

Acceptability of Miracle Berry Fruit (*Crescentia Cujete*) Wine

Dr. Maria Sevilla – Chua, D.M. *, Dr. Cenby Eppie Guimbaolibot Gaytos, Ph.D.**

*Bachelor of Science in Industrial Technology, College of Technology – ESSU Guiuan

Email: chuamaria1970@gmail.com

** Bachelor of Elementary Education, College of Education – ESSU Guiuan

Email: cnbg314@gmail.com

Abstract:

The miracle berry fruit is a fruit abundant in Guiuan, Eastern Samar, and yet, only the older members of communities know the medicinal and therapeutic values of this plant. With the results of this study, it is therefore anticipated that the miracle berry can be used, especially by low income individuals as well as unemployed individuals to help them generate another means of income. Wines are not only drank for pleasure and enjoyment but more importantly, this can now aid in improving health of individuals. This study involved 70 respondents which included students from the different colleges of the university as well as some faculty members and the researchers themselves. The respondents were given a chance to taste the product and asked them to evaluate it using score cards. The information gathered out from the scorecard were consolidated and organized. They were analyzed, interpreted by using statistical tools. To evaluate the rose petal ice cream, the researchers conducted (3) trials for each of the following tests: benchmark test, pilot test, and final tests. The researchers discovered that from the three (3) trials in the Benchmark Test 4.59 interpreted as Extremely Acceptable, out from the three (3) trials of Pilot Test 4.90 interpreted as Extremely Acceptable. Findings of this study, showed that based on the result of this study, the respondents liked the flavor, appearance, texture, aroma and color of Miracle Berry Fruit Wine. This product not only targets old individuals but as well as anyone who pleasures in drinking both wine and medicinal or therapeutic drinks.

Keywords — Miracle Berry, Miracle Fruit, Calabash, wine, Product Development, Sensory Evaluation, Innovation

I. INTRODUCTION

People around the world enjoy wine. Some countries have been drinking wine since as early as 6000 BCE (Georgia with the ancient booze cred), and others are only just beginning to enjoy it. To much of Asia, for instance, the availability of grape wine is one of the spoils of a globalized market. (Thrillist.com, 2016)

According to an article written by Johan Botha on wine.co.za, there re 5 big reasons why people (should) drink wine; (1) Wine can be drunk as an alternative to say water, to quench one's thirst, (2)

Wine can be used before a meal to improve one's appetite, (3) Drinking wine during a meal can enhance and complement the flavor of food, (4) Wine can be served to make social gatherings more memorable, and (5) wine can be enjoyed to help people unwind and produce a state of euphoria.

Miracle fruit is an evergreen shrub that grows in tropical countries, especially in Asia. The berry of the miracle fruit plant is used as medicine. People take miracle fruit to treat diabetes and correct chemotherapy-related taste disturbances. In foods, miracle fruit is used as a low-calorie sugar-free sweetener.

Miracle fruit contains a chemical that affects taste receptors in the tongue. This chemical makes the tongue register sour tastes as sweet tastes. The chemical itself has no taste at all.

Miracle berry are abundant in the municipality of Guiuan, Eastern Samar but its medicinal properties are not yet fully known by its community members. With the development of this study, this overlooked fruit can be put to very good use by creating a miracle fruit flavored wine to be developed and sold by its community members, help them have income or livelihood, and improve the economy of the place.

Objective of the study

The main purpose of the study was to make wine with Miracle Berry Fruit Specifically, it aimed to evaluate and analyze the product in terms of the following:

1. develop a new wine product using the miracle berry fruit.
2. evaluate the acceptability level of the miracle berry fruit wine through the following indicator.
 - a. flavor
 - b. appearance
 - c. texture
 - d. aroma
 - e. color
3. determine the general acceptability of the miracle berry fruit wine.

Significance of study

The output of the study is beneficial to the following:

To unemployed members of the community. For them to be aware of the entrepreneurial potentials of the miracle fruit, especially on helping the community members earn extra money or have a business with low investment and a product locally available and abundant.

To businessmen and food establishment owners. For them to introduce a new product

innovation into their sales and products in order to attract more customers to their stores.

The students. This study will give the students (future researchers) an idea and to innovate new products using miracle fruit.

The customers. The result of this study will provide the costumers an idea on the consumption and use of miracle fruit. Since this fruit is thriving in the municipality and most community members does not know how to consume this fruit, this study then aims in promoting a use for the said fruit. This will not only help the economy but put to great use a fruit that no one seems to take notice of.

The instructors. This study will help the instructors to give an idea to their students on how to innovate a new product that is made from miracle berry fruit.

Scope and Delimitations of the Study

This study was limited in testing the miracle berry fruit wine. The respondents of the study included a total of 100 individuals, with the thirty (30) selected fourth year students ten (10) from College of Business Management and Accountancy, ten (10) from College of Education and Ten (10) from College of Engineering and Technology for the pilot test, thirty (30) Faculty members in ESSU-Guiuan Campus for the Benchmark test and Ten (10) wine enthusiasts and vendors for the final test. This study used a score card to determine the acceptability of Miracle Berry Fruit Wine indicating the following criteria, flavor, appearance, texture, aroma, color and general acceptability.

Definition of Terms

The following terms are defined in a random order to aid the comprehension of the readers:

Acceptability. The quality of being accepted. In this study, the term refers to the quality of miracle fruit wine as basis of acceptance from consumers.

Aroma. A distinctive, pervasive, and usually pleasant or savory smell. In this study, the term refers to the pleasant or savory smell of miracle berry fruit wine.

Appearance. The state, condition, manner, or style in which a person or object appears. In this study, the term refers to the state, condition, manner or style in which the miracle berry fruit wine appears.

