.

For the texture, F value is 2. 463 which are significant at 0.05 level of significance with df (3) and P value of 0.065. This means that there is a no significant difference in the taste of gumamela flower, therefore the null hypothesis is accepted.

To sum up its sensory attributes which is represented by its overall acceptability. The F-value generated for the overall acceptability is 2.350 which are significant at 0.05 level of significance with df (3) and P value of 0.1406. This means that there is a no significant difference in the overall acceptability of gumamela flower candy, therefore the hypothesis is accepted.

Table 4.
Difference on the Acceptability Level of Gumamela Flower (hibiscus rosa-sinensis) Candy

Sensory Attributes	Degree of freedom	Sum of Squares	Mean Square	Observe F	P-Value	F crit	Description	Interpretation
Appearance	3	2.129	0.710	3.957	0.0094	2.663	Significant	Reject Ho
Aroma	3	0.481	0.160	1.095	0.353	2.663	Insignificant	Accepted Ho
Taste	3	1.085	0.362	1.884	0.135	2.663	Insignificant	Accepted Ho
Texture	3	1.608	0.536	2.463	0.065	2.663	Insignificant	Accepted Ho
Overall **Acceptability**	3	1.326	0.442	2.350	0.1406	2.663	Insignificant	Accepted Ho

Table 5 result below implies that the paired mention below has significant differences in terms of appearance (T1 vs. T2) of Gumamela Flower Candy. Meanwhile in terms of appearance (T2 vs. T3) (T1 vs. T3) (T2 vs. T4) (T1 vs. T4) (T3 vs. T4),aroma (T1 vs. T2) (T2 vs. T3) (T1 vs. T3) (T2 vs. T4) (T1 vs. T4) (T3 vs. T4), taste (T1 vs. T2) (T2 vs. T3) (T1 vs. T3) (T2 vs. T4) (T1 vs. T4) (T3 vs. T4), and texture (T1 vs. T2) (T2 vs. T3) (T1 vs. T3) (T2 vs. T4) (T1 vs. T4) (T3 vs.

T4), has no significant difference of Gumamela Flower Candy because of the four treatments varying consistency due to the different treatment.

Table 5
Comparison of Post Hoc Analysis result on the Acceptabilityof the Different Level of Gumamela Flower (Hibiscus Rosa-Sinensis) Candy in four treatments in terms of sensory attributes.

Post Hoc Analysis for Appearance

Pairing of treatments	P-Value	Interpretation	Decision
T1 vs.T2	0.000322369	Significant	Reject hypothesis
T2 vs. T3	0.033215897	Insignificant	Accept hypothesis
T1 vs. T3	0.20948675	Insignificant	Accept hypothesis
T2 vs. T4	0.237694488	Insignificant	Accept hypothesis
T1 vs. T4	0.043920456	Insignificant	Accept hypothesis
T3 vs. T4	0.427907543	Insignificant	Accept hypothesis

Post Hoc Analysis for Aroma

Pairing of treatments	P-Value	Interpretation	Decision
T1 vs. T2	0.431991621	Insignificant	Accept hypothesis
T2 vs. T3	0.616709166	Insignificant	Accept hypothesis
T1 vs. T3	0.843407845	Insignificant	Accept hypothesis
T2 vs. T4	0.369691198	Insignificant	Accept hypothesis
T1 vs. T4	0.11149251	Insignificant	Accept hypothesis
T3 vs. T4	0.164825841	Insignificant	Accept hypothesis

Post Hoc Analysis for Taste

Pairing of treatments	P-Value	Interpretation	Decision
T1 vs. T2	0.807698823	Insignificant	Accept hypothesis
T2 vs. T3	0.231716004	Insignificant	Accept hypothesis
T1 vs. T3	0.340997732	Insignificant	Accept hypothesis
T2 vs. T4	0.040362766	Insignificant	Accept hypothesis
T1 vs. T4	0.067422276	Insignificant	Accept hypothesis
T3 vs. T4	0.327539823	Insignificant	Accept hypothesis

Post Hoc for Texture

Pairing of treatments	P-Value	Interpretation	Decision
T1 vs. T2	0.025088341	Insignificant	Accept hypothesis
T2 vs. T3	0.049932649	Insignificant	Accept hypothesis
T1 vs. T3	0.736000966	Insignificant	Accept hypothesis
T2 vs. T4	0.020741821	Insignificant	Accept hypothesis
T1 vs. T4	0.768648357	Insignificant	Accept hypothesis
T3 vs. T4	0.546321307	Insignificant	Accept hypothesis

Chapter 3

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

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

Summary

The main trust of this study was to find out the sensory evaluation on the acceptability of the different level of gumamela flower (*hibiscus rosa- sinensis*) in candy making. Specifically, the researchers aimed to determine the demographic profile of the respondents and the acceptability level of gumamela flower candy as perceived by the participants in terms of appearance, aroma, taste, texture; visual quality level; and the significant difference among the treatments of gumamela flower candy.

The analysis of the data gathered helped the researchers to come up with the following findings:

I. Demographic Profile

The demographic profile of the respondents showed that the most of the respondents were ages 16-27 years old, female, single, and college students.

