International Journal of Tourism and Hospitality Dynamics (IJTHD)

Acceptability of Bilimbi (Averrhoa Bilimbi) As Wine: A Product Development

Bacolod, Daryl Faith C.[1], Bautista, John Paul E.[2], Olmedo, Jan Carl C.[3], Parcon, Ray John Carlo G.[4]
[1]Central Philippines State University – Hinigaran Campus, College of Hospitality Management
darylfaith23@gmail.com, johnpaulbautista0727@gmail.com, jancarlolmedo@gmail.com, parconrayjohncarlo@gmail.com

Abstract- This study investigates the acceptability of Averrhoa bilimbi as a base ingredient for wine production, focusing on its sensory characteristics and the acceptability of the product. Averrhoa bilimbi, commonly known as bilimbi, is a tropical fruit with high acidity and distinct tartness, which poses both challenges and opportunities for winemaking. The evaluation of the product will be done by having respondents who will evaluate the acceptability of the product developed. This study comprised the creation of Bilimbi wine via controlled fermentation with Saccharomyces cerevisiae (yeast), followed by microbial test, physicochemical investigation, and sensory assessment. The researchers conducted a survey of random respondents using a 5-point hedonic scale, namely for sensory evaluation, that determined the acceptability of the characteristics of the extract-based bilimbi fruit wine in terms of appearance, aroma, color, taste, and texture. As such, the overall findings of the researchers from the data gathered are that most of the respondents who evaluated the product have Liked Very Much based on the different sensory characteristics of the established formulation of Bilimbi fruit (Averrhoa Bilimbi) as wine in terms of Aroma, color, texture, taste, and appearance.

Keywords- Acceptability, Bilimbi, wine, fermentation, microbial test, physicochemical, sensory, Appearance, Aroma, color, Taste, Texture

Date of Submission: 14/07/2025
Date of Review: 05/08/2025
Date of Acceptance: 19/08/2025
IJTHD / Volume 1, Issue 1, 2025

INTRODUCTION

Bilimbi fruit is abundant in many locations here in the Philippines. It is known for its unique flavor and texture, and it is mostly used in dishes or simply just as a snack, but most people tend to disregard bilimbi fruits and their value due to their abundance.

The potential of Averrhoa bilimbi, also referred to as bilimbi or "kamias," as a base ingredient for wine production is investigated in this study. Because of its intense sourness, the bilimbi, a tropical fruit that is widely available in the Philippines and other Southeast Asian countries, is still underutilized. Packed with antioxidants, vitamin C, and other nutrients, the fruit has potential health advantages and practical uses. In order to provide a new value-added product from a resource that is frequently disregarded, the study aims to turn this extremely acidic fruit into a drinkable and commercially viable wine. This study supports the creation of distinctive Filipino-made beverages, encourages sustainable agricultural practices, and advances local fruit innovation by examining the fermentation process, chemical characteristics, and sensory acceptability of bilimbi wine.

This study seeks to determine the extent of acceptability of the selected respondents in utilizing bilimbi as wine.

LITERATURE REVIEW

METHODOLOGY

In this research, a mixed-methods research design will be used. Experimenting is applied with the aim of developing bilimbi (Averrhoa Bilimbi) into wine. The evaluation of the product will be done by having respondents who will evaluate the acceptability of the product developed. Using a standardized questionnaire, it aims to evaluate the selected respondents to the bilimbi wine in terms of its aroma, color, taste, texture, and appearance.

(Include ethical permissions and technical information about the study.)

Our demonstration methodology is designed to effectively showcase the functionality, performance, and potential applications of the solution. The approach is structured into the following key phases:

1. Objective Definition

This study pointed out the expanded use of bilimbi fruit (Averrhoa bilimbi) as an extract-based wine and determined the acceptability level based on characterization. Specifically, the study aimed to:

- Determined which among the sensory characteristics is/are most accepted or liked in terms of: a.) Aroma, b.) Taste c.) Appearance d.) Texture and e.) Color
- Determined the acceptability of the established formulation of the Bilimbi Fruit (Averrhoa Bilimbi) as wine to business owners, faculty, Local Government Unit (LGU), Local Residents, HM students in terms of: a) Aroma, b) Taste, c) Appearance, d) Texture, and e.) Color

2. Scenario Development

Upon conducting the experimentation process, there were certain challenges faced by the researchers. A total of three (3) trials were performed. Upon Observation in the first trial, the wine product is quite thick due to the extract from the bilimbi fruit. The aroma of the product is pungent and is similar to the smell of the “Tuba” known in the Philippines. The light smell of the cinnamon is visible and is not overwhelming, and has a sweet taste at first, then comes the citrus or the sour taste, followed by the light bitterness formed due to fermentation, resulting in low alcoholic content.

