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Level of Acceptability of Karondas Berry (Carissa Carandas) as Wine

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Abstract

This experimental study was aimed to determine the level of acceptability of Karondas Berry as wine in terms of its aroma, color, flavor and general acceptability. A standard sensory evaluation score sheet using a modified Hedonic scale was used by the 45 respondents to assess the acceptability of Karondas Berry as wine. Statistically, mean was used to determine the level of acceptability of Karondas Berry wine as to aroma, color, flavor and general acceptability while One-way Analysis of Variance (ANOVA), set at .01 alpha, was used to find out the significant difference in the level of acceptability of Karondas Berry wine as to aroma, color, flavor and general acceptability. Results revealed that the color and aroma of the three treatments (treatment A, B, and C) were "Liked Very Much" by the respondents. However, they extremely liked the formulation of treatment D (commercial wine) among the categories. In terms of flavor and general acceptability, both treatment A and C were "Liked Very Much". On the other hand, Treatment B were only "Liked Moderately", and that treatment D was the most liked among the four formulations. However, when treatment D is disregarded, treatment C has the highest acceptability level among the rest of the treatments. Thus, this treatment has a higher potential for mass production and market distribution. Results also showed that there was a significant difference in three formulations of Karondas Berry Wine in terms of color, aroma, flavor and general acceptability. This means that the amount of Karondas Berry Juice mixed in the formula produces different color, aroma, and flavor, hence, can affect the likability of the formulation. It is recommended that Karondas Berry Wine can be introduced to the market and can be a good venture for income generation and augment family income.

Keywords: Karondas Berry, wine, hedonic scale, level of acceptability, aroma, color, flavor

INTRODUCTION

Wine is an alcoholic drink produced from fermented grapes. The production and consumption of wine saw significant growth starting in the 15th century, coinciding with European expansion. In Jewish traditions, wine has been used in rituals since Biblical times, and its role became even more prominent in the Christian Church during the Eucharist, which commemorates Jesus's Last Supper. Archaeological evidence suggests that the earliest possible use of grapes in a fermented beverage, combined with rice and honey, dates back around 9,000 years in China. Approximately two millennia later, the seeds of what would become the European winemaking tradition began to sprout in western Asia.

According to Dr. Serge Renaud, a nutritionist, the notably low incidence of coronary heart disease in southern France can be attributed to the presence of antioxidants in wine, which help disperse the cholesterol that accumulates in arteries. Among alcoholic beverages, red wine is a fermented grape juice that is considered more advantageous than others, including white wine, possibly due to its higher polyphenol content. Although alcohol is generally a pro-oxidant, when combined with other ingredients like grapes, it exhibits overall antioxidant properties (Kaye et al., 2006).

The Karondas Berry, scientifically known as Carissa carandas, is a flowering shrub in the dogbane family, Apocynaceae, recognized by various names across different regions. This hardy, drought-resistant plant thrives in diverse soil conditions and grows naturally in the Himalayas at elevations ranging from 300 to 1,800 meters, as well as in the Siwalik Hills, the Western Ghats, Nepal, and Afghanistan. It flourishes particularly well in areas with high temperatures (Jadhav, 2022).

Karondas Berry has a rich history in traditional Indian medicine. Communities in the Western Ghats utilize the fruit to stabilize blood sugar levels and protect against liver damage. The

National Bureau of Plant Genetic Resources notes that various groups have employed the fruit to address a range of health issues, including biliousness, as an astringent, to combat anemia, parasites, worms, fungal infections, diarrhea, and skin ailments, as well as for fevers, ear infections, and as insect repellents. The fruit has attracted interest from multiple researchers (Gopala et al., 2021).

It is noted that the Karondas Berry offers significant nutritional benefits for consumers. Researchers have developed a wine specifically from this berry and aim to assess its acceptability compared to commercial wines in terms of color, aroma, flavor, and overall enjoyment.

This experimental study is based on the product innovation theory proposed by Wirtschaftlichen Entwicklung in 1912, which defines product innovation as the development or adoption of new concepts or ideas, as well as the successful implementation of these new ideas. Creativity involves generating ideas, while innovation refers to putting those ideas into practice. Creativity manifests when the innovator takes an idea and transforms it into reality. Successfully leveraging new ideas can lead to various forms of enhancement.