Color. A quality such as red, blue, green, yellow, etc., that you see when you look at something. In this study, the term refers to the quality of the miracle berry fruit wine.

Flavor. The quality of something that affects the sense of taste. In this study, the term refers to how the miracle fruit wine affects the sense of taste of an individual.

Taste. To have a specific flavor; to ascertain the flavor of by taking a little into the mouth. In this study, the term is used to determine the specific flavor of the miracle berry fruit wine.

Texture. the way it feels when you touch it, for example how smooth or rough it is. In this study, the term refers to the smoothness or roughness of the miracle berry fruit wine once it touches the lips, mouth, tongue, and throat, as well as the rest of the digestive system.

Wine. The alcoholic fermented juice of fresh grapes used as a beverage. In this study, a fruit growing from a dense shrub or small tree named miracle berry fruit is used.

II. REVIEW OF RELATED LITERATURE AND STUDIES

This chapter presents the relevant articles, studies, and literatures that will serve as the basis of this study.

Related Literature

Miracle Berry Fruit or Mindanao Fruit, internationally called as calabash (sc. name: *Crescentia cujete*) is a tree that bears huge fruits that looks like a buko (young coconut). It grows abundantly everywhere in Mindanao, and some parts of Bicol region, and in the Visayas. Few are also growing in Luzon up to the northern part of Ilocos and Cagayan region. Sad to see that most of

the fallen fruits were left to rot on the ground. Most local folks do not know what to do to make good use of this wonderful fruit. They dreaded the black color of its flesh and the gummy smell. What they do not realize. The black juice is sweet and has healing wonders, the reason why old folks called it the “miracle fruit”. (Polistico, E., 2021)

In Mindanao, there’s a strange fruit that never fails to catch the attention of whoever sees it. Although not very popular yet, it looks like a young coconut in appearance and watermelon in size. Its name is even strange: calabash. In the science world, it is called *Crescentia cujete*. It is known as calabacero in Spain, totumo in Columbia and Panama, mate in Ecuador, pate in Peru, jicaro in Mexico, Higuera in Puerto Rico and rum tree in Sri Lanka. But most Filipinos call it miracle fruit. The reason: it cures some diseases, even cancer. In General Santos City, a group of students from Notre Dame of Dadiangas University found that calabash extracts have the ability to prevent blood vessel growth and development. As such, it can be used to help prevent the cancer cells in the human body. (Tacio, H., 2015)

Related Studies

Synsepalum dulificum (also known as miracle berry) fruit is rich in nutrients, flavor and antioxidant compounds. However, the fruit is underutilized in the sub region and susceptible to post harvest losses. In this study, miracle berry wine was produced and the effects of varying pH and inocula levels during fermentation (at room temperature for 7 days) on the wine parameters (soluble solids, pH, titratable acidity, acid taste index, total phenols and antioxidant activity (% DPPH inhibition) ranged 300-580 mg GAE/L and 52-86% respectively. There was a decrease in Brixin Brix, pH, phenolic content and antioxidant activity for all samples fermented at varying pH after fermentation. There was, however, an increase in titratable acidity (7-14 g/L tartaric acid) and acid taste index after fermentation. Wine samples produced at pH of 3.8, 4.6 and 5.8 using 1% and 2%, respectively, but increased in titratable acidity

and acid taste index after fermentation. At the end of the fermentation process, wine sample with pH 4.6 and inocula of 1% and 2% had alcohol content of 10% and 12% (v/v), respectively. This study revealed that it is possible to produce red wine from miracle merry rich in antioxidant with possible health imparting benefits. Again, varying the pH and inoculum levels can affect the quality of the wine produced. (Agbenorhevi, J., et.al., 2019)

The calabash fruit has its fresh calabash meat tastes like guayabano and has a mixture of sweet and sour taste, but when boiled, it tastes bitter like wine. The primary purpose of this study was to develop a mocktail using calabash extract as base with the juices: guayabano, pomelo, as jackfruit as modifiers and honey as the sweetener. This study utilized the experimental research design using research – made questionnaire. There were randomly selected participants who participated in the study from a university. One -way ANOVA and the weighted mean were used as statistical treatment. It was found out that most acceptable optimum ratio in developing a mock tail using calabash extract as the base was to make use of 60 ml calabash extract, 30ml guayabano juice, and 15 ml honey (mock tail 3). For mock tail 3, lot 1 found out to be the most expensive formulation of P25.80 that contains 60ml of calabash extract and 30 ml guayabano juice while for the mock tail 1, lot 1 was the cheapest formulation of P21.76 that contains 60 ml of calabash extract and 30 ml guayabano juice. The theoretical nutritional values of the Sucrose; 25.09 g Fructose; 18.24 g Galactose; 7.88 mg Iron; and 59.77 mg Sodium. The most acceptable mock tail with regards to appearance for mock tail 1 was lot 1. For mock tail 2, lot 2 was the most acceptable with regards to aroma and taste. Further, there was no significant difference between and among calabash (*Crescentia cujete*) mock tail and commercial mock tail regarding appearance, aroma, and taste. In developing calabash mocktail, it is ideal to make use of 50 ml of calabash extract, 30 ml of pomelo juice, and 10 ml of honey as the sweetener. (Yamamoto, K., et.al., 2016)

