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Local Production Techniques and Sensory Evaluation of Cassava Wine

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Abstract. This study aimed to develop a local production technique for cassava wine and evaluate its sensory acceptability across three treatments with varying cassava-to-yeast ratios: Treatment 1 (1 kg cassava, 50 g yeast), Treatment 2 (2 kg cassava, 50 g yeast), and Treatment 3 (3 kg cassava, 50 g yeast). Specifically, it assessed aroma, appearance, taste, texture, and respondents' likelihood of consuming cassava wine compared to other options. A quantitative approach integrating descriptive and experimental methods was employed. Sensory evaluations, conducted using a hedonic scale, revealed distinct acceptability levels among the treatments. Treatment 1 received moderate ratings for appearance (40%) and high ratings for aroma (30%), with most respondents describing its taste as sweet with a mild alcoholic note. Treatment 2 garnered mixed feedback, with 50% moderately liking the appearance and 40% slightly liking the flavor. Treatment 3 achieved the highest overall acceptability, with 50% highly rating its appearance and 40% moderately appreciating its taste. Regarding consumption preference, 40% of respondents indicated a willingness to consume Treatment 3 regularly, a preference comparable to rice wine. The study highlights the potential of cassava wine, particularly the variant produced with 3 kg of cassava, as a viable alternative in local markets. Enhancing fermentation techniques, increasing consumer awareness, and promoting cassava wine could improve its acceptance and commercial viability.

Keywords: Product development; Cassava wine; Local production technique.

1.0 Introduction

The global wine industry has played a significant role in social, cultural, and economic development, contributing to various sectors, including tourism, agriculture, and international trade (Brito et al., 2024). As part of the broader agenda set by the United Nations Sustainable Development Goals (SDGs), particularly Goal 12: Responsible Consumption and Production, the need for sustainable and innovative practices in food and beverage production has become increasingly imperative (Martínez-Falcó et al., 2023). With its long history from 6000 BCE in regions like Georgia, Iran, and Armenia, wine has evolved through technological advancements and diversification, reflecting changing consumer preferences and sustainability concerns (Lekicks, 2021; Wagner et al., 2023).

Traditional wine production, involving fermentation processes such as alcoholic and malolactic fermentation, has continually adapted to meet consumer demands for quality, flavor, and variety—fermentation conditions, including sugar content and temperature, influence sweetness, acidity, and aroma. However, the lengthy and resource-intensive nature of conventional winemaking poses challenges in terms of sustainability and efficiency (Shahrajabian, 2023). In alignment with SDG 2: Zero Hunger and SDG 9: Industry, Innovation, and Infrastructure, exploring alternative ingredients for wine production is essential to support agricultural innovation, promote food

security, and enhance rural development. Cassava (Manihot esculenta), a drought-resistant staple crop rich in carbohydrates, vitamins, and minerals (Mahapatra, 2020), presents a promising alternative. Its utilization in wine production offers a new avenue for product diversification. It supports cassava-producing rural communities, particularly in regions like North Maluku, Philippines, where cassava is a primary source of livelihood.

Cassava, especially the Lakan 1 variety known for its high starch content and moderate glycemic index, offers the potential for creating a unique wine product (Coelho et al., 2020; Andrés–Meza et al., 2024). This study aims to leverage cassava's agricultural abundance and nutritional value to produce a sustainable and innovative wine alternative, addressing consumer preferences and global sustainability goals. The motivation to conduct this research stems from introducing new, eco-friendly products in the wine industry, reducing dependency on traditional grape-based wines, and supporting rural economies through value-added agricultural products. This study explores the feasibility of producing cassava-based wine, focusing on its fermentation process, sensory attributes, and market potential. By utilizing Lakan 1 cassava, the research aims to contribute to developing sustainable agricultural practices, promoting food diversity, and enhancing economic opportunities for cassava farmers. The ultimate goal is to align with SDG targets by fostering innovation, supporting rural livelihoods, and promoting responsible production within the beverage industry.