By doing so, the results of the study would be of great help to the bartenders to widen their knowledge in making other drink recipes made out of Karondas Berry wine and other ingredients. This study would also help the drinkers to choose the right beverages that suit to their taste. Educational institution would also benefit from the study by having this product patented to the institutions' name and sold to the market. The study will also have a great impact to the Food and Beverage Industry in terms of income generation. Lastly, the study would give an idea to future researchers on the uses of other fruits such as Karondas Berry and for their future undertakings.

LITERATURES

Wine Production and Sensory Evaluation. Wine production and sensory evaluation are crucial aspects of oenology. The history of wine production dates back to the Near East, spreading to the Mediterranean and Central Europe (Jackson, 2020). From latin word (vinum), is an alcoholic beverage made from fermented grapefruit from a specific vine named Vitis Vinifera or crosses with Vitis Labrusca or Vitis Rupestris. In some places like Japan, the word wine refers also to the product of fermentation of other fruits or cereals, like rice. Due to a natural chemical balance, grapes ferment without the addition of sugars, acids, enzymes, water, or other nutrients. Yeast consumes the sugar in the grapes and converts it to ethanol and carbon dioxide. Different varieties of grapes and strains of yeasts produce different styles of wine. These variations result from the complex interactions between the biochemical development of the grape, the reactions involved in fermentation, subsequent appellation and with human intervention in the overall process.

Wine has been produced for thousands of years. The earliest evidence of wine to date was found in the country of Georgia, where 8000-year-old wine jars were uncovered. Throughout history, wine has been consumed for its intoxicating effects, which are evident at normal serving sizes. Wines made from produce besides grapes include rice wine and innumerable fruit wines, of which some of the best-known are pomegranate wine, apple wine and elderberry wine.

Sensory evaluation techniques have evolved to provide unbiased, statistically analyzable data on wine characteristics, quality, and consumer preferences (Lesschaeve & Noble, 2022). In conducting analytical sensory tests, it is crucial to eliminate marketing cues and biases that could affect participants' perceptions of quality. Samples should be presented uniformly in identical, coded containers to prevent extraneous influences, with clear tulip-shaped wine glasses preferred for aroma evaluation. To optimize conditions, the testing environment must be temperature-controlled, quiet, and free from distracting odors, and central location settings should mimic natural consumption contexts to ensure accurate liking scores.

Panelists must not administer their tests to avoid errors from nonuniform sample sizes and potential bias, and clear, comprehensive instructions are essential to guide their participation. Additionally, the design of studies should address sequence effects and allow for expectoration of samples to minimize changes in response due to satiety or alcohol absorption. Techniques to mitigate sensory fatigue include rinsing with water or using palate cleansers like unsalted crackers. Overall, a systematic approach to the testing environment and procedures ensures reliable and valid sensory evaluations. These techniques are essential for wineries of all sizes to support business decisions and develop new wine styles (Lesschaeve & Noble, 2022).

A study investigates the significance of sensory evaluation in understanding wine preference and consumer choice within a comprehensive framework (Magalios et al., 2019). It emphasizes the need for wine makers to grasp the interplay between sensory properties and other factors influencing consumer decisions to ensure market sustainability and success. By introducing innovative approaches for matching preferences and assessing sensory attributes, the research aims to enhance both theoretical and empirical knowledge in this area. An empirical study utilizing real wine tasting data analyzed through Correspondence Analysis (CA) reveals the method's suitability for analyzing wine sensory data, given its categorical and non-parametric nature. The findings underscore CA's effectiveness in establishing a robust understanding of wines based on their aromatic characteristics.

Process of Wine Making. After the harvest, grapes are brought to a winery for primary fermentation. The processes for red and white wine differ significantly at this point. Red wine is produced using the pulp of red or black grapes, and fermentation occurs alongside the grape skins, which contribute to the wine's color. In contrast, white wine is created by pressing crushed grapes to extract the juice, with the skins removed before fermentation begins.