“Miracle Fruit” is a taste -altering berry that causes sour foods to be perceived as sweet. The present paper describes a laboratory exercise that uses Miracle Fruit to educate students about sensation and perception of taste. This laboratory exercise reinforces course material pertaining to the function of sweet taste receptors covered in a Sensation and perception course at Christopher Newport University. Here we provide a step – by – step explanation of the methodology, and an example of data collected and analyzed by one group of students who participated in this laboratory exercise. The origins of miracle fruit, the structure and the physiological function of miraculin (the glycoprotein responsible for the taste – modifying effect found in the pulp of the miracle fruit) were discussed before the laboratory exercise. Students then sampled foods known to target different types of tastes and rated their perceptions of taste and intensity for each food item. Next, students each consumed miracle fruit berries, then resampled each original food item and again recorded their perception of taste intensity ratings for these foods the data confirmed that the sour food items were perceived sweeter after the miracle fruit was consumed. The students also completed a written assignment to assess what they learned about the origins structure and physiological function of miracle fruit. This hands -on laboratory exercise received positive feedback from students. The exercise can be used by other neuroscience educators to teach concepts related to the sensory system of taste. (Lipatova, O. and Campolattaro, M., 2020)

Work Flow

The study of this product includes input, process and output of the products. In these aspects it speaks on how the miracle berry fruit wine is being produced, what the ingredients and what materials needed.

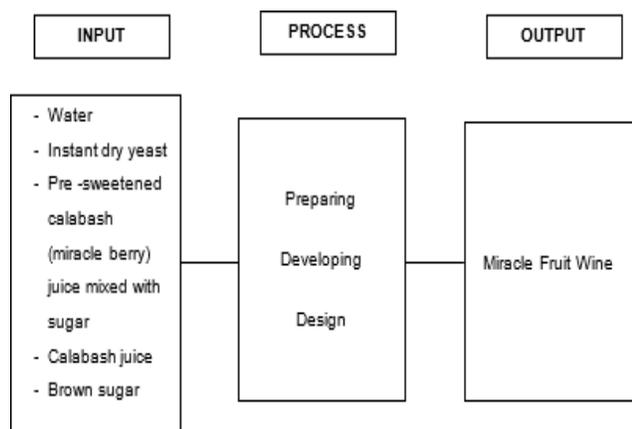


Figure 1. Workflow of the study

III. METHODOLOGY

This chapter presents the research design, locale of the study, and respondents of the study, research instruments, and data collection procedure, measurement of variables and analysis of data.

Ingredients

1. Water (1/4 glass, lukewarm)
2. Instant dry yeast (2 tablespoon)
3. Pre – sweetened juice (1/2 cup calabash / miracle berry fruit juice) mixed with 1 tablespoon brown sugar
4. Calabash juice (1 bottle “long neck”, give space for the 1/2 cup “must” to be added later)
5. Brown sugar (3/4 cup)

Procedure

- A. Preparing the must
 1. Pour lukewarm water in glass.
 2. Add yeast, stir to mix and let stand for 30mins at room temperature
 3. Check if some bubbles have formed on the surface or the sides, if yes, then proceed to the next step. If no, repeat the process.
 4. Add 50% of the pre-made sweetened juice or miracle berry / calabash juice
 5. Cover and let stand for 4 hours in room temperature or higher, around 25degrees celsius to 28degrees Celsius)
 6. Add the other 50% of the miracle berry/calabash juice.

7. Cover and let stand for another 4 hours in room temperature.

B. Fermentation Process

1. Add the prepared must
2. Add brown sugar and stir to mix
3. Cover bottle loosely (to avoid breaking or exploding due to pressure produced by the fermentation process)
4. Tighten the lid after one month
5. Keep the bottle in a safe place and away from the sunlight.
6. After 2 months, the wine is ready, but for better taste, wait for 5 to 6 months.

Benchmark Testing Cost

Trial 1 Costing	Trial 2 Costing	Trial 3 Costing
Instant Dry Yeast P15 (11g) cheaper label	Instant Dry Yeast P15 (11g) cheaper label	Instant Dry Yeast P15 (11g) cheaper label
Water (P10)	Water (P10)	Water (P10)
Pre -sweetened / calabash juice (free)	Pre -sweetened / calabash juice (free)	Pre -sweetened / calabash juice (free)
Brown sugar (P50/kilo) divided by 3 =P17	Brown sugar (P50/kilo) divided by 3 =P17	Brown sugar (P50/kilo) divided by 3 =P17
Total: P42	Total: P42	Total: P42

Pilot Testing Cost

Trial 1 Costing	Trial 2 Costing	Trial 3 Costing
Instant Dry Yeast P25 (11g)	Instant Dry Yeast P25 (11g)	Instant Dry Yeast P25 (11g)
Water (P10)	Water (P10)	Water (P10)
Pre -sweetened / calabash juice (free)	Pre -sweetened / calabash juice (free)	Pre -sweetened / calabash juice (free)
Brown sugar (P50/kilo) divided by 3 =P17	Brown sugar (P50/kilo) divided by 3 =P17	Brown sugar (P50/kilo) divided by 3 =P17
Total: P52	Total: P52	Total: P52

Final Testing Cost

Trial 1 Costing	Trial 2 Costing	Trial 3 Costing
Instant Dry Yeast P153 (500g) divided by 3 =P51	Instant Dry Yeast P153 (500g) divided by 3 =P51	Instant Dry Yeast P153 (500g) divided by 3 =P51
Water (P25) divided by 3 =P9	Water (P25) divided by 3 =P9	Water (P25) divided by 3 =P9
Pre -sweetened / calabash juice (free)	Pre -sweetened / calabash juice (free)	Pre -sweetened / calabash juice (free)
Brown sugar (P50/kilo) divided by 3 =P17	Brown sugar (P50/kilo) divided by 3 =P17	Brown sugar (P50/kilo) divided by 3 =P17
Total: P77	Total: P77	Total: P77

Methods

Research Design

The study utilized the Experimental method of research particularly the completely randomized design (CRD) where all samples were randomly assigned to all panelists as this experimental design is most associated with sensory studies to avoid or minimize artifacts due to order of sample presentation. CRD is also ideal design for central location consumer test where each panelist evaluates each sample (Lawless and Heymann, 2010)

Locale of the Study

The study was conducted at Eastern Samar State University – Guiuan Campus located at Brgy. Salug Guiuan Eastern Samar.

