



PHYSICO-CHEMICAL AND SENSORY EVALUATION OF
GUMAMELA (*HIBISCUS ROSA SINENSIS LINN*) WINE

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ABSTRACT

The purpose of this study was to evaluate the Gumamela *Hibiscus Rosa Sinensis* Linn Wine in three treatments with the goal of developing a plan of action. This study was conducted in President Carlos Polestico Garcia Technical Vocational School of Fisheries and Arts at Puerto San Pedro Bien Unido, Bohol. Respondents were chosen according to the purpose of the study. They were grouped accordingly to their age bracket. Age from 18-29 were composed of 25 persons; 15 boys and 10 girls, age 30-45 were grouped of 25 teachers and lastly age 46-above were grouped of drunkards. This study made use of the experimental research design employing the score sheet as a data gathering instrument. The questionnaire was used by the researcher. Furthermore, the study determined the profile of gumamela wine in terms of ingredients, tools and equipment procedure, cost, its alcohol content, total sugar and titrability acidity. It also determined whether the gumamela wine is acceptable in terms of its taste, aroma and color. The researcher passed first the wine sample to the First Analytical Services and Technical Cooperative (F.A.S.T) Laboratory for content testing in terms of alcohol content, the total sugar, and the acidity. Further, the researcher should promote the recipe to the community especially in the neighboring barangay for livelihood programs and to the local government unit for tourism support.

Keywords: Gumamela, *Hibiscus Rosa Sinensis*, alcohol content, total sugar and titrability acidity

INTRODUCTION

Man is a complex being. He has various needs that should be satisfied. It is also the nature of man to look for ways to answer his necessities. This study is anchored in the Philosophy of Hedonism which emphasizes pleasure, contentment, and satisfaction as necessities of human life. The main regard of Psychological Hedonism is that actual choices are made in order to obtain pleasure and holds that it is an essential aspect of human nature to seek pleasure. This theory is also used in any production company in meeting the needs and satisfaction of the customers (Ingking, 2006).

Wine is a fermented plant juice product that is consumed as a stimulating beverage. It has been a favorite beverage among humans for countless years. The exchange of wine between cultures created pathways for the dissemination of intellectual and theological ideas throughout

Europe. The Bible constantly makes reference to wine, from Noah and his grapevines through Jesus, who is considered to be the best winemaker to date. Wine has historically played a significant role, as seen by the Catholic Church's usage of the beverage as a replacement for the blood of Christ. A wine business was historically regarded as a sign of a developed nation because only such societies could sustain a thriving and competitive wine industry. It is frequently asserted that wine served as the cornerstone of western culture (Goldberg KD, 2011).

There are various sorts of wine. Table wines, often known as still or natural wines, come first. They are available in three hues: red, white, and rose. Second, there are the aromatic wines, which are prepared in the same manner as natural wines but with the addition of fragrant during fermentation. Third, red wines made from "black" (red-colored) grapes that included the skin during fermentation. Fourth, the rosé wines are blush pink or pink in hue. Red and white wines are blended to give wine its pink hue. Most rosé wines are usually light and moderately sweet. Fifth, the extremely sweet dessert wines that are served with or in place of dessert. The sixth and last category of wines are fortified wines, which are wines that have brandy or other spirits added during the fermentation process. In actuality, wine plays a significant role at every meal (Gatchalian, 2003).

In connection to the given facts above, this study anchored on the "Three Laws of Spiritual Healing" by Streetman, 2009. According to the Law of Similar Form, plants exhibit physical traits that are reminiscent of the organs in our bodies. According to the shaman Don Juan, every organ in a person's body is represented someplace in the plant kingdom, which implies that every bodily part is reflected in plants, and that part of the plant will heal to a comparable form to that of our body.

Additionally, according to the Law of Equality, no plant is more potent than another and all plants have medical benefits. They are all on par. This statement proves that all plants have an equal medicinal capacity to cure a specific illness.

According to the Law of Due Reward, all activities taken toward plants and animals shall be appropriately repaid. This means that all things that are done by human beings to the plant will return to human being in due time. Therefore, people are using them as useful one, then at a right time it will have desirable effect.