Sometimes, white wine can be made from red grapes by extracting the juice while minimizing skin contact. Rosé wines can either be produced from red grapes by allowing the juice to remain in contact with the dark skins for a short time to achieve a pink hue (through maceration or saignée) or by blending red and white wines together. Both white and rosé wines extract fewer tannins from the skins compared to red wines.

To initiate primary fermentation, yeast may be introduced to the must for red wines, or fermentation can occur naturally due to ambient yeast present on the grapes or in the environment. For white wines, yeast is typically added to the juice. This fermentation process lasts about one to two weeks, during which yeast converts most sugars in the grape juice into ethanol and carbon dioxide, with the latter escaping into the air.

Following the primary fermentation of red grapes, the free-run wine is separated and transferred to tanks, while the skins are pressed to extract any remaining juice. The press wine is then blended with the free-run wine at the winemaker's discretion. The wine is kept warm during this stage to convert any remaining sugars into alcohol and carbon dioxide.

The next step in red wine production is malo-lactic fermentation, a bacterial process that transforms sharp malic acid into softer lactic acid, resulting in a smoother taste. Red wines are sometimes aged in oak barrels for several weeks or months, which imparts additional oak flavors and tannins. Prior to bottling, the wine must be clarified and any necessary adjustments made.

The time from harvest to consumption can vary significantly, ranging from a few months for Beaujolais nouveau wines to over twenty years for high-quality wines with substantial acidity, tannins, or sugars. However, only about 10% of red wines and 5% of white wines improve in taste after five years compared to their first year. Depending on grape quality and desired wine style, some steps in the process may be

combined or skipped to meet the winemaker's specific objectives. Many wines of similar quality can be made using various production methods, with quality determined more by the characteristics of the grapes than the vinification steps.

There are also variations in this process. For sparkling wines like Champagne, a secondary fermentation occurs in the bottle, creating the characteristic bubbles by dissolving trapped carbon dioxide. Sweet or off-dry wines are produced by halting fermentation before all sugars are converted to ethanol, allowing some residual sugar to remain. This can be achieved by chilling the wine, adding sulfur or other approved additives to inhibit yeast activity, or using sterile filtration to eliminate all yeast and bacteria. For sweet wines, initial sugar levels may be increased by harvesting grapes late (late harvest wine), freezing them to concentrate sugars (ice wine), encouraging botrytis cinerea fungus to dehydrate the grapes, or allowing grapes to raisin either on the vine or on racks or straw mats.

In many high-sugar wines, fermentation can stop naturally due to the high sugar levels and increasing ethanol concentration inhibiting yeast activity. In fortified wines like port, high-proof neutral grape spirits (brandy) are added to stop fermentation and adjust the alcohol content once the desired sugar level is reached. Alternatively, winemakers may reserve some sweet grape juice to add after fermentation, a method known in Germany as *süssreserve*.

Level of Acceptability of Commercial Wine. Research on wine acceptability has explored various factors influencing consumer preferences.

Chemical analysis of white wines revealed correlations between specific compounds and consumer acceptability, with sugars positively associated and acetic acid and catechins negatively associated (Han et al., 2022). White wine's aroma and flavor are shaped by a variety of chemical constituents, both volatile and nonvolatile, such as organic acids and polyphenols. These compounds not only define the sensory characteristics of the wine but also play a crucial role in consumer perception. A study analyzing the chemical composition of 12 commercial white wines utilized methods like headspace solid-phase microextraction (HS-SPME) with gas chromatography–mass spectrometry (GC–MS) to assess volatile compounds, and high-performance liquid chromatography (HPLC) to evaluate nonvolatile substances, including polyphenols. Sensory evaluations were also conducted to gauge consumer preferences. The results revealed that white wines can be differentiated based on their chemical makeup, with 33 volatile compounds and 23 nonvolatile compounds identified. Importantly, seven of the volatile compounds showed a significant correlation with consumer acceptability, indicating that sugars enhance consumer preference, while nonvolatile compounds such as acetic acid and catechins were negatively associated with consumer preference. This research enhances the understanding of how the chemical profiles of wines influence their appeal to consumers, emphasizing the interplay between specific compounds and overall taste perception.