II.Acceptability Of Gumamela Flower Candy

Furthermore, the acceptability level of gumamela flower candy as perceived by the participants in terms of appearance, T2- 100grams of gumamela flower added to 1 cup of sugar, ¼ cup water, 2 Tablespoon lemon, and 1 Tablespoon

vanilla got the highest weighted mean scale with 4.28 with descriptive interpretation of “Extremely Like”. In terms of aroma, T1- 50grams of gumamela flower added to 1 cup of sugar, ¼ cup water, 2 Tablespoon lemon, and 1 Tablespoon vanilla got the highest weighted mean scale with 4.28 with descriptive interpretation of “Extremely Like”. In terms of taste, T2 got the highest weighted mean scale with 4.34 with descriptive interpretation of “Extremely Like. In terms of Texture, T2 got the highest weighted mean scale with 4.22 with descriptive interpretation of “Extremely Like. The right quantity of gumamela flower variety appropriately combined with the white sugar, water, lemon and vanilla was the T2 with the highest rate of 4.27 described as “Extremely Like.”

For the visual quality evaluation T1 got the highest level among the treatments exposed to room temperature.

The analysis of variance showed that there is no significant difference among the treatments, thus the null hypothesis is accepted.

Conclusions

A conclusion had been drawn based on the finding of the study.

Based on the result of the sensory evaluation conducted, Gumamela Flower Candy was highly acceptable by the consumer in terms of appearance, aroma, taste, texture and visual quality. Gumamela Flower Candy is not only for adult but for young as well that are looking for healthy candy that are chewable while they were in work. Therefore, Gumamela Flower is not only a cultivated flower that grown by the farmers, but based on the result of our study Gumamela Flower can

be utilized as candy. Also we could obtain the product without spending a lot of money and the consumer may gain from the nutrition and health benefits as will as a source of living as income for individual hands.

Recommendations

Based on findings, the researchers offered the following recommends:

1. The researcher would advocate on the utilization of natural resources found in our surroundings, particularly Gumamela Flower (*Hibiscus rosa-sinensis*), which can be found almost in any place. Gumamela flower candy is a confection that may be consumed by both adults and children.
2. The researchers may enhance and add more flavors in its mixture to especially determine the difference of its appearance, aroma, taste and texture of candy.
3. The school may improve and enhance the product of Gumamela Flower (*Hibiscus rosa-sinensis)* Candy as a form of entrepreneurial activity for the benefits of everybody.

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

Proposed Technology Guide

Gumamela Flower (*Hibiscus rosa-sinensis*) in Candy Making

Rationale

Edible flower such as *Hibiscus rosa-sinensis Linn* is also known as either Hibiscus, China Rose, Shoe flower or in some places it is locally called Gumamela. It is a fast-growing evergreen shrub with dark green and glossy leaves with dicot flowers. The flowers of the gumamela can be white, pink, red, yellow, peach and purple. Red flower on its variety is used for medical purposes and is present in some dietary supplements. Gumamela Flower contains vital vitamins, mineral, antioxidants and essential compounds like anthocyanin's, and flavonoids that plays a crucial role in protecting the immune system.

Hibiscus has more than three hundred species distributed in tropical and subtropical regions around the world and are used as ornamental plants. It is edible flower have been utilized for human consumption in various culture. The flower also contains moisture, protein, crude fiber, carotene, carbohydrate, fat vitamin c, mineral such as calcium, potassium, iron, zinc, nitrogen, phosphorus and ascorbic acid. It is very helpful for those who want to lose weight and cancer. Gumamela Flower is used and cooked as candy for food production to improve today's economic position with the latest trend of technology. Moreover, the gumamela flower candy was created in order to serve as an evidence that the flower that we have can turn into good product that is new and useful, an innovation that maximize the flower's potential to the entrepreneur world.

II. Objectives

The objectives of this proposed technology guide are the following:

1. To enhance the quality.
2. To ensure that food is safe for future consumption.
3. Gumamela Flower Candy will be introduced to the community and schools.
4. To make a healthy and cost-effective confectionery product.
5. To promote the gumamela flower candy to the industry in terms of research, production, and processing.
6. To encourage the community to utilize locally available resources specially Gumamela Flower.
7. Increase farmer revenue through boosting agricultural production.

TECHNOLOGY GUIDE OF GUMAMELA FLOWER IN CANDY MAKING

Cooking of Gumamela Flower Candy needs the following ingredients, tools and equipment by observing the proven procedural steps:

A. Ingredients

100 grams Red gumamela flower single petals

1cup White sugar

¼ cup Water

2Tablespoon Lemoncito

1Tablespoon Vanilla

B. Tools and Equipment

1. Weighing Scale

2. Knife

3. Mixing bowl

4. Chopping board

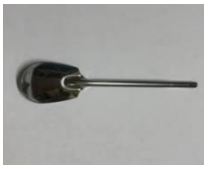
5. Plastic tray

6. Bowl

7. Pan

8. Measuring cups

9.Table spoon



10. Ladle

C. Procedure

1. Prepare the gumamel flower. Then remove the petals and place in a tray.

2. Cut the gumamela petals into small pieces.

3. In a clean pan, put 1 cup of white sugar then add ¼ cup of water.



4. Stir over low heat until the sugar is dissolved. Add the gumamela flower, lemon juice and vanilla.




5. Increase the heat to high, and bring the mixture to a full rolling boiling until the desired thickness is achieved.

6. Wrap it in water- resistant cellophane and package it.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APPENDIX A
APPROVED LETTERS

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

April 19, 2021

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

Greetings!