In the last week of fermentation in the first trial, the thick part of the wine subsided and rested on the bottom of the bottle, resulting in a lighter color similar to a champagne, which is a yellowish-orange color. The aroma is still pungent but not as strong as the first week of fermentation. The taste of sweetness is still visible, and the sourness is also visible to the palate and followed by the light bitterness. The researchers concluded that the product is not as close to wine.

3. Setup and Configuration

- The researchers gathered all the ingredients, especially the main ingredient, which is the bilimbi fruit. All the tools and materials that were used were cleaned and sterilized before beginning the trials, and developed bilimbi wine

extract into wine, following the staple process for making wine to produce an extract-based bilimbi wine. All data and information are recorded to support the process and the overall structure of this study.

- For materials and tools used are the following: cleaned and sterilized Jar, weighing scale, casserole, measuring cups, measuring spoons, glass bottle, strainer, and chopping board.
- The finished product, Bilimbi (Averrhoa Bilimbi) wine, underwent physicochemical testing to determine its alcohol content and to make sure it was safe to drink and appropriate for market distribution, as well as a microbial test called Aerobic Plate Count (APC) to evaluate the product's microbiological quality.

4. Step-by-Step Execution

• Introduction:

This research study's detailed implementation describes the methodical procedure used to turn bilimbi fruit into a wine product. Every stage was meticulously designed and carried out to guarantee the precision, consistency, and dependability of the outcomes. The study sought to investigate the viability of using bilimbi fruit as an alternate base for wine production, covering everything from raw material selection and preparation to fermentation, bottling, and evaluation. The steps taken to turn the raw fruit into a practical and inventive wine product are described in detail in this section.

Feature Showcase: After harvesting the bilimbi fruit, it is properly cleaned to remove any dust or debris that may have accumulated. It is weighed at one kilogram (1kg) and sliced into tiny pieces ranging from two to four centimetres (2 - 4 cm), cleaned again, and dried by wiping a clean tablecloth or napkin over it. Transfer the cut bilimbi fruit and sugar to the jar, piling them together until none remains. Add the cinnamon sticks, one (1) liter of water, and the yeast, and let aside for a few minutes to activate. Using the ladle, stir the ingredients until it is thoroughly blended. The jar is firmly wrapped with a clean cotton towel to prevent air leakage and stored in a cool, dry area away from direct sunlight for two days (primary fermentation). After a few days of fermentation, stir the mixture with a long ladle/mixing spoon, seal it again, and let it sit aside for a week to ferment and fully mature into wine. After a week, the wine was filtered or sifted using the fine cheese cloth to capture more clear wine and let it set for an hour and transferred it into a clean sterilized bottle using the strainer and a fine cheese cloth to get more clear wine and seal it with the 2 - 3 inches in size of a clean table cloth, rolled and act as a cork for an airtight bottle and store it in the glass bottle and is ready for the second fermentation process. After the maturing procedure, the wine is put to a clean, disinfected bottle. Then follows the bottling procedure.

Interactive Engagement: The respondents of this study are composed of the following: Business owners, Faculty, Local Government Unit Officials, Local Community within the Municipality of Hinigaran, and Hospitality Management Students of Central Philippines State University – Hinigaran Campus. The instrument was distributed, and the researchers themselves were the ones who conducted the study to ensure 100% retrieval of the instrument. The researchers conducted a survey to random respondents using a 5-point hedonic scale namely (5-Like Very Much), (4-Like moderately), (3-Neither like or dislike), (2-dislike moderately), (1-dislike very much) for sensory evaluation that determined the acceptability of the characteristics of the extract-based bilimbi fruit wine in terms of aroma taste, appearance, texture, and color.