Wine composition significantly impacts the perception of Brettanomyces metabolites, with oak masking associated aromas more effectively than green flavors (Schumaker et al., 2019). As Brett levels increased, consumers noted stronger associations with typical spoilage-related terms such as Band-Aid®, smoky, and leather, but these were significantly reduced in the oak wine. Moreover, consumers with wine industry experience expressed lower liking ratings compared to those without experience, suggesting that expertise may influence sensitivity to spoilage-related characteristics. The findings highlight how different wine compositions can shape the perception of Brettanomyces spoilage, providing the wine industry with insights into managing undesirable aromas through specific wine styles and additives.

Carbonation levels in muscadine and fruit wines affect consumer preferences, with carbonated samples generally preferred over non-carbonated ones (Wendrick et al., 2021). The

study explored how carbonation, a value-added process, can influence the sensory attributes of niche market wines, such as muscadine and fruit wines, which are common in the Southeastern USA. While traditional sparkling wines have been extensively studied, limited research exists on these niche varieties. The findings indicate that consumers consistently preferred the carbonated wines over the noncarbonated version. Among the four carbonation levels, there was no clear preference for one level over another, with participants showing an even distribution of choices. Statistically significant differences were noted in the liking, preference, and purchase intent between the original and carbonated versions, supported by consumer comments. Overall, the research demonstrates that carbonation can enhance consumer acceptance of niche wines, offering winemakers insights on diversifying and expanding their product offerings. This has implications for improving the marketability of niche wines by adjusting carbonation levels to meet consumer preferences.

The addition of unique flavors, such as calamansi fruit in mead wine, can also influence acceptability, with positive responses to appearance and aroma (Baua, 2021). The study explores the development and acceptability of a calamansi-flavored mead wine, highlighting its potential as a valuable product. Mead, a fermented honey-based beverage, can vary in flavor based on ingredients such as fruits, spices, and the fermentation process. In this research, calamansi, a fruit abundant in the region where the study took place, was selected to infuse the mead with a distinct flavor. The sensory evaluation of the product, conducted by 30 respondents, assessed the wine based on appearance, aroma, flavor, and texture. Results indicated that the calamansi-flavored mead had an alcohol content of 12%, and the respondents showed a strong preference for its aroma and appearance, which received the highest ratings in the sensory tests. Overall, the study concluded that calamansi is a promising ingredient for mead production. The favorable reception of the wine by respondents suggests that it has the potential to become a viable and profitable enterprise within the local community. The study demonstrates that calamansi-flavored mead wine could serve as a new product that meets consumer preferences and offers economic opportunities.

These studies highlight the complexity of factors affecting wine acceptability, including chemical composition, carbonation, and flavor additions, providing valuable insights for winemakers to enhance product development and meet consumer preferences.

Health Benefits of Karondas Berry. Karondas Berry has a rich tradition in Indian folk medicine, particularly among tribes in the Western Ghats, where it is valued for its ability to stabilize blood sugar levels and protect against liver damage. According to the National Bureau of Plant Genetic Resources, various communities have used this fruit to address numerous health issues, including biliousness, astringency, scurvy, anemia, parasites, worms, fungal infections, diarrhea, microbial infections, wounds, skin ailments, fevers, ear infections, and even as an insect repellent. Numerous scientific studies have also explored its medicinal properties.

One study indicated that the root bark of Karondas Berry exhibits antihelminthic properties comparable to the pharmaceutical drug albendazole (John et al., 2007). Another research published in Der Pharmacia Lettre highlighted the hemaprotective effects of the root bark, demonstrating its efficacy similar to that of silymarin, a common liver health supplement (Singh, Bajpai, and Mishra, 2009). Additionally, research published in the International Journal of Food Sciences and Technology found that extracts from Karondas display significant antimicrobial activity. A 2011 study in the Journal of Ethnopharmacology reported strong wound healing properties of Karondas root extract (Mishra et al., 2022). Furthermore, a different 2011 study published in the Journal of Ethnopharmacology confirmed the traditional use of Karondas for diabetes treatment, finding that methanol extracts of the fruit possess antidiabetic potential (David, Arulmoli, and Parasuraman, 2015).