Wine has a number of health advantages, including a lower risk of depression, a lower risk of colon cancer, anti-aging, a lower risk of breast cancer, a lower risk of dementia, improved lung function from antioxidants, a lower risk of coronary heart disease, healthier blood vessels in the elderly, a lower risk of cancer cells, clean arteries, a lower risk of ovarian cancer, stronger bones, and a lower risk of heart attack for men with high blood pressure.

Nonetheless, the production of wine needs a process. This process is called fermentation. According to Jacob (2006), fermentation occurs when specific types of food are allowed to stand in a warm, dark environment. The food is referred to as fermenting because it goes through chemical changes and frequently releases gas as a result. The Latin term for ferment is *fervere*, which means "to boil" where yeast acts as catalyst and mediator through a series of reaction that converts sugar into alcohol. Fruit juices serve as a base for many different alcoholic and non-alcoholic drinks. Fortunately for the ancient drinkers, however, the range of wine available fairly limited. Today, there are tens of thousands of different labels and bottles to choose from. All sorts

of winemakers are busily using all sort of grapes and methods to produce all sorts of wine. Some so-called white wines are the color of liquid gold, while others are pale enough almost to be mistaken for water; redwines likewise range in hue from violet-red to almost black. There are strong wines and weak ones; still wines and fizzy ones; sweet wines and dry ones; wine that tastes of litchsand wines that smell of freshly ground pepper.

The idea of making wine was spread through imitations and colonization. These Philippine wines however, have found their way into the international market although they have to be qualified as non-grape wines. The region's unique environment and culture, however, support ongoing local wine production. Many nations throughout the world that have access to these tropical trees make tuba, also known as palm wine, which is created from the sweet sap of palm trees. Lambanog is a high-proof beverage made from coconut flowers that is more closely related to a spirit in nature than wine. Strawberry wine has gained popularity in the Philippines, especially in the Baguio region. It is a light pink, sweet nectar. Tapuy- this comes from fermented rice wine. Basi - from fermented sugar cane wine.

The most common varieties of wine produced in the Philippines use the tropical fruit, rice, sugar cane, and coffee that are plentiful there. Philippine wineries use widely available botanicals to create a variety of wines. With this, researcheris driven to produce wines from other flower extracts specifically from the gumamela flower. Since the Philippines is abundant with different types of flower, the researcher has come up with the gumamela flower extract Hibiscus Rosa Sinensis Linn as a source or the main ingredient in making wine.

Gumamela is largely cultivated as ornamentals for its colorful flowers. It is also planted as a hedge. It is a shrub that typically reaches heights of 1 to 4 meters. Hibiscus is a sturdy, adaptable plant that may improve the appearance of any garden in tropical climates. Due to its adaptability, it may readily grow in pots as a creeper or even in hanging pots and adapts to balcony gardens in crowded metropolitan areas. It is a perennial that blooms all year long. It's a plant that may bring color and vibrancy to any garden because it comes in a variety of hues.

The hue of this flower can range from red to yellow to orange to white, purple, pink, and various color combinations. The five-petalled hibiscus is said to have therapeutic qualities. The roots contain mucilage, which calms the mucous membranes of the digestive and respiratory tracts, while the blooms are said to be astringent. Expectorant, diuretic, anti-infectious, anti-inflammatory, antipyretic, anodyne, and refrigerant are further medical uses for it.

Hibiscus rosa-sinensis Linn, often known as gumamela, is a shrub that can reach heights of one to four meters and is grown for its decorative qualities. Additionally, it is axillary, solitary, and enormous, measuring 12 centimeters in diameter and 10 cm in length. The outermost series of bracteoles are six, lance-shaped, green, and no longer than eight millimeters. Green, 2-centimeter-long calyx with oval lobes. The petals are imbricate, obovate, whole, red, orange, or rose-white in color. Stamens create a lengthy staminal tube that extends from the flower and encloses the entire style of the pistil. Five styles are united below each five-celled ovary. Fruits are capsules with five loculicidal valves, however they are rarely produced in agriculture. Glossy green, ovate, acuminate, pointy, coarsely serrated, alternating, stipulate leaves are 7 to 12 cm long.