Respondents of the Study

The respondents of the study included a total of 100 individuals, with the thirty (30) selected fourth year students ten (10) from College of Business Management and Accountancy, ten (10) from College of Education and Ten (10) from College of Engineering and Technology for the pilot test, thirty (30) Faculty members in ESSU-Guiuan Campus for the Benchmark test and Ten (10) wine enthusiasts and vendors for the final test. This study used a score card to determine the acceptability of Miracle Berry Fruit Wine indicating the following criteria, flavor, appearance, texture, aroma, color and general acceptability.

Research Instrument

The researchers used a score card for the acceptability test in this study that served as a guide of the respondents' evaluation process. The evaluation used the following indicators; flavor, appearance, texture, aroma, color and general acceptability. Each indicator has a scale of 1-5. 1 is for not acceptable, 2 is for slightly acceptable, 3 is for acceptable, 4 is for highly acceptable, 5 is for extremely acceptable.

Data Collection Procedure

The researchers prepared a communication letter addressed to the campus administrator of ESSU – Guiuan where the study was conducted. After the request was approved, the researchers distributed score card to the respondents together with the product. The researchers used the purposive sampling in which the respondents were chosen based on the characteristics needed in the investigation. Then, the researchers collected the data gathered from the score card and tallied the result ready for interpretation.

Measurement of Variables

To measure the variables, the criteria below were used:

To measure the variables, the criteria below were used:

Ranges	Scale	Interpretation
4.21-5.00	5	Extremely Acceptable
3.41-4.20	4	Highly Acceptable
2.41-3.40	3	Acceptable
1.81-2.40	2	Slightly Acceptable
1.00-1.80	1	Not Acceptable

Data Analysis

The data that were gathered and tallied in order to derive the frequency and mean ratings for each of the variables considered in this study. The mean ratings were interpreted using the 5 point Likert scale namely: 5- extremely acceptable, 4- highly acceptable, 3- acceptable, 2- slightly acceptable, 1- not acceptable.

IV. RESULTS AND DISCUSSION

This chapter presents the answers to the researcher questions posed in the study based on the data gathered of the product development of Miracle Berry Fruit Wine.

Development of the Product

To develop the Miracle Berry Fruit wine, a must should be prepared beforehand. After making the must, the first step is to mix this with brown sura and stir to mix, cover bottle loosely to avoid breaking or exploding due to the pressure produced by the fermentation process. After a month, we can now tighten the lid. Keep the bottle in a safe place and away from the sunlight. After 2 months, the wine is now ready but it would be better to wait for another 5 months or more to have a better tasting miracle berry fruit wine.

Must:

To prepare the must, put lukewarm water in glass, add yeast and stir to mix and then let it stand for half an hour at room temperature. Check if some bubbles form in the surface or at the sides, if yes, then proceed to the next step. If not, then repeat the process. Add half of the pre – made sweetened juice or miracle berry fruit wine. Add cover and let it stand for 4 hours in room temperature or 1-2 degrees higher. After this, add the rest of the miracle berry, this is the remaining 50% of the sweetened juice. Lastly, cover and let stand for another 4 hours in room temperature.

Testing the Product

To determine the acceptability of the miracle berry fruit wine, the researchers conducted 3 tests, the benchmark test, the pilot test, and the final test. A scorecard with different criterion was used to test the acceptability of each indicator in the scorecard. Upon demonstrating the development of the product and giving a free taste to the respondents, the researchers handed the scorecard to determine the respondent's perception and acceptability of the product.

Pilot Test

Table 1. The Result of the Pilot Test of Miracle berry fruit wine in terms of flavor

Items	Mean	Interpretation
Trial 1	4.25	Extremely Acceptable
Trial 2	4.50	Extremely Acceptable
Trial 3	4.73	Extremely Acceptable
Total Mean	4.50	Extremely Acceptable

Table 1 shows the evaluation result of the pilot test participated by Thirty selected fourth year students ten from College of Business Management and Accountancy, ten from College of Education and Ten from College of Engineering and Technology. The researchers conducted three trials in pilot test. Each indicator has a scale of 1-5. Trial 3 got highest mean score of the flavor is 4.73 and interpreted as extremely acceptable. Trial 1 has the lowest score of 4.25 and interpreted as extremely acceptable. With an overall mean score of 4.50 and is interpreted as extremely acceptable.

Table 2. The Result of the Pilot Test of Miracle berry fruit wine in Terms of Appearance

Items	Mean	Interpretation
Trial 3	4.76	Extremely Acceptable
Trial 3	4.46	Extremely Acceptable
Trial 3	4.61	Extremely Acceptable
Total Mean	4.61	Extremely Acceptable

Table 2 shows the evaluation result of the pilot test participated by Thirty selected fourth year students ten from College of Business Management and Accountancy, ten from College of Education and Ten from College of Engineering and Technology for the pilot test the researchers conducted three trials in pilot test. Each indicator has a scale of 1-5. In trial 1 the mean score of the appearance 4.76 and interpreted as extremely acceptable. Meanwhile, Trial 2, has a mean score 4.46 and interpreted as extremely acceptable. In trial 3 mean score is 4.61 and is interpreted as extremely acceptable. With an overall mean score of 4.61 and is interpreted as extremely acceptable.