In a separate study, Sanchez (2013) examined the traditional production of sugarcane wine (basi) in the Philippines, documenting various preparation methods from different regions and analyzing the chemical composition of the wines produced. The study identified three primary methods: La Union, Ilocos, and Pangasinan. Notable differences were observed in the additives used and the resulting chemical properties. Chemical analysis indicated that La Union's basi had the highest alcohol content (14.82%), along with lower reducing sugar (8.25%), acidity (5.36 ml of 0.1N NaOH/10ml), and polyphenol levels (182 mg/100 ml) compared to the other regions.

Varakumar (2014) investigated the creation of mango wine (Mangifera indica L.) using a new yeast-mango peel immobilized biocatalyst system. This method involved repeated batch fermentation at temperatures of 15, 20, 25, and 30°C. The biocatalyst demonstrated good operational stability, yielding high ethanol concentrations (76.0–96.0 g/l) and productivities (1.53–3.29 g/l/h), suggesting its suitability for winemaking even at lower temperatures. The concentration of ethyl acetate remained below 40 mg/l, and the levels of higher alcohols were low (< 330 mg/l), indicating an enhancement in product quality over free cell fermentation. Sensory evaluation indicated a fruity aroma (7.9 ± 0.73), a pleasant taste (7.7 ± 0.24), and overall superior quality for the wines produced using the immobilized system.

Idise (2012) focused on wine production from pineapple (Ananas comosus), employing a ratio of 1:4 (pineapple must sugar) across different recipes (A to D). After 144 hours of fermentation, the wines displayed similar average values for various parameters, such as pH, optical density, specific gravity, total aerobic count, alcohol percentage, and titratable acidity. Taste tests revealed minimal differences among recipes A to C, while statistical analysis indicated no significant differences. The control wine exhibited characteristics akin to natural palm wine.

Noah et al. (2013) conducted comparative research on wine produced from varying proportions of pawpaw juice and coconut milk (90:10, 80:20, 70:30, 60:40, and 50:50). They employed a comprehensive winemaking process, including washing, peeling, juice extraction, amelioration, clarification, sulphation, pitching, fermentation, clarification, bottling, pasteurization, and aging. The resulting wines were analyzed for various physicochemical and sensory properties, comparing them with a commercial reference wine, Calypso. As the proportion of coconut milk increased, the alcohol yield decreased from 10% at the 90:10 blend to 6% at the 50:50 mix, alongside corresponding decreases in titratable acidity and brix values, while pH, specific gravity, and temperature increased. Sensory evaluation by trained panelists revealed significant differences, with the 90:10 pawpaw juice and coconut milk blend performing favorably compared to the commercial wine.

Karondas Berry as Wine. Research on wine production from non-traditional fruits and yeasts has shown promising results. A study showed that temperature significantly impacted ethanol formation and phenolic content, with 28°C being the ideal fermentation temperature (Minh, 2021). Sugar addition of 9% produced the highest ethanol content and sensory scores. Similarly, a yeast inoculum size of 14% was optimal for achieving desirable wine characteristics. Aging for 10 weeks contributed to the overall wine quality by enhancing phenolic content and sensory attributes. Karanda fruit wine, when fermented under optimal conditions, achieved high ethanol content, total phenolic content, and overall acceptability.

Another study explores the production and characteristics of three types of Korean black raspberry wines made from juice, juice-pulp, and juice-pulp-seed (Ogbonna et al., 2020). During fermentation, notable changes occurred in their physicochemical properties. Color intensity weakened due to a 50% reduction in anthocyanin content but was bolstered by the inclusion of pulp and seeds. Citric acid was identified as the predominant organic acid, and amino acid levels significantly decreased. Fermentation also increased the total volatile

compounds, with isobutanol, n-propanol, and isoamyl acetate as the key components. The juice-pulp-seed wine demonstrated the highest levels of anthocyanins, polyphenols, and proanthocyanins, which contributed to enhanced antioxidant activity. This variant also contained two to three times more proanthocyanidins than commercial grape wines, influencing its pucker and bitter taste. Sensory evaluations favored the juice-pulp-seed wine for its superior color, flavor, taste, and overall acceptance. Non-Saccharomyces yeasts like Meyerozyma guilliermondii and Pichia guilliermondii produced wines with comparable organoleptic characteristics to commercial wines, demonstrating their potential in wine production.