We the undersigned, a third year college students taking up Bachelor of Science in Industrial Technology Major in Food Preparation and Service Management are doing a research study entitled, **"SENSORY EVALUATION ON THE ACCEPTABILITY OF THE DIFFERENT LEVEL OF GUMAMELA FLOWER (*Hibiscus rosa- sinensis*) in CANDY MAKING"** as a requirement for our Research 2 subject in the S.Y 2020-2021.

In this connection, we would like to ask permission from your office to allow us to distribute and to gather the data necessary in this study. We assure 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.

Thank you and more power.

Very truly yours,

Gamil, Flordelyn S.
Ibanez, James Jacob R.
Romero, Windel A.
Tuzon, Marie Joy T.
Student Researchers

Noted by:

(Sgd.) HERBERTO H. PIOLLO
Thesis Adviser

Recommending Approval:

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

Approved by:

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

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

REQUEST LETTER

COLLEGE OF TECHNOLOGY AND ALLIED SCIENCES

May 01, 2021

TO WHOM IT MAY CONCERN,

Good day!

We the third year college students taking up Bachelor of Science in Industrial Technology Major in Food Preparation and Service Management are doing a research study entitled, **"SENSORY EVALUATION ON THE ACCEPTABILITY OF THE DIFFERENT LEVEL OF GUMAMELA FLOWER (*Hibiscus rosa- sinensis*) in CANDY MAKING"**as a requirement for our Research 2 subject. We would like to know from you and to get your ideas and opinions on this study.

We would like to request you to answer this questionnaire as honestly as you can.

Thank you very much for your cooperation.

Very truly yours,

Gamil, Flordelyn S.
Ibanez, James Jacob R.
Romero, Windel A.
Tuzon, Marie Joy T.
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 B
Questionnaire

5- Hedonic Scale of Sensory Evaluation on the Acceptability of the Different Level of Gumamela Flower (*Hibiscus rosa- sinensis*) in Candy Making

Name (Optional): Age:

Educational Attainment: Gender:

Occupation: Civil Status:

Direction: Below are the different qualities of Gumamela Flower Candy. Please indicate a checkmark on the right column that corresponds your answer. Numerical choices correspond to the following quantifiers.

Legend:

1- Extremely Dislike. The product is awful and unacceptable
2- Dislike. You don't like the product.
3- Like. You like the product but you feel like there is something lacking.
4- Very Like. The product is almost perfect.
5- Extremely Like. The product is perfect in appearance, aroma, taste, and texture

Treatment 1					
Indicators	**5**	**4**	**3**	**2**	**1**
	Extremely Like	Very Like	Like	Dislike	Extremely Dislike
A. Appearance					
B. Aroma					
C. Taste					
D. Texture					

Treatment 2					
Indicators	**5**	**4**	**3**	**2**	**1**
	Extremely Like	Very Like	Like	Dislike	Extremely Dislike
A. Appearance					
B. Aroma					
C. Taste					
D. Texture					

Treatment 4					
Indicators	**9**	**8**	**7**	**2**	**1**
	Extremely Like	Very Like	Like	Dislike	Extremely Dislike
A. Appearance					
B. Aroma					
C. Taste					
D. Texture					

Treatment 3					
Indicators	**5**	**4**	**3**	**2**	**1**
	Extremely Like	Very Like	Like	Dislike	Extremely Dislike
A. Appearance					
B. Aroma					
C. Taste					
D. Texture					

Some Suggestions:

_____
_____
_____

APPENDIX C

Gumamela Flower and Gumamela Flower Candy

APPENDIX D

Raw Data

PROFILE OF RESPONDENTS															
R.N	Replication 1					Replication 2					Replication 3				
	Age	Educational Attainment	Occupation	Gender	Civil Status	Age	Education Attainment	Occupation	Gender	Civil Status	Age	Educational Attainment	Occupation	Gender	Civil Status
1	2	3	2	2	2	1	3	1	2	1	1	3	5	2	1
2	2	2	3	1	2	1	3	1	1	1	4	3	4	2	2
3	4	3	2	2	2	1	3	1	2	1	2	3	5	1	1
4	1	3	5	1	1	1	3	1	2	1	4	2	3	1	2
5	4	3	2	2	2	1	3	1	2	1	3	1	3	1	2
6	1	3	1	2	1	1	3	1	1	1	2	3	1	2	1
7	1	3	1	2	1	1	3	1	2	1	1	2	1	2	1
8	4	3	4	2	2	2	2	2	2	2	1	3	1	2	1
9	1	2	4	1	1	1	3	2	2	1	1	2	2	2	2
10	1	3	1	1	1	2	3	1	2	1	2	2	2	2	2
11	1	3	1	1	1	1	3	1	2	1	1	2	1	2	1
12	1	3	1	1	1	1	2	1	2	1	3	2	2	2	2
13	1	3	1	2	1	1	3	3	2	1	3	2	2	2	2
14	1	3	1	2	1	4	3	2	2	2	2	3	3	1	2
15	1	3	1	2	1	1	2	2	2	2	2	3	5	2	2
16	1	3	1	1	1	4	2	3	2	2	2	3	5	2	1
17	1	3	1	1	1	4	3	4	2	2	1	3	1	2	1
18	1	3	1	2	1	1	3	1	2	1	1	3	1	2	1
19	5	3	2	2	1	1	3	1	2	1	1	3	1	2	1
20	2	2	2	2	2	1	3	5	2	1	1	3	1	1	1
21	1	3	1	1	1	3	2	2	2	2	2	2	2	2	2
22	1	3	1	2	1	1	2	1	2	1	5	3	5	2	1
23	1	3	1	2	1	2	3	1	1	2	1	3	1	2	1
24	1	3	1	2	1	1	2	1	1	1	1	3	1	1	1
25	1	3	5	2	1	1	2	1	1	1	1	3	1	1	1
26	2	3	5	2	2	1	2	1	1	1	1	3	1	2	1
27	2	3	3	1	2	1	3	1	1	1	1	3	1	2	1
28	3	2	2	2	2	1	2	1	1	1	1	3	1	2	1
29	3	2	2	2	2	2	3	3	1	2	1	3	1	1	1
30	1	2	1	2	1	1	3	1	1	1	1	3	1	1	1
31	2	2	2	2	2	1	2	1	1	1	1	3	1	1	1
32	1	2	2	2	2	1	2	1	1	1	1	2	4	1	1
33	1	3	1	2	1	1	2	1	1	1	5	3	4	2	2
34	1	2	1	2	1	1	3	1	1	1	1	3	1	2	1
35	2	3	1	2	1	1	2	1	1	1	1	3	1	2	1
36	3	1	3	2	2	3	2	3	1	2	4	3	2	2	2
37	4	2	3	1	2	1	3	1	1	1	1	3	5	1	1
38	2	3	5	1	1	1	2	1	1	1	4	3	2	2	2
39	4	3	4	2	2	1	2	1	1	1	2	2	3	1	2
40	1	3	5	2	1	1	2	1	1	1	2	3	2	2	2

R.N	APPEARANCE															
	Treatment 1				Treatment 2				Treatment 3				Treatment 4			
	R 1	R 2	R 3	Average	R1	R2	R3	Average	R1	R2	R3	Average	R 1	R 2	R 3	Average
1	4	5	4	4.33	5	5	4	4.66	5	4	4	4.33	5	3	5	4.33
2	4	3	4	3.66	3	4	4	3.66	5	3	4	4	4	3	4	3.66
3	5	3	4	4	5	4	4	4.33	5	3	4	4	3	3	4	3.33
4	4	4	4	4	4	4	4	4	4	4	4	4	5	4	4	4.33
5	3	3	5	3.66	4	4	5	4.33	5	3	5	4.33	5	3	5	4.33
6	4	4	4	4	4	4	4	4	4	3	4	3.66	5	3	4	4
7	4	3	3	3.33	4	4	5	4.33	4	4	5	4.33	4	3	5	4
8	3	3	4	3.33	3	5	5	4.33	3	4	4	3.66	3	4	5	4
9	3	4	5	4	4	4	5	4.33	3	4	5	4	3	3	4	3.33
10	4	3	4	3.66	4	4	5	4.33	3	3	4	3.33	4	4	4	4
11	4	3	3	3.33	5	4	5	4.66	4	3	5	4	4	4	4	4
12	5	3	3	3.66	4	4	3	3.66	3	3	3	3	3	3	3	3
13	4	3	3	3.33	5	4	4	4.33	5	3	4	4	5	4	4	4.33
14	3	2	5	3.33	4	4	5	4.33	3	4	5	4	5	4	5	4.66
15	3	4	5	4	4	4	4	4	3	5	4	4	5	4	5	4.66
16	2	4	4	3.33	4	3	4	3.66	2	4	4	3.33	3	3	4	3.33
17	4	4	5	4.33	3	3	5	3.66	3	4	4	3.66	3	3	5	3.66
18	3	4	4	3.66	3	3	4	3.33	3	4	4	3.66	4	3	4	3.66
19	5	3	4	4	5	4	5	4.66	5	3	5	4.33	5	4	4	4.33
20	5	3	4	4	5	4	4	4.33	5	3	4	4	5	3	4	4
21	4	5	5	4.66	4	5	5	4.66	4	5	5	4.66	4	5	5	4.66
22	4	4	5	4.33	5	5	5	5	5	5	5	5	4	5	5	4.66
23	4	5	3	4	4	5	3	4	4	5	3	4	4	5	4	4.33
24	5	5	4	4.66	5	4	3	4	4	4	3	3.66	5	4	3	4
25	4	5	2	3.66	4	5	4	4.33	4	4	2	3.33	4	5	3	4
26	5	5	3	4.33	4	5	4	4.33	4	5	3	4	5	5	5	5
27	5	4	3	4	5	5	4	4.66	5	5	3	4.33	5	5	5	5
28	3	5	4	4	4	5	5	4.66	4	5	5	4.66	4	5	5	4.66
29	3	5	5	4.33	3	5	4	4	3	5	3	3.66	3	5	3	3.66
30	3	5	4	4	5	4	5	4.66	5	5	4	4.66	4	4	4	4
31	4	5	4	4.33	5	5	4	4.66	4	5	3	4	4	5	4	4.33
32	5	5	3	4.33	5	5	4	4.66	5	5	3	4.33	4	5	3	4
33	4	4	3	3.66	5	5	3	4.33	4	5	3	4	5	5	3	4.33
34	3	5	4	4	5	5	4	4.66	5	5	4	4.66	5	5	4	4.66
35	4	5	4	4.33	4	5	4	4.33	4	5	4	4.33	4	5	5	4.66
36	5	5	3	4.33	5	5	4	4.66	5	4	5	4.66	5	5	5	5
37	4	5	4	4.33	4	5	4	4.33	4	5	4	4.33	4	5	5	4.66
38	4	4	5	4.33	4	4	5	4.33	4	5	5	4.66	4	4	3	3.66
39	4	4	4	4	4	4	3	3.66	4	5	5	4.66	4	5	4	4.33
40	4	4	4	4	4	4	5	4.33	4	4	5	4.33	4	5	5	4.66