This herbal plant five-petalled hibiscus is known to have therapeutic qualities. The roots contain mucilage, which calms the mucous membranes of the digestive and respiratory tracts, while the blooms are said to be astringent. Antioxidant, antipyretic, analgesic, and spasmolytic are all terms used to describe proanthocyanidins. hisbiscetin, polyphenols, flavonoids, anthocyanins, calcium oxalate, thiamine, riboflavin, niacin, and ascorbic acid have all been found in flowers. In addition to treating bronchitis, coughs, sore throats, fever, dysentery, urinary tract infections, and bladder infections, these properties also aid in the healing of wounds, immune-modulation, blood pressure reduction, prevention of constipation, headaches, swelling & abscesses, and mumps (Quisumbing, 1978).

OBJECTIVES

This study's primary goal was to evaluate the acceptability and content of gumamela wine. The study was conducted at President. Carlos Polestico Garcia Technical Vocational School of Fisheries and Arts at Puerto San Pedro, Bien Unido, Bohol

It specifically seeks to respond to the following queries:

1. What are the characteristics of gumamela wine:
 - 1.1 components and price
 - 1.2 instruments and apparatus;
 - 1.3 procedure;
 - 1.4 alcohol content,
 - 1.5 total sugar; and
 - 1.6 titrable acidity?
2. What is the acceptability level of wine based on different age bracket of respondent in relation to:
 - 2.1 taste;
 - 2.2 smell;
 - 2.3 color;
 - 2.4 overall liking?
3. Does the variable age range of the taste products significantly affect the level of acceptability of wine in the four sensory attributes?

RESEARCH METHODOLOGY

Research Design

The researcher utilized the experimental research design. The researcher conducted an experiment to produce gumamela wine and to test on acceptability in terms of taste, aroma and color.

Research Environment

The researcher chose the people residing in Puerto San Pedro, Bien Unido, Bohol as the respondents since it is accessible to that place since he is teaching there. And it has many gumamela flower planting along the street.

Purposive sampling was utilized by the researcher to select the respondents. They were grouped according to their age bracket. Age from 18-29 were composed of 25 person; 15 boys

and 10 girls, age 30-45 were composed of 25 teachers, and lastly, age 46-above were grouped of 25 drunkards. Age grouping was done because ones perception differs with age. As one gets older, many changes happen to one's senses. With the sense of taste, the number of taste buds decreases as one ages.

Components and Price

Ingredients refer to the needed materials to form a recipe, which is classified into two forms: liquid and solid ingredients. The three treatments of Gumamela Wine used the ingredients of 2 cups of water, 1 cup of sugar, 1 tablespoon of yeast and 50 fresh flowers of native gumamela. For the costing, T1, T2, and T3 had the same amount which is Thirty Nine Pesos (Ph39). The Php 20.00 is for 1 cup sugar, Php 5.00 for 1 tablespoon yeast and Php 4.00 for 2 cups of water and Php 10.00 for 50 pieces of native gumamela flower so a total of Php 39.00 only for each treatment.

Instrument

The researcher utilized a scoring sheet to gauge the respondents' opinion about the acceptability of the gumamela wine. This also contains levels of acceptability with respect to the product taste, aroma, smell, overall liking and general acceptability. It was in a checklist form wherein the respondents would simply check the 4-point hedonic scale from 4- like extremely, 3- like, 2- dislike, and 1- dislike extremely.

Instruments and Apparatus

The following resources were used by the researcher to carry out the study: measuring spoon and cups, knife, kettle, stove, ladle, cheesecloth, funnel, and sterilized bottles.

Procedure and Data Gathering

Phase I- Preparation of the Gumamela wine

To obtain the data of the study, the researcher prepared and conducted the experiment in making gumamela wine through following procedures.

Step 1 – Wash the fresh gumamela flower, discard the sepals.

Step 2 – Bring to a boil in a bowl with 2 cups of water, then simmer for about 10 minutes.

Step 3 – In a non-metallic container, strain the juice. Step 4 – Remove and measure 1 3/4 cups of juice.

Step 5 – Add 1-cup sugar into a juice. Bring to boil. Put it in a clean and dry wine bottle. Step 6 – Sprinkle yeast, allow it to float on top of the mixture. Cover the bottle with a clean dishtowel and let it ferment for about one week.