Table 3. The Result of the Pilot Test of Miracle berry fruit wine in Terms of Texture

Items	Mean	Interpretation
Trial 1	4.80	Extremely Acceptable
Trial 2	4.50	Extremely Acceptable
Trial 3	4.88	Extremely Acceptable
Total Mean	4.72	Extremely Acceptable

Table 3 shows the evaluation result of the pilot test participated by Thirty selected fourth year students ten from College of Business Management and Accountancy, ten from College of Education and Ten from College of Engineering and Technology. The researchers conducted three trials in pilot test. Each indicator has a scale of 1-5. In trial 1 the mean score of the texture 4.80 and interpreted as extremely acceptable. Meanwhile, Trial 2, has a mean score 4.50 and interpreted as extremely acceptable. In trial 3 mean score is 4.86 and is interpreted as extremely acceptable. With an overall mean score of 4.72 and is interpreted as extremely acceptable.

Table 4. The Result of the Pilot Test of Miracle berry fruit wine in Terms of Aroma

Items	Mean	Interpretation
Trial 1	4.58	Extremely Acceptable
Trial 2	4.25	Extremely Acceptable
Trial 3	4.97	Extremely Acceptable
Total Mean	4.60	Extremely Acceptable

Table 4 shows the evaluation result of the pilot test participated by Thirty selected fourth year students ten from College of Business Management and Accountancy, ten from College of Education and Ten from College of Engineering and Technology. The researchers conducted three trials in pilot test. Each indicator has a scale of 1-5. Trial 3 got highest mean score of the aroma is 4.97 and interpreted as extremely acceptable. Trial 2 has the lowest score of 4.25 and interpreted as extremely acceptable. With an overall mean score of 4.60 and is interpreted as extremely acceptable.

Table 5. The Result of the Pilot Test of Miracle berry fruit wine in Terms of Color

Items	Mean	Interpretation
Trial 1	4.25	Extremely Acceptable
Trial 2	4.75	Extremely Acceptable
Trial 3	4.32	Extremely Acceptable
Total Mean	4.44	Extremely Acceptable

Table 5 shows the evaluation result of the pilot test participated by Thirty selected fourth year students ten from College of Business Management and Accountancy, ten from College of Education and Ten from College of Engineering and Technology. The researchers conducted three trials in pilot test. Each indicator has a scale of 1-5. Trial 2 got highest mean score of the color is 4.75 and interpreted as extremely acceptable. Trial 1 has the lowest score of 4.25 and interpreted as extremely acceptable. With an overall mean score of 4.44 and is interpreted as extremely acceptable.

Table 6. Summary on the Overall Perceptions of the Respondents on Pilot Test.

Indicator	Mean	Interpretation
Flavor	4.5	Extremely Acceptable
Appearance	4.62	Extremely Acceptable
Texture	4.72	Extremely Acceptable
Aroma	4.60	Extremely Acceptable
Color	4.44	Extremely Acceptable
Total Mean	4.57	Extremely Acceptable

Table 6 reveals the result of the evaluation of the pilot test participated by Thirty selected fourth year students ten from College of Business Management and Accountancy, ten from College of Education and Ten from College of Engineering and Technology. Each indicator has the scale of 1-5. Among the parameters, texture was the highest mean score of 4.72 which means that the respondents were extremely acceptable the product. However, color was the lowest mean score of 4.44 and interpreted as highly acceptable. The overall mean in the pilot test garner the score of 4.59 and was interpreted as extremely acceptable.

Benchmark Test

Table 7. The Result of the Benchmark Test of Miracle berry fruit wine in Terms of Flavor

Items	Mean	Interpretation
Trial 1	4.89	Extremely Acceptable
Trial 2	4.93	Extremely Acceptable
Trial 3	4.91	Extremely Acceptable
Total Mean	4.91	Extremely Acceptable

Table 7 shows the evaluation result of the benchmark test participated by thirty faculty members of ESSU Guiuan Campus. The researchers conducted three trials in benchmark test. Each indicator has a scale of 1-5. Trial 2 got highest mean score of the flavor is 4.93 and interpreted as extremely acceptable. Trial 1 has the lowest score of 4.89 and interpreted as extremely acceptable. With an overall mean score of 4.91 and is interpreted as extremely acceptable.

Table 8. The Result of the Benchmark Test of Miracle berry fruit wine in Terms of Appearance

Items	Mean	Interpretation
Trial 1	4.89	Extremely Acceptable
Trial 2	4.93	Extremely Acceptable
Trial 3	4.91	Extremely Acceptable
Total Mean	4.91	Extremely Acceptable

Table 8 s shows the evaluation result of the benchmark test participated by thirty faculty members of ESSU Guiuan Campus. The researchers conducted three trials in pilot test. Each indicator has a scale of 1-5. Trial 1 got highest mean score of the appearance is 4.94 and interpreted as extremely acceptable. Trial 3 has the lowest score of 4.83 and interpreted as extremely acceptable. With an overall mean score of 4.89 and is interpreted as extremely acceptable.

Table 9. The Result of the Benchmark Test of Miracle berry fruit wine in Terms of Texture

Items	Mean	Interpretation
Trial 1	4.85	Extremely Acceptable
Trial 2	4.97	Extremely Acceptable
Trial 3	4.94	Extremely Acceptable
Total Mean	4.92	Extremely Acceptable

Table 9 shows the evaluation result of the benchmark test participated by thirty faculty members of ESSU Guiuan Campus. The researchers conducted three trials in benchmark test. Each indicator has a scale of 1-5. Trial 2 got highest mean score of the texture is 4.97 and interpreted as extremely acceptable. Trial 1 has the lowest score of 4.85 and interpreted as extremely acceptable. With an overall mean score of 4.92 and is interpreted as extremely acceptable.