	AROMA															
	Treatment 1				Treatment 2				Treatment 3				Treatment 4			
R 1	R 2	R 3	Average	R 1	R 2	R 3	Average	R 1	R 2	R 3	Average	R 1	R 2	R 3	Average
5	5	5	5	5	5	4	4.66	5	3	5	4.33	5	3	4	4
4	3	5	4	3	5	4	4	5	3	5	4.33	4	3	4	3.66
3	4	5	4	3	5	4	4	4	4	4	4	4	4	5	4.33
4	5	5	4.66	4	4	4	4	4	4	5	4.33	4	4	4	4
5	3	4	4	3	4	4	3.66	4	3	5	4	4	3	5	4
5	4	4	4.33	5	4	4	4.33	5	3	4	4	5	3	4	4
4	3	3	3.33	4	3	5	4	3	3	5	3.66	3	4	5	4
3	4	5	4	3	5	4	4	3	5	4	4	3	4	4	3.66
3	3	5	3.66	4	4	5	4.33	3	4	4	3.66	3	4	5	4
4	4	5	4.33	4	4	5	4.33	4	4	4	4	3	4	4	3.66
5	4	3	4	5	4	3	4	5	4	3	4	4	4	3	3.66
5	4	3	4	5	4	3	4	5	4	3	4	4	4	3	3.66
5	3	3	3.66	5	4	5	4.66	5	3	5	4.33	5	4	5	4.66
4	4	5	4.33	3	4	4	3.66	4	4	5	4.33	3	4	5	4
4	5	4	4.33	3	5	4	4	3	5	5	4.33	3	5	5	4.33
4	4	4	4	3	3	4	3.33	2	4	5	3.66	2	3	5	3.33
4	4	5	4.33	5	3	4	4	4	4	5	4.33	4	3	4	3.66
4	4	4	4	4	3	4	3.66	3	4	4	3.66	2	3	4	3
5	3	4	4	5	4	5	4.66	5	3	5	4.33	5	4	5	4.66
5	4	4	4.33	5	4	4	4.33	5	4	4	4.33	5	4	4	4.33
4	5	5	4.66	4	5	5	4.66	4	5	5	4.66	4	5	5	4.66
4	5	5	4.66	5	5	5	5	5	5	5	5	5	5	5	5
4	5	4	4.33	4	5	4	4.33	4	5	3	4	4	5	2	3.66
5	5	4	4.66	4	5	5	4.66	5	5	4	4.66	4	5	4	4.33
4	5	4	4.33	5	5	3	4.33	5	5	2	4	5	5	2	4
4	5	4	4.33	4	5	3	4	5	5	3	4.33	5	5	3	4.33
5	5	4	4.66	4	5	3	4	5	5	4	4.66	5	5	3	4.33
3	5	5	4.33	5	5	5	5	5	5	5	5	5	5	5	5
3	5	5	4.33	3	5	5	4.33	3	5	5	4.33	3	5	4	4
3	4	5	4	3	4	5	4	3	5	5	4.33	3	5	4	4
5	5	4	4.66	5	5	4	4.66	4	5	4	4.33	4	5	3	4
5	5	3	4.33	5	5	4	4.66	4	5	3	4	5	5	3	4.33
5	5	3	4.33	4	5	3	4	4	5	3	4	4	5	3	4
3	5	4	4	5	5	4	4.66	5	5	3	4.33	5	5	4	4.66
4	5	5	4.66	4	5	5	4.66	4	5	5	4.66	4	5	5	4.66
4	5	5	4.66	4	4	3	3.66	5	5	4	4.66	5	5	4	4.66
5	5	4	4.66	4	5	4	4.33	5	5	4	4.66	4	5	4	4.33
5	5	3	4.33	4	5	3	4	4	5	4	4.33	5	5	4	4.66
5	5	4	4.66	4	5	3	4	5	5	5	5	4	5	4	4.33
5	5	5	5	4	5	5	4.66	5	5	5	5	4	5	5	4.66