Step 7- Strain the wine in cheesecloth once fermentation stops or when no bubbles can be seen in the wine.

Step 8 – Strain the wine once more. This time it is ready for bottling. Phase

II- Aging the Gumamela Wine

After conducting the trials, the researcher gathered the data and interpreted the trials to determine which trial is more liked by the respondents. And the trial that is more liked will be the one to undergo ageing for one month, two months and three months.

Phase III- Tasting the product and answering the score sheet

After ageing, the researcher asked the respondents to rate the different ages of gumamela wine. The researcher meets personally the respondents. The gumamela wine was distributed among the respondents for tasting. Each respondent tasted gumamela wine. The respondents answered the questionnaires were collected immediately after tasting session.

Statistical Treatment

To interpret the data, the researcher made a thorough analysis of the data. The researcher got the Average Weighted Mean to determine the acceptability of the different treatments of gumamela wine in terms of taste, aroma, and color

RESULTS AND DISCUSSION

Physico-Chemical Result of Gumamela Wine

Content	Treatment	Gumamela Percentage	Wine
Alcohol Content	T1	5.03	
	T2	7.82	
	T3	8.29	
Total Sugar	T1	11.18	
	T2	11.79	
	T3	11.74	
Trirability Acidity	T1	0.48	
	T2	0.36	
	T3	0.42	

Alcohol content

Another way to describe alcohol concentration is as a proportion of the entire beverage. You can find the percentage of alcohol by volume, followed by the acronym "ABV" (alcohol by volume), or sometimes just the word "vol," on wine bottles and beer cans. The recommended percentage of wines are; 12.5% and under is low alcohol content , 12.5%–13.5% is medium alcohol content, 13.5%–14.5% is medium-high alcohol content , 14.5% and up is considered as high alcohol content that is according to the Winefolly.

In the case of the three treatments of Gumamela wine, the T3 or the wine fermented in three months got the highest percent of alcohol content which is 8.29 percent, T2 (fermented in 2 months)has 7.82 percent which ranked second and T1 has 5.03 percent of alcohol content which is the lowest in rank.

Sugar Content

It shows that T2 or the wine fermented in 2 months got the highest percentage of total sugar which is 11.79 percent,T3 (fermented in 3 months) has 11.74 percent which ranked second and T1 has 11.18 percent of the total sugar which is the lowest in rank. As shown in the Table 2, T2 got little bit higher percentage than T3 when in fact, the researcher used only 1 cup of sugar. Thus, the total sugar in every treatment is closely ofthe same percentage.

Titribility Acidity

T1, T2 and T3 had 0.48, 0.36, and 0.42 percent respectively in terms of tritribilityacidity. It shows that the three treatments had closely of the same percentage in terms ofacidity even if they were not the same months of aging.

In the case of Gumamela wine which can be considered as non-grape wine, the treatments contain less than 0.50-0.60 percent but very close to it since T1 had 0.48, T2had0.36 and T3 had 0.42 percent

Acceptability Level of the Different Ages

Sensory	Weighted Mean								
	Trials	Ages (18-29)	Description	Ages (30-45)	Description	Ages (46-above)	Description	Average weighted Mean	Rank
Taste	T ₃	3.04	(L)	3.36	(LM)	3.16	(L)	3.18	3
	T ₂	3.44	(LM)	3.24	(L)	3.56	(LM)	3.41	2
	T ₁	3.56	(LM)	3.36	(LM)	3.4	(LM)	3.44	1
Smell	T ₃	3.32	(LM)	3.36	(LM)	3.2	(L)	3.29	3

	T ₂	3.4	(LM)	3.4	(LM)	3.44	(LM)	3.41	2
	T ₁	3.6	(LM)	3.4	(LM)	3.48	(LM)	3.49	1
Color	T ₃	2.6	(L)	3.04	(L)	2.92	(L)	2.85	3
	T ₂	3.56	(LM)	3.56	(LM)	3.44	(LM)	3.52	2
	T ₁	3.72	(LM)	3.52	(LM)	3.48	(LM)	3.57	1
Overall Liking	T ₃	3.48	(LM)	3.28	(LM)	3.20	(LM)	3.32	3
	T ₂	3.68	(LM)	3.56	(LM)	3.56	(LM)	3.60	1
	T ₁	3.64	(LM)	3.48	(LM)	3.48	(LM)	3.53	2