5. Data Collection

The researchers gathered all the ingredients, especially the main ingredient, which is the bilimbi fruit. All the tools and materials that were used were cleaned and sterilized before beginning the trials and developed bilimbi wine extract into wine, following the staple process for making wine to produce an extract-based bilimbi wine. All data and information are recorded to support the process and the overall structure of this study. In the collection/ harvesting of the primary ingredient, Fresh bilimbi fruit (Averrhoa bilimbi) was harvested at Hacienda San Roque, Barangay Gargato. Hinigaran Negros Occidental. They started the extraction by slicing the appropriate quantity of bilimbi from the small fruit branches to be used in each trial, and the wine-making process the following day. Prior to trials, the harvesting process is completed. The bilimbi fruit was cleaned with running water to get rid of dust and debris after it was harvested. Prior to the wine-making process, the fresh bilimbi fruit is kept and stored in a sterile plastic bag to prevent exposure.

A set of three trials were performed, during first trial the researchers discovered in the first trial that the wine yield was fairly thick owing to the extract from the bilimbi fruit in the first week. After straining the wine, they observed that the result had a brownish-peach tint, similar to vinegar. The substance has a strong scent, comparable to the smell of "Tuba" in the Philippines. During the second trial improves the product's flavour, scent, look, colour, and texture improve, resulting in a better overall balance. The colour of the product remains close to champagne; however, it is somewhat darker than the previous sample. The perfume is still intense, but not as powerful as the previous sample, with a faint whiff of "Tuba" and whiskey. The sweet and sour flavour remains noticeable on the tongue, as does the bitter aftertaste, which is considerably closer to wine, given that the alcohol percentage is larger than in the first sample due to increased component measurements.

6. Evaluation and Iteration

• The evaluation and iteration phase of the research study on bilimbi fruit as wine was crucial for improving the final product and making sure it satisfied customer preferences and quality standards. Aroma, taste, colour, texture, and alcohol balance were the main focuses of the first sensory assessments. Bilimbi's inherent acidity caused the first batch to have an excessively sour profile, which led to changes in the sugar content, fermentation duration, and clarification methods. Following these changes, a second assessment revealed a notable improvement in both visual appeal and flavour balance. According to a consumer taste test, the majority of them thought the wine was tasty and valued its distinct tropical acidity. A final version with natural sweetening, prolonged aging, and environmentally friendly, regionally inspired packaging was the result of more feedback. All things considered, the evaluation and iteration process were essential in making the bilimbi fruit wine more palatable and ready for the market.

7. Conclusion and Next Steps

The study showed that it is possible to successfully turn bilimbi fruit into a distinctive and commercially viable wine product. Important lessons learned include the necessity of using appropriate fermentation and sweetening methods to balance the fruit's natural acidity and the importance of ongoing assessment and customer feedback in product improvement. The procedure demonstrated the potential of underappreciated tropical fruits, such as bilimbi, as a substitute for wine sources, providing a locally sourced and sustainable product. The solution's advantages include lowering food waste, supporting regional agriculture, bringing a novel fruit wine to the market, and giving small-scale producers new sources of income. Customers found the finished product to be both palatable and appealing, indicating potential for future commercialization. A number of follow-up measures are suggested in order to expand on the research study's conclusions regarding bilimbi fruit as wine. First, testing the product's consistency, shelf life, and consumer acceptability under various circumstances will be aided by pilot production trials. To further enhance the wine's quality, flavour stability, and safety, it is also crucial to consult with food technologists and fermentation specialists. Target customers' opinions on taste, presentation, and overall appeal can be obtained by planning wine tasting events. A market analysis will also assist in identifying possible distribution opportunities, pricing plans, and demand. Refining the product's labelling to adhere to food and beverage regulations is also crucial, especially with regard to the alcohol content and nutritional data.

RESULTS & DISCUSSION

(Present findings and their interpretation, comparing with other studies.)

The findings present frequency and percentage count results on the acceptability of sensory characteristics, mainly Aroma, Taste, Appearance, Texture, and Color.

Findings show that the majority of Business Owners to the Bilimbi fruit as wine with respect to the five (5) sensory characteristics in terms of Aroma, Taste, Appearance, Texture, and color. with the mean score of 5, the Aroma as liked very much rated as the highest sensory characteristic, Appearance as Liked very much with the mean score of 4.7, Texture as Liked very much with the mean score of 4.7, Color as Liked very much with the mean score of 4.7, and the Taste as Liked very much with the mean score of 4.3. It implies that the Business Owners liked the Bilimbi fruit as wine, resulting in a total mean score of 4.68.