TASTE															
Treatment 1				Treatment 2				Treatment 3				Treatment 4			
R 1	R 2	R 3	Average	R 1	R 2	R 3	Average	R 1	R 2	R 3	Average	R 1	R 2	R 3	Average
5	5	4	4.66	5	5	5	5	5	2	5	4	5	2	4	3.66
4	3	4	3.66	3	5	5	4.33	5	3	4	4	4	3	4	3.66
5	2	4	3.66	5	5	4	4.66	5	3	4	4	4	3	4	3.66
5	4	4	4.33	5	4	5	4.66	5	4	4	4.33	5	4	4	4.33
3	3	5	3.66	3	4	5	4	3	3	5	3.66	3	3	5	3.66
5	4	4	4.33	4	4	4	4	5	3	4	4	5	3	4	4
4	3	3	3.33	4	3	5	4	3	3	5	3.66	3	3	5	3.66
3	4	4	3.66	3	5	5	4.33	3	4	4	3.66	3	4	4	3.66
3	4	5	4	4	4	5	4.33	3	3	5	3.66	3	4	5	3.66
4	3	5	4	5	4	5	4.66	5	4	4	4.33	5	4	4	4.33
5	3	4	4	5	4	5	4.66	5	4	4	4.33	5	4	3	4
5	3	3	3.66	4	4	3	3.66	4	4	3	3.66	3	3	3	3
4	4	3	3.66	4	4	5	4.33	4	3	5	4	4	3	5	4
5	3	5	4.33	2	4	5	3.66	4	3	5	4	3	3	5	3.66
5	5	5	5	2	4	4	3.33	4	4	5	4.33	3	4	5	4
5	3	5	4.33	2	3	5	3.33	3	3	5	3.66	3	3	5	3.66
5	3	5	4.33	5	3	5	4.33	5	3	5	4.33	5	3	5	4.33
4	3	5	4	3	3	5	3.66	2	3	5	3.33	3	3	5	3.66
5	3	5	4.33	5	4	5	4.66	5	3	5	4.33	5	3	5	4.33
5	4	4	4.33	5	4	4	4.33	5	3	4	4	5	3	4	4
4	5	5	4.66	4	5	5	4.66	4	5	5	4.66	4	5	5	4.66
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5	5	4	4.66	5	5	3	4.33	5	5	2	4	5	5	3	4.33
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	2	4	5	5	3	4.33	5	5	3	4.33
5	5	5	5	4	5	2	3.66	4	5	4	4.33	5	5	3	4.33
5	5	5	5	5	5	2	4	5	5	4	4.66	5	5	3	4.33
3	5	4	4	5	5	4	4.66	5	5	4	4.66	5	5	4	4.66
3	5	5	4.33	3	5	4	4	3	5	4	4	3	5	3	3.66
4	5	5	4.66	5	5	5	5	4	5	5	4.66	3	5	5	4.33
5	5	4	4.66	5	5	5	5	4	5	5	4.66	4	5	5	4.66
5	5	3	4.33	5	5	4	4.66	5	5	3	4.33	5	5	3	4.33
4	5	3	4	5	5	3	4.33	4	5	3	4	4	5	3	4
3	5	4	4	5	5	4	4.66	5	5	3	4.33	5	5	3	4.33
4	5	5	4.66	4	5	4	4.33	4	5	5	4.66	4	5	5	4.66
5	5	3	4.33	5	5	3	4.33	5	5	3	4.33	5	5	3	4.33
4	5	5	4.66	5	5	5	5	4	5	5	4.66	4	5	5	4.66
4	5	5	4.66	4	5	5	4.66	4	5	5	4.66	4	5	4	4.33
4	5	4	4.33	5	5	3	4.33	4	5	5	4.66	4	5	4	4.33
4	5	5	4.66	5	5	5	5	4	5	5	4.66	4	5	5	4.66