In a study on Korean red wines, the researchers analyzed the chemical properties and sensory qualities of different wines produced from domestic grape varieties: Gerbong (G), Campbell Early (C), Muscat Bailey A (M), Seredan (Sd), Seibel (Sb), and Neo-muscat (N) (Lee et al., 2004). In terms of overall acceptability, the Campbell Early (C) variety scored the highest (6.49) among the dry red wines, with significant differences noted ($p < 0.05$). However, among the sweet red wines, the Seredan (Sd) variety had the lowest acceptability score (3.27), also showing a significant difference compared to the others ($p < 0.05$). For white wines, Seibel (Sb) had a slightly higher acceptability score (5.20) than Neo-muscat (N), but this difference was not pronounced. Notably, the dry red wines exhibited higher levels of sourness than the optimal range, indicating a need for adjustment. Similarly, the sweetness and sourness levels of white wines and the sweetness of certain sweet red wines, particularly Campbell Early, Gerbong, and Seredan, required modification. The study concluded that the Campbell Early and Muscat Bailey A varieties were well-suited for the production of Korean red wines.

These studies highlight the importance of optimizing fermentation parameters, yeast selection, and grape variety in wine production. They also suggest that non-traditional fruits and yeasts can produce wines with acceptable color, aroma, flavor, and general acceptability, comparable to commercial wines, opening new possibilities in the wine industry.

METHODS

Research Design. Experimental research was used in this study. Control is used as to basis in order to determine the significant difference of Karondas Berry wine from the wine being sold in the market. According to Ariola (2006), experimental research is a procedure used to find out something not presently known. These are usually carried out in order to discover the cause of a phenomenon. In a real sense, experimental is a kind of structured observation to determine cause and effect relationship, and an effective way in developing accurate description of behavior.

Setting and Population. This study was conducted at Iloilo State College of Fisheries-Dumangas Campus Food Laboratory in the Municipality of Dumangas. It is located at Ilaya 1st Dumangas, Iloilo. This institution offered courses in its four colleges, where BSHRM is one of its leading courses.

A total of 45 respondents were employed as respondents of the study. Fifteen (15) alcohol drinkers were randomly selected from different areas in the Municipality of Dumangas, Iloilo. Another fifteen (15) HRM teachers and fifteen (15) HRM students, both from Iloilo State College of Fisheries - Dumangas Campus, were randomly selected by the researchers.

Instrumentation. This study used a sensory evaluation score sheet using the modified five-point Hedonic scale which was adapted from studies delving on the acceptability of products. The data gathering instrument was validated by a panel of experts and the research adviser.

Data Gathering Procedure. The data gathering procedure was divided into three phases. Phase I includes the preparation of tools, utensils and equipment to conduct the study. These are, measuring cup, measuring spoon, wine bottle, cork, air lock, fermenting bottle, strainer, is also needed for blending process. Phase II includes

the preparation of Karondas Berry. The researchers first gathered the ripe Karondas Berry fruit as main ingredients in making Karondas Berry wine. It was washed and peeled to get the Karondas Berry juice and set aside.
The researchers then formulated the three different wine treatments. Treatment A has 4 cups of Karondas Berry Juice, treatment B has 3 cups of Karondas Berry Juice, and treatment C has 2 cups of Karondas Berry juice. Aside from the different amounts of Karondas Berry Juice, these treatments undergone the same method of including 2 cups of sugar and 2 tablespoons of fermented yeast, all mixed together in a fermenting bottle and were sealed with cork and air lock. All three treatments were set aside for 4 weeks of fermentation process. After 4 weeks, the fermented juice was poured into a sterilized wine bottle and sealed with cork again and left out for 6 months. The study also required a fourth treatment (treatment D) which includes commercial wine for comparison.