Table 10. The Result of the Benchmark Test of Miracle berry fruit wine in Terms of Aroma

Items	Mean	Interpretation
Trial 1	4.70	Extremely Acceptable
Trial 2	4.92	Extremely Acceptable
Trial 3	4.96	Extremely Acceptable
Total Mean	4.86	Extremely Acceptable

Table 10 s shows the evaluation result of the benchmark test participated by thirty faculty members of ESSU Guiuan Campus. The researchers conducted three trials in benchmark test. Each indicator has a scale of 1-5. Trial 3 got highest mean score of the aroma is 4.96 and interpreted as extremely acceptable. Trial 1 has the lowest score of 4.70 and interpreted as extremely acceptable. With an overall mean score of 4.86 and is interpreted as extremely acceptable.

Table 11. The Result of the Benchmark Test of Miracle berry fruit wine in Terms of Color

Items	Mean	Interpretation
Trial 1	4.87	Extremely Acceptable
Trial 2	4.89	Extremely Acceptable
Trial 3	4.76	Extremely Acceptable
Total Mean	4.90	Extremely Acceptable

Table 11 shows the evaluation result of the benchmark test participated by thirty faculty members of ESSU Guiuan Campus. The researchers conducted three trials in benchmark test. Each indicator has a scale of 1-5. Trial 2 got highest mean score of the color is 4.89 and interpreted as extremely acceptable. Trial 3 has the lowest score of 4.76 and interpreted as extremely acceptable. With an overall mean score of 4.90 and is interpreted as extremely acceptable.

Table 12. Summary on the Overall Perceptions of the Respondents on Benchmark Test.

Indicator	Mean	Interpretation
Flavour	4.91	Extremely Acceptable
Appearance	4.89	Extremely Acceptable
Texture	4.92	Extremely Acceptable
Aroma	4.86	Extremely Acceptable
Color	4.90	Extremely Acceptable
Total Mean	4.89	Extremely Acceptable

Table 12 shows the evaluation result of the benchmark test participated by thirty faculty members of ESSU Guiuan Campus. Each parameter has the scale of 1-5. Among the parameters, texture was the highest mean score of 4.92 which interpreted as extremely acceptable, that means the respondents likes the texture of the product. Meanwhile, aroma was the lowest mean score of 4.86 which also interpreted as extremely acceptable. This means that in terms of aroma should be improve in order to attract customers through the smell of the product. The overall mean in the benchmark test got the score of 4.90 and was interpreted as extremely acceptable.

Final Test

Table 13. The Result of the Final Test of Miracle berry fruit wine in Terms of Flavor

Items	Mean	Interpretation
Trial 1	4.55	Extremely Acceptable
Trial 2	4.48	Extremely Acceptable
Trial 3	4.32	Extremely Acceptable
Total Mean	4.45	Extremely Acceptable

Table 13 shows the evaluation result of the final test participated ten wine enthusiasts and vendors in Guiuan Eastern Samar. The researchers conducted three trials in final test. Each indicator has a scale of 1-5. Trial 1 got highest mean score of the flavor is 4.55 and interpreted as extremely acceptable. Trial 3 has the lowest score of 4.32 and interpreted as extremely acceptable. With an overall mean score of 4.45 and is interpreted as extremely acceptable.

Table 14. The Result of the Final Test of Miracle berry fruit wine in Terms of Appearance.

Items	Mean	Interpretation
Trial 1	4.40	Extremely Acceptable
Trial 2	4.60	Extremely Acceptable
Trial 3	4.38	Extremely Acceptable
Total Mean	4.44	Extremely Acceptable

Table 14 shows the evaluation result of the final test participated ten wine enthusiasts and vendors in Guiuan Eastern Samar. The researchers conducted three trials in final test. Each indicator has a scale of 1-5. Trial 2 got highest mean score of the appearance is 4.60 and interpreted as extremely acceptable. Trial 3 has the lowest score of 4.38 and interpreted as extremely acceptable. With an overall mean score of 4.44 and is interpreted as extremely acceptable.

Table 15. The Result of the Final Test of Miracle berry fruit wine in Terms of Texture

Items	Mean	Interpretation
Trial 1	4.45	Extremely Acceptable
Trial 2	4.56	Extremely Acceptable
Trial 3	4.73	Extremely Acceptable
Total Mean	4.58	Extremely Acceptable

Table 15 shows the evaluation result of the final test participated ten wine enthusiasts and vendors in Guiuan Eastern Samar. The researchers conducted three trials in final test. Each indicator has a scale of 1-5. Trial 3 got highest mean score of the texture is 4.73 and interpreted as extremely acceptable. Trial 1 has the lowest score of 4.45 and interpreted as extremely acceptable. With an overall mean score of 4.58 and is interpreted as extremely acceptable.

Table 16. The Result of the Final Test of Miracle berry fruit wine in Terms of Aroma

Items	Mean	Interpretation
Trial 1	4.22	Extremely Acceptable
Trial 2	4.30	Extremely Acceptable
Trial 3	4.98	Extremely Acceptable
Total Mean	4.50	Extremely Acceptable

Table 16 shows the evaluation result of the final test participated ten wine enthusiasts and vendors in Guiuan Eastern Samar. The researchers conducted three trials in final test. Each indicator has a scale of 1-5. Trial 3 got highest mean score of the aroma is 4.98 and interpreted as extremely acceptable. Trial 1 has the lowest score of 4.22 and interpreted as extremely acceptable. With an overall mean score of 4.50 and is interpreted as extremely acceptable.