While the majority rate of the Faculty of CPSU – Hinigaran Campus to the Bilimbi Fruit as Wine, the Texture as liked very much has the highest rate in the sensory characteristics, with the mean score of 4.6. It implies that the Faculty liked very much the Bilimbi fruit as wine with a Total mean score of 4.32. For the third respondent of the Local Government Unit (LGU) to Bilimbi fruit as wine with respect to the five (5) sensory characteristics. Taste was liked very much with a mean score of 4.6, resulting in the highest rate in the sensory characteristics. The fourth respondent is the local community in the municipality of Hinigaran that the Taste as liked very much gathering a mean score of 4.5, resulting to the highest rate of sensory characteristics This implies that the Local community liked the Bilimbi fruit as wine, with a Total mean score of 4.2.

Finally, Findings show the majority rate of the Hospitality Management Students to Bilimbi fruit as wine with respect to the five (5) sensory characteristics in terms of Aroma, Taste, Appearance, Texture, and Color. The Aroma was liked very much with a mean score of 4.4, the Taste was liked very much with a mean score of 4.6, the Appearance was liked very much with a mean score of 4.5, the Texture was liked very much with a mean score of 4.8, and the Color was liked very much with a mean of 4.4. It implies that the Hospitality Management Students liked very much the Bilimbi Fruit as wine with a total Mean score of 4.54.

CONCLUSION

This research therefore concluded that the Bilimbi fruit (Averrhoa Bilimbi) is suitable for product development as a main ingredient for wine making based on the established formulation identified from the data gathered in this study, which is the acceptability level of the established formulation of Bilimbi fruit as wine based on characterization in terms of aroma, color, taste, texture and appearance. Generally, all the results and discussion as supported by the aims of this study on the development of wine using the extract of Bilimbi fruit (Averrhoa Bilimbi) and the determination of the acceptability level of the established formulation based on characterization in terms of Aroma, Taste, Appearance, Texture, and Color are most highly accepted by the respondents based on the gathered data.

RECOMMENDATIONS

According to the research study's conclusions, it is advised that the local community use locally sourced ingredients to produce wine on a small scale in order to investigate the possibility of bilimbi fruit wine as a sustainable source of income. To improve innovation and community impact, academic institutions and faculty should support and promote product-based research further. Students studying hospitality management are urged to apply their understanding of food and beverage operations, product development, and marketing to the creation of locally produced, value-added products. Last but not least, the local government unit (LGU) is urged to back such projects by creating policies, funding aid, and training programs that encourage regional entrepreneurship, sustainable agriculture, and the commercialization of novel food items.

REFERENCES

[1] Kuriakose, Ajesh C. et.al. (2016). Sample Collection. Wine production from Various Underutilized and Neglected Fruits in Kerala, 5 (2), pg.3.https://www.researchgate.net/publication/305143110_Wine_Production_From_Various_Underutilized_And_Neglected_Fruits_In_Kerala

[2 Berkly, F. (2016). Fermentation of bilimbi (Averrhoa bilimbi L.) wines: Physicochemical and sensory characteristics (Undergraduate thesis, University of the West Indies, St. Augustine, Trinidad and Tobago), Page 1-10. https://uwispace.sta.uwi.edu/server/api/core/bitstreams/499dd43f-cf4d-4fdf-8791-3ee388dc3fb9/content

[3] Laveena, K. B., & Akshaya, K. V. (2024, July). Production and quality analysis of wine samples after fermentation of Phyllanthus emblica, Passiflora edulis, and Averrhoa bilimbi. International Journal of Scientific Development and Research, 9(7), 41–48. https://ijsdr.org/papers/IJSDR2407005

ACKNOWLEDGMENTS

The author(s) would like to express their gratitude to [Dr. Lycel L Pacheco, Phd. – Research Coordinator, Dr. Karla C. Salvallon, Phd – Campus Administrator, and Dr. Aladino C. Moraca, Phd.- University President, and Central Philippines State University – Hinigaran Campus, for their invaluable support, guidance, and resources that contributed to the successful completion of this article.