Phase III involves the evaluation of the product. The evaluators were composed of fifteen (15) alcohol drinkers who were picked out by the researchers from different areas in the municipality of Dumangas, Iloilo. Fifteen (15) HRM teachers and fifteen (15) HRM students were selected at Iloilo State College of Fisheries Dumangas Campus. They were the respondents of the study. Respondents also evaluated the three wine as experimented sample and the control according to taste, aroma, color, texture and general acceptability. They requested to respond to sampling evaluation score sheet using a modified five-point Hedonic scale.

Table 1
Scale Range and Description of the Modified Five - Point Hedonic Scale

Scale	Description
4.21 – 5.00	Like Extremely
3.41 – 4.20	Like Very Much
2.61 – 3.40	Like Moderately
1.81 – 2.60	Dislike Very Much
1.00 – 1.80	Dislike Extremely

After the score sheets were gathered, the prescribed data were tabulated and interpreted with appropriate statistical treatment.

Data Analysis. The data gathered was analyzed using weighted mean to determine the acceptability of Karondas Berry Wine. The mean result was further interpreted using Analysis of Variance (ANOVA) or F-test. This was used to determine the significant differences in the evaluation of Karondas Berry Wine as to color, aroma, flavor and general acceptability.

RESULTS

Table 2
Level of Acceptability of Karondas Berry (Carrisacaranda) Wine in Different Proportions as to color

Treatment	Mean	Description
A – 4C Karondas juice	3.47	Like Very Much
B – 3C Karondas juice	3.54	Like Very Much
C – 2C Karondas juice	3.84	Like Very Much
D – 0C Karondas juice	4.67	Like Extremely

Table 2 shows the mean rating of Karondas Berry Wine in three formulations as to color by the three groups of respondents: students, teachers and alcohol drinkers. Result revealed that control D obtained a mean of 4.67 (“Like Extremely”) while treatments A, B and C respectively obtained the following means: 3.47, 3.56, and 3.84. All interpreted as “Like Very Much”.

Table 3
Level of Acceptability of Karondas Berry (Carissa Carandas) Wine in Different Proportions as to Aroma

Treatment	Mean	Description
A – 4C Karondas juice	3.22	Like Very Much
B – 3C Karondas juice	3.38	Like Very Much
C – 2C Karondas juice	4.02	Like Very Much
D – 0C Karondas juice	4.47	Like Extremely

Table 3 shows the mean rating of Karondas Berry Wine in three formulations as to aroma by a group of respondents as students, teachers and alcohol drinkers. Result revealed that control D obtained a mean of 4.47 (“Like

Extremely") while treatments A, B and C respectively obtained the following means: 3.22, 3.38, and 4.02. All interpreted as "Like Very Much".

Table 4
Level of Acceptability of Karondas Berry (Carissa Carandas) Wine in Different Proportions as to Flavor

Treatment	Mean	Description
A – 4C Karondas juice	3.47	Like Very Much
B – 3C Karondas juice	3.33	Like Moderately
C – 2C Karondas juice	3.87	Like Very Much
D – 0C Karondas juice	4.71	Like Extremely

Table 4 shows the mean rating of Karondas Berry Wine in three formulations as to flavor by a group of respondents as students, teachers and alcohol drinkers. Result revealed that control D obtained a mean of 4.71 ("Like Extremely") while treatment B obtained a mean of 3.33 ("Like Moderately"). Treatments A and C obtained the following means: 3.47 and 4.47. Both interpreted as "Like Very Much".

Table 5
Level of Acceptability of Karondas Berry (Carissa Carandas) Wine in Different Proportions as to general acceptability

Treatment	Mean	Description
A – 4C Karondas juice	3.43	Like Very Much
B – 3C Karondas juice	4.46	Like Moderately
C – 2C Karondas juice	3.93	Like Very Much
D – 0C Karondas juice	4.67	Like Extremely

Table 5 shows the mean rating of Karondas Berry Wine in three formulations as to general acceptability by a group of respondents as students, teachers and alcohol drinkers. Result revealed that the control D obtained (M= 4.67). "Like Extremely". Treatment B obtained (M= 3.36) "Like Moderately". Treatment A and C obtained (M= 3.43) and (M 3.93) "Like Very Much" respectively.