Table 17. The Result of the Final Test of Miracle berry fruit wine in Terms of Color

Items	Mean	Interpretation
Trial 1	4.58	Extremely Acceptable
Trial 2	4.60	Extremely Acceptable
Trial 3	4.52	Extremely Acceptable
Total Mean	4.56	Extremely Acceptable

Table 17 shows the evaluation result of the final test participated ten wine enthusiasts and vendors in Guiuan Eastern Samar. The researchers conducted three trials in final test. Each indicator has a scale of 1-5. Trial 2 got highest mean score of the color is 4.60 and interpreted as extremely acceptable. Trial 3 has the lowest score of 4.52 and interpreted as extremely acceptable. With an overall mean score of 4.56 and is interpreted as extremely acceptable.

Table 18. Summary on the Overall Perceptions of the Respondents on Final Test.

Indicator	Mean	Interpretation
Flavor	4.45	Extremely Acceptable
Appearance	4.46	Extremely Acceptable
Texture	4.58	Extremely Acceptable
Aroma	4.5	Extremely Acceptable
Color	4.56	Extremely Acceptable
Total Mean	4.51	Extremely Acceptable

The table 18 shows the evaluation result of the final test participated ten wine enthusiasts and vendors in Guiuan Eastern Samar. Each parameter has 1-5 scale. Among of the parameters, appearance and general acceptability was the highest mean score of 4.61 which is interpreted as extremely acceptable. This means that the respondents of the final test are pleased with the appearance they feel whenever they drink the miracle fruit wine. In the other hand, the indicator Flavoring ranked lowest among the group and was rated 4.45 but still, interpreted as an extremely like. This just proves that in terms of flavoring, the researcher's needs to improve the flavor of the product enable to become more palatable for the target customers.

Overall Mean Result

Table 19. Overall Perception of Respondents for Miracle berry fruit wine.

Items	Benchmark Test	Pilot Test	Final Test	Overall Result	Interpretation
Flavour	4.50	4.91	4.45	4.62	Extremely Acceptable
Appearance	4.81	4.89	4.46	4.65	Extremely Acceptable
Texture	4.72	4.92	4.58	4.74	Extremely Acceptable
Aroma	4.80	4.88	4.5	4.65	Extremely Acceptable
Color	4.44	4.90	4.56	4.63	Extremely Acceptable
General Acceptability	4.72	4.95	4.81	4.78	Extremely Acceptable
TOTAL	27.59	29.43	27.16	28.05	Extremely Acceptable
Grand Mean	4.59	4.90	4.52	4.67	Extremely Acceptable

Table 19 shows the overall perception on a sensory evaluation result of the respondents. For the pilot test it has a total mean score of 4.59 with corresponding interpretation of extremely acceptable; the benchmark test has a total mean score of 4.90 with corresponding interpretation of extremely acceptable; the final test has a total mean score of 4.52 with corresponding interpretation of highly acceptable. This means that the respondents of Eastern Samar State University Guiuan Campus rated the product development known as the Miracle berry fruit wine to be extremely acceptable.

General Acceptability of Miracle berry fruit wine

Table 20. The Result of the Pilot Test of Miracle berry fruit wine in Terms of General Acceptability

Items	Mean	Interpretation
Trial 1	4.70	Extremely Acceptable
Trial 2	4.82	Extremely Acceptable
Trial 3	4.64	Extremely Acceptable
Total Mean	4.72	Extremely Acceptable

Table 20 shows the evaluation result of the pilot test participated by thirty selected fourth year students ten from College of Business Management and Accountancy, ten from College of Education and Ten from College of Engineering and Technology. The researchers conducted three trials in pilot test. Each indicator has a scale of 1-5. Trial 2 got highest mean score of the general acceptability is 4.84 and interpreted as extremely acceptable. Trial 3 has the lowest score of 4.64 and interpreted as extremely acceptable. With an overall mean score of 4.72 and is interpreted as extremely acceptable.

Table 21. The Result of the Benchmark Test of Miracle berry fruit wine in Terms of General Acceptability

Items	Mean	Interpretation
Trial 1	4.90	Extremely Acceptable
Trial 2	4.98	Extremely Acceptable
Trial 3	4.97	Extremely Acceptable
Total Mean	4.95	Extremely Acceptable

Table 21 shows the evaluation result of the benchmark test participated by thirty faculty members of ESSU Guiuan Campus. The researchers conducted three trials in benchmark test. Each indicator has a scale of 1-5. Trial 2 got highest

mean score of the general acceptability is 4.98 and interpreted as extremely acceptable. Trial 1 has the lowest score of 4.90 and interpreted as extremely acceptable. With an overall mean score of 4.95 and is interpreted as extremely acceptable.

Table 22. The Result of the Final Test of Miracle berry fruit wine in Terms of General Acceptability

Items	Mean	Interpretation
Trial 1	4.49	Extremely Acceptable
Trial 2	4.63	Extremely Acceptable
Trial 3	4.71	Extremely Acceptable
Total Mean	4.61	Extremely Acceptable

Table 22 shows the evaluation result of the final test participated by wine enthusiasts and vendors of Guiuan Eastern Samar. The researchers conducted three trials in final test. Each indicator has a scale of 1-5. Trial 3 got highest mean score of the general acceptability is 4.71 and interpreted as extremely acceptable. Trial 1 has the lowest score of 4.49 and interpreted as extremely acceptable. With an overall mean score of 4.61 and is interpreted as extremely acceptable.