TEXTURE															
Treatment 1				Treatment 2				Treatment 3				Treatment 4			
R 1	R 2	R 3	Average	R 1	R 2	R 3	Average	R 1	R 2	R 3	Average	R 1	R 2	R 3	Average
5	4	4	4.33	5	5	4	4.66	5	3	4	4	5	3	4	4
4	3	4	3.66	3	5	4	4	5	3	4	4	4	2	4	3.33
4	3	3	3.33	5	4	3	4	5	3	4	4	3	3	4	3.33
4	5	4	4.33	4	4	4	4	4	3	4	3.66	4	4	4	4
5	3	4	4	5	4	4	4.33	4	3	4	3.66	5	3	5	4.33
4	4	3	3.66	4	4	3	3.66	5	3	3	3.66	5	3	4	3.33
4	3	4	3.66	4	4	5	4.33	4	3	5	4	5	4	5	4.66
3	4	4	3.66	3	5	5	4.33	3	4	4	3.66	3	4	4	3.66
3	3	5	3.66	4	4	5	4.33	3	3	4	3.33	3	3	3	3
4	3	5	4	5	4	5	4.66	4	3	4	3.66	3	4	4	3.66
4	3	3	3.33	4	4	4	4	5	3	3	3.66	4	4	2	3.33
4	3	3	3.33	4	4	3	3.66	4	3	3	3.33	3	3	3	3
4	4	3	3.66	5	5	4	4.66	5	4	4	4.33	5	4	4	4.33
4	4	5	4.33	3	4	5	4	3	4	5	4	3	4	5	4
4	2	5	3.66	3	3	4	3.33	3	3	4	3.33	3	3	5	3.66
4	3	4	3.66	3	3	4	3.33	2	3	5	3.33	3	3	4	3.33
3	3	4	3.33	4	3	5	4	3	3	5	3.66	4	3	5	4
2	3	4	3	3	3	4	3.33	3	3	4	3.33	3	3	4	3.33
5	3	5	4.33	5	4	5	4.66	5	3	5	4.33	5	3	4	4
5	3	4	4	5	4	4	4.33	5	3	4	4	5	3	4	4
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5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	4.66
4	5	2	3.66	4	5	3	4	4	5	3	4	4	5	3	4
4	5	3	4	5	5	4	4.66	5	5	3	4.33	5	5	4	4.66
4	5	4	4.33	4	5	3	4	5	5	2	4	4	5	3	4
5	5	4	4.66	4	5	3	4	4	5	3	4	5	5	3	4.33
5	5	4	4.66	5	5	3	4.33	5	5	3	4.33	5	5	3	4.33
3	5	4	4	4	5	5	4.66	4	5	5	4.66	4	5	5	4.66
3	5	4	4	3	5	4	4	3	5	4	4	3	5	3	3.66
3	5	4	4	4	5	4	4.33	3	5	5	4.33	2	5	4	3.66
5	5	4	4.66	5	5	5	5	4	5	4	4.33	4	5	3	4
5	5	3	4.33	5	5	4	4.66	4	5	3	4	2	5	3	3.33
4	5	3	4	5	5	3	4.33	4	5	3	4	4	5	3	4
4	5	4	4.33	5	5	4	4.66	5	5	4	4.66	5	5	5	5
3	5	4	4	3	5	4	4	3	5	5	4.33	4	5	5	4.66
4	5	5	4.66	4	5	5	4.66	4	5	4	4.33	5	5	5	5
4	5	4	4.33	4	5	4	4.33	4	5	4	4.33	4	5	4	4.33
3	5	4	4	3	5	5	4.33	4	5	5	4.66	4	4	3	3.66
4	4	4	4	4	5	3	4	4	5	5	4.66	4	5	4	4.33
4	5	5	4.66	4	5	5	4.66	4	4	5	4.33	4	4	5	4.33

APPENDIX E

Computation of the One-way Analysis of Variance

Appearance

Groups	*Count*	*Sum*	*Average*	*Variance*
T1	40	158.55	3.96375	0.141516346
T2	40	171.17	4.27925	0.139530192
T3	40	163.21	4.08025	0.197515321
T4	40	166.54	4.1635	0.238982308

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	2.12942187	3	0.70980729	3.956870251	0.009407367	2.662568549
Within Groups	27.9842225	156	0.17938604			
Total	30.1136444	159				

Aroma

Groups	*Count*	*Sum*	*Average*	*Variance*
T1	40	171.2	4.28	0.116246154
T2	40	168.88	4.222	0.149754872
T3	40	170.55	4.26375	0.126331731
T4	40	165.54	4.1385	0.192823333

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.48053188	3	0.16017729	1.094937194	0.35309652	2.66256855
Within Groups	22.8210875	156	0.14628902			
Total	23.3016194	159				

Taste

Groups	*Count*	*Sum*	*Average*	*Variance*
T1	40	172.53	4.31325	0.205360962
T2	40	173.53	4.33825	0.213784038
T3	40	168.86	4.2215	0.161495128
T4	40	165.18	4.1295	0.18726641

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.0847825	3	0.361594	1.883532167	0.134606878	2.662568549
Within Groups	29.948355	156	0.191977			
Total	31.033138	159				

Texture

Groups	*Count*	*Sum*	*Average*	*Variance*
T1	40	159.86	3.9965	0.205136154
T2	40	168.87	4.22175	0.183886603
T3	40	161.2	4.03	0.186958974
T4	40	158.54	3.9635	0.29483359

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.608322	3	0.536107	2.462553329	0.06459893	2.66256855
Within Groups	33.9618	156	0.217704			
Total	35.57012	159				