Table 6
Difference in the level of Acceptability of the three Formulations of Karondas Berry (Carissa Carandas) Wine as to color

Source of Variance	*df* of Squares	Sum of Squares	Mean	F-value	Fprob
Between Groups	3	40.328	13.443		
Within Groups	176	190.222	1.081	12.438	.000*
Total	179	230.550			

**p<.01 alpha level of significant*

The ANOVA result in Table 6 showed a significant difference in the level of acceptability of the three formulations of Karondas Berry Wine as to color with F(3,176)=12.438, P=.000 <.01 alpha level.

Table 7
Difference in the level of Acceptability of the three Formulations of Karondas Berry (Carissa Carandas) Wine as to Aroma

Source of Variance	*df* of Squares	Sum of Squares	Mean	F-value	Fprob
Between Groups	3	45.128	15.043		
Within Groups	176	164.533	.935	16.091	.000*
Total	179	209.661			

**p<.01 alpha level of significant*

Based on the ANOVA result shown in Table 7, a significant difference in the level of acceptability of the three formulations of Karondas Berry wine as to aroma with F(3,176)=16.091, P=.000 <.01 alpha level.

Table 8
Difference in the level of Acceptability of the three Formulations of Karondas Berry (Carissa Carandas) Wine as to Flavor

Source of Variance	*df* of Squares	Sum of Squares	Mean	F-value	Fprob
Between Groups	3	52.000	17.333		
Within Groups	176	193.644	1.100	15.754	.000*
Total	179	254.644			

p<.01 alpha level of significant

Based on the ANOVA result shown in Table 8, a significant difference in the level of acceptability of the three formulations of Karondas Berry wine as to flavor with F(3,176)=15.754, P=.000 <.01 alpha level.

Table 9

Difference in the level of Acceptability of the three Formulations of Karondas Berry (Carissa Carandas) Wine as to General Acceptability.

Source of Variance	*df* of Squares	Sum of Squares	Mean	F-value	Fprob
Between Groups	3	63.350	21.117		
Within Groups	176	200.311	1.138	18.554	.000*
Total	179	263.661			

p<.01 alpha level of significant

Based on the ANOVA result shown in Table 9, a significant difference in the level of acceptability of the three formulations of Karondas Berry Wine as to general acceptability with F(3,176)=18.554, P=.000 <.01 alpha level.

DISCUSSION

This study aimed to find out the general acceptability of Karondas Berry (Carissa Carandas) wine in terms of aroma, color, flavor and general acceptability. It further attempted to determine the significant difference in the level of acceptability of Karondas Berry wine in terms of color, aroma, flavor and general acceptability as compared with commercial wine, as well as the significant difference in the level of acceptability of three formulations of karondas Berry wine in terms of color, aroma, flavor and general acceptability.

The results revealed that the color and aroma of the three treatments (treatment A, B, and C) were "Liked Very Much" by the respondents. However, they extremely liked the formulation of treatment D in these categories, which is the commercial wine. In terms of flavor and general acceptability, both treatment A and C were "Liked Very Much". On the other hand, Treatment B were only "Liked Moderately", and that treatment D was the most liked among the four formulations. However, when treatment D is disregarded, treatment C has the highest acceptability level among the rest of the treatments. Thus, this treatment has a higher potential for mass production and market distribution.

Results also showed that there was a significant difference in three formulations of Karondas Berry Wine in terms of color, aroma, flavor and general acceptability. This means that the amount of Karondas Berry Juice mixed in the formula produces different color, aroma, and flavor, hence, can affect the likability of the formulation.

Since the result of this study was acceptable, it is recommended that Karondas Berry Wine can be introduced to the market and can be a good venture for income generation and augment family income. It is further recommended to future researchers to use Karondas Berry as the main ingredient in other products and varied formulations. Similar studies using different variables can be conducted to evaluate the acceptability of the finished product.

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