V. SUMMARY, CONCLUSIONS AND RECOMMENDATION

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

Summary of Findings

The study determined the sensory of acceptability of Miracle Berry Fruit wine with the following objectives:

1. Develop a new flavor of wine
2. Evaluate the acceptability level of the miracle fruit wine through the following indicator:

Flavor
 Appearance
 Texture

Aroma
 Color

3. Determine the general acceptability of the miracle fruit wine.

This study determined the sensory acceptability of Miracle berry fruit wine based on commercial flavor for making wine.

The development of miracle berry fruit into wine is evident to the following characteristics: flavor, appearance, texture, aroma, color, and general acceptability.

A total of 100 individuals considered as the respondents of the study. Thirty selected fourth year students ten from College of Business Management and Accountancy, ten from College of Education and Ten from College of Engineering and Technology for the pilot test, thirty Faculty members in ESSU-Guiuan Campus for the Benchmark test and Ten wine enthusiasts and vendors for the final test.

A score card was used as an instrument to determine the acceptability of the consumers. To quantify the responses, mean was used to know the acceptability of Miracle berry fruit wine in terms of flavor, appearance, texture, aroma color and general acceptability.

The pilot test was participated by Thirty selected fourth year students ten from College of Business Management and Accountancy, ten from College of Education and Ten from College of Engineering and Technology. Each indicator has the scale of 1-5. Among the parameters, texture was the highest mean score of 4.72 which means that the respondents were extremely like the product However color was the lowest mean score of 4.44 and interpreted as extremely like. The overall mean in the pilot test garner the score of 4.59 and was interpreted as extremely like. This means that during the pilot testing, the acceptability of the miracle berry fruit wine had been tested and approved by the respondents in the said test.

In the benchmark test, among the parameters, texture was the highest mean score of 4.92 which interpreted as extremely like, that means the respondents likes the texture of the product.

Meanwhile, aroma was the lowest mean score of 4.86 which also interpreted as extremely like. This means that in terms of aroma should be improve in order to attract customers through the smell of the product. The overall mean in the benchmark test got the score of 4.90 and was interpreted as extremely like. The overall mean in the benchmark test garner the score of 4.90 and was interpreted as extremely liked.

Moreover, during the Final Test, appearance and general acceptability was the highest mean score of 4.61 which is interpreted as extremely like. This means that the respondents of the final test are pleased with the appearance they feel whenever they drink the miracle berry fruit wine. In the other hand, the indicator Flavoring ranked lowest among the group and was rated 4.45 but still, interpreted as an extremely like. This just proves that in terms of flavoring, the researcher's needs to improve the flavor of the product enable to become more palatable for the target customers. This just proves that in terms of flavoring, the researcher's needs to develop more designs in able to give life of packaging that would attract more target customers.

Conclusion

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

Based in the result of the test conducted, Miracle berry fruit wine was extremely liked by the consumer. Miracle berry fruit wine is not only for adults but also for children, and for everyone who seeks pleasure and new flavor in drinking wine. Therefore, miracle berry fruit is not only used for decoration but based on the result of our study miracle berry fruit is also acceptable as a wine byproduct.

Recommendation

Based on our conclusion the following recommendation is drawn:

1. To the future researchers may conduct another research using miracle berry fruit as an ingredient.

2. Another experimentation should be done to test if the miracle fruit wine can be fermented for longer than 5 to 6 months and if this should improve the general acceptability of the product.
3. Better presentation on the over all appearance of the finished product including the packaging to aid in the overall acceptability of the product.
- 4.

REFERENCES

- Agbenorhevi, J., et.al. (2019) Quality of Miracle Berry Wine as Influenced by pH and Inoculum Levels. *Journal of Food and Nutrition Research*. 7 (2): 148 – 154. DOI: 10.12691/jfnr-7-2-7
- Collins Disctionary (2021). Texture. Retrieved on December 25, 2021 on the website <https://www.collinsdictionary.com/dictionary/english/texture>
- Dictionary.com (2021) Appearance. Retrieved on December 25, 2021 on the website [.https://www.dictionary.com/browse/appearance](https://www.dictionary.com/browse/appearance)
- Lexico.com (2021). Acceptability. Retrieved on December 25, 2021 on the website <https://www.lexico.com/definition/acceptability>
- Lipatova, O. and Matthew M. Campolattaro, (2020). The Miracle Fruit: An Undergraduate Laboratory Exercise in Taste Sensation and Perception. *Journal of Undergraduate Neuroscience Education*.
- Merriam -Webster (2021) . Aroma. Retrieved on December 25, 2021 on the website <https://www.merriam-webster.com/dictionary/aroma>
- Merriam -Webster (2021) . Color. Retrieved on December 25, 2021 on the website <https://www.merriam-webster.com/dictionary/color>

- Merriam -Webster (2021) . Flavor. Retrieved on December 25, 2021 on the website <https://www.merriam-webster.com/dictionary/flavor>
- Merriam -Webster (2021) . Taste. Retrieved on December 25, 2021 on the website <https://www.merriam-webster.com/dictionary/taste>
- Merriam -Webster (2021) . Wine. Retrieved on December 25, 2021 on the website <https://www.merriam-webster.com/dictionary/wine>
- Polistico, Edgie. (2021). Miracle Fruit. *Philippine Food Illustrated*. Retrieved from the website <https://pinoyfoodillustrated.blogspot.com/2018/06/miracle-fruit.html> on December 26, 2021
- Tacio, H. (2015). Calabash the Miracle Fruit. *Health and Fitness*. Retrieved from the website buisnessmirror.com.ph on December 27, 2021
- Yamamoto, K, et.al. (2016) Development of Calabash (*Crescentia cujete*) mocktail. *University of Cebu Thesis / Dissertations*. Retrieved from the website herdin.ph on December 27, 2021