Acceptability Level of the Three Treatments of Gumamela Wine Taste

In terms of taste as shown in the table, T₁ gained the weighted mean of 3.56, 3.36 and 3.4 respectively among the three groups of respondents with the description of “like much”. And it also ranked first in the average weighted mean of 3.44 among the three treatments. It means that the respondents liked much the wine aged in 1 month. So the result negates the theory that the older the wine, the better it would taste because in this case the Gumamela wine aged in 1 month ranked first.

Smell

As shown in the table, the three treatments had similar descriptive rating, though it differed on the numerical ratings. The average weighted mean of the T₁ was 3.49, described as “like much” which is higher than those of T₂ and T₃ whose weighted mean were 3.41 and 3.29 accordingly.

Color

The three gumamela wine treatments differ in terms of the color acceptance level, T₁ had the same descriptive rating of “like much” but slightly different in numerical rating with the weighted average of 3.72, 3.52, 3.48 and ranked #1 with respect to an average weighted average of 3.57, as described “like much”. The same with the T₂, the respondents in different ages “like much” also the color of the treatment. The weighted mean in different ages was 3.56, 3.56 and 3.44 accordingly as described “like much” with the average weighted mean of 3.52. This means that the respondents in all ages “like much” the color of T₁ and T₂ which looked like a red wine in color.

Moreover, T₃ gained the weighted mean of 2.6, 3.04 and 2.92 respectively as described “like” in all different ages. It implies that the respondents slightly like the color of T₃ which has a pale color and brownies hue with the average weighted mean of 2.85, describe as “like”.

Overall liking

In overall liking, the same table shows that the respondents in all different ages liked the three treatments with the description of “like much”. T1 gained the weighted mean of 3.64, 3.48 and 3.48 respectively which described “like much” by the respondents. The same with the T1, the T2 has a descriptive rating of “like much” in all different ages with the weighted mean of 3.68, 3.56 and 3.56 accordingly. While T3 has a weighted mean of 3.48 and 3.28 as described “like much” of the respondents ages 18-35 and 46- above, while ages 46-above has a weighted mean of 3.2, as described “like” by the respondents.

It implies that the respondent slightly liked the treatment in terms of the three sensory attributes which are the taste, aroma and color of the gumamela wine.

Difference in the Acceptability Level of the Three Treatments of Gumamela Wine

Attributes	P-value	5% Level of Significant	Decision
Taste	0.04	0.05	Significant
Aroma	0.06	0.05	Insignificant
Color	0.0000000005	0.05	Significant
Overall liking	0.01	0.05	Significant

The table shows the variance in Gumamela Wine's acceptability level in terms of taste, smell, color and overall liking based on the three treatments. It was reflected in the findings that the P-value of 0.04 was lesser than the 0.05 level of significant in terms of taste which means found the three treatments' tastes differed significantly from one another. In terms in aroma, the P-value of 0.06 was higher above the threshold of 0.05 significant which showed no difference on the three treatments. In addition, in terms of color and overall liking the P-value of 0.0000000005 and 0.01 was lesser than the significant at 0.05. Therefore, the null hypothesis is disproved, which means that there is significant difference of color and overall liking in the three treatments.

CONCLUSION

The level of acceptability of the three treatments varied significantly to its months they aged. The respondents liked much the Gumamela wine aged at 1 to 2 months. Ageing affects the acceptability of the gumamela wine. Generally Gumamela wine is acceptable.

RECOMMENDATION

- The researcher may promote the recipe in making gumamela wine especially in the neighboring barangays for the livelihood programs and to the local government unit for the tourism support.
- The campus may support for the mass production of the product and improve the bottling and labelling of the product to attract the costumers and buy the product as “pasalubong”.
- The campus may also support for the evaluation of the product with Department of Science and Technology for evaluation of other nutrients.
- Improve the tritrability acidity.
- Other researcher may conduct parallel study to verify the results of this study.

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