APPENDIX F

Computation of Post Hoc Analysis

Post Hoc Analysis for Appearance

Pairing of treatments	P-Value	Interpretation	Decision
T1 vs.T2	0.000322369	Significant	Reject hypothesis
T2 vs. T3	0.033215897	Insignificant	Accept hypothesis
T1 vs. T3	0.20948675	Insignificant	Accept hypothesis
T2 vs. T4	0.237694488	Insignificant	Accept hypothesis
T1 vs. T4	0.043920456	Insignificant	Accept hypothesis
T3 vs. T4	0.427907543	Insignificant	Accept hypothesis

Post Hoc Analysis for Aroma

Pairing of treatments	P-Value	Interpretation	Decision
T1 vs. T2	0.431991621	Insignificant	Accept hypothesis
T2 vs. T3	0.616709166	Insignificant	Accept hypothesis
T1 vs. T3	0.843407845	Insignificant	Accept hypothesis
T2 vs. T4	0.369691198	Insignificant	Accept hypothesis
T1 vs. T4	0.11149251	Insignificant	Accept hypothesis
T3 vs. T4	0.164825841	Insignificant	Accept hypothesis

Post Hoc Analysis for Taste

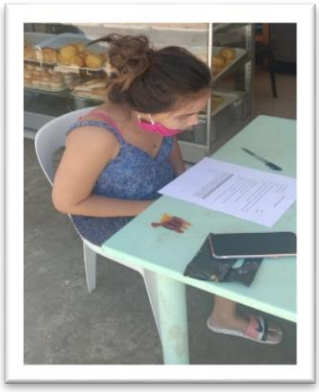
Pairing of treatments	P-Value	Interpretation	Decision
T1 vs. T2	0.807698823	Insignificant	Accept hypothesis
T2 vs. T3	0.231716004	Insignificant	Accept hypothesis
T1 vs. T3	0.340997732	Insignificant	Accept hypothesis
T2 vs. T4	0.040362766	Insignificant	Accept hypothesis
T1 vs. T4	0.067422276	Insignificant	Accept hypothesis
T3 vs. T4	0.327539823	Insignificant	Accept hypothesis

Post Hoc for Texture

Pairing of treatments	P-Value	Interpretation	Decision
T1 vs. T2	0.025088341	Insignificant	Accept hypothesis
T2 vs. T3	0.049932649	Insignificant	Accept hypothesis
T1 vs. T3	0.736000966	Insignificant	Accept hypothesis
T2 vs. T4	0.020741821	Insignificant	Accept hypothesis
T1 vs. T4	0.768648357	Insignificant	Accept hypothesis
T3 vs. T4	0.546321307	Insignificant	Accept hypothesis

APPENDIX G

Documentation



APPENDIX H

Technology Guide of Gumamela Flower (*Hibiscus Rosa- Sinensis*) in Candy Making

REARCHER'S BIODATA

PERSONAL DATA

Name	: Flordelyn S. Gamil
Address	: Zamora, Bilar, Bohol
Date of Birth	: November 4, 1999
Citizenship	: Filipino
Civil Status	: Single
Parents	: Pilar S. Gamil
	: Leonardo C. Gamil

EDUCATIONAL ATTAINMENT

Elementary	: Zamora Elementary School Zamora, Bilar, Bohol 2011-2012
Secondary	: Bilar National High School Yanaya, Bilar, Bohol 2017-2018
Tertiary	: Bohol Island State University (BISU) Zamora, Bilar, Bohol 2021 : Bachelor of Science in Industrial Technology Major in Food Preparation Service Management
Motto	: "We fight hard, though we fail, in the end, we will prevail."

RESEARCHER'S BIODATA

PERSONAL DATA

Nam	: James Jacob R. Ibañez
Address	: Zamora, Bilar, Bohol
Date of Birth	: May 7,1999
Citizenship	: Filipino
Civil Status	: Single
Parents	: Jose D. Rabuca
	: Vicenta I. Rabuca

EDUCATIONAL ATTAINMENT

Elementary	: Zamora Elementary School Zamora Bilar, Bohol 2011-2012
Secondary	: Bohol Island State University(BISU) Zamora Bilar, Bohol 2017-2018
Tertiary	: Bohol Island State University (BISU) Zamora, Bilar, Bohol 2021 : Bachelor of Science in Industrial Technology Major in Food Preparation Service Management
Motto	: "Success is the sum of your efforts."

RESEARCHER'S BIODATA

PERSONAL DATA

Name	: Windel A. Romero
Address	: Zamora, Bilar, Bohol
Date of Birth	: November 14, 1998
Citizenship	: Filipino
Civil Status	: Single
Parents	: Lilia A. Romero
	: Vicente D. Romero

EDUCATIONAL ATTAINMENT

Elementary	: Zamora Elementary School Zamora Bilar, Bohol 2010-2011
Secondary	: Bohol Island State University (BISU) Zamora, Bilar, Bohol 2017-2018
Tertiary	: Bohol Island State University (BISU) Zamora, Bilar, Bohol 2021 :Bachelor of Science in Industrial Technology Major in Food Preparation Service Management
Motto	: "Never give up. Today is hard, tomorrow will be worse, but the day after tomorrow will be sunshine."- JackMa

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Motto : "Don't let one bad day stop you from reaching
your goal."-Julianarw :