2.0 Methodology

2.1. Research Design

This study applied Quantitative research, a method of inquiry used in various academic disciplines and industries to collect and analyze numerical data to answer research questions. The methods included in the quantitative research were descriptive and experimental. Descriptive analysis focuses on summarizing and describing the characteristics of a dataset. Experimental design is a method used to investigate causal relationships between variables by manipulating one or more variables and observing the effect on another variable. These methods determined the Cassava wine's acceptability and palatability level.

2.2 Research Locale

This study was conducted at Alfonso Lista and focused on the cultural significance of cassava wine within the Ifugao community. Cassava wine is essential as a traditional beverage deeply embedded in local customs and celebrations. Researching its production not only preserves and promotes this cultural heritage but also explores innovative opportunities for entrepreneurship.

2.3 Research Participants

This study employed a purposive sampling technique to select respondents with specialized expertise in food science, fermentation processes, and beverage production. The study included five local experts in Alfonso Lista, Ifugao, and five food specialists from Ifugao State University – Potia Campus, all with significant wine fermentation experience. Respondents were chosen based on their food science, fermentation expertise, and professional experience. Their knowledge provided valuable insights into cassava wine production, particularly fermentation kinetics, quality control, and sensory evaluation.

2.4 Research Instrument

The researcher utilized five attributes for the research questionnaire to determine the level of acceptability of cassava wine. The questionnaire contained a letter to the respondents. The first part included the profile, which gathered demographic information. The second part focused on evaluating different cassava wine sample products, labeled Sample 1 to Sample 4, using a 9-point hedonic scale patterned from the study of Hou et al. (2020). Lastly, part three contains the likelihood of drinking Cassava Wine.

2.5 Data Gathering Procedure and Analysis

The questionnaire for sensory evaluation and likelihood to consume was personally administered to the respondents and retrieved upon completion. Following data collection, responses were coded for analysis. Taste tests were conducted before the completion of the questionnaire to ensure accurate sensory evaluation. Respondents were personally approached for participation in the study. Those who expressed interest were asked to sign an informed consent form granting permission to participate. Four distinct products with varying treatments were presented to the respondents. A randomized sample of one product was provided for tasting in

the initial stage. Participants were given a cup of water to cleanse their palate before proceeding to the following sample. This process was repeated until all four products had been tasted and evaluated. Frequency and percentage distribution were used to analyze data.

3.0 Results and Discussion

3.1 Local Production Techniques

Fresh cassava tubers and fertilizer agents are the primary ingredients in producing cassava wine. The primary ferment (yeast strain) used in this work was the commercial lager brewing strain (Saccharomyces cerevisiae brand Instant Yeast Nevada) collected from a supermarket. To produce local Cassava Wine. Thoroughly wash the cassava tubers under running water to remove all dirt, soil, and impurities. Carefully peel the cassava to remove the outer skin, ensuring that no remnants of the peel remain, as it contains cyanogenic compounds that can affect the fermentation process. Slice the cassava into medium-sized pieces that fit comfortably into the cooking pot for even boiling. Place the cassava pieces in a pot of boiling water and cook until they are soft and fully cooked (approximately 30–45 minutes, depending on the size of the pieces). The cassava should be tender and easy to mash. Remove the cassava from the pot and allow it to cool to room temperature. Ensure the cassava is completely cooled before proceeding to prevent yeast degradation from heat exposure. Chop the cooled cassava into small, uniform pieces to ensure even fermentation and better interaction with the yeast. Spread the chopped cassava evenly onto a large, clean platter or tray to allow any remaining moisture to evaporate slightly and to prepare for mixing. Mix the chopped cassava with the measured yeast (Treatment 1 - 1 kg cassava, 50 g yeast, Treatment 2 - 2 kg cassava, 50 g yeast, and Treatment 3 - 3 kg cassava, 50 g yeast). Ensure the yeast is distributed uniformly for consistent fermentation across the batch. Transfer the yeast-cassava mixture into a clean, sterilized fermentation container. Cover the mixture with clean banana leaves, which act as a natural cover and can enhance the flavor profile during fermentation. Seal the container tightly to prevent leaks or contamination. Place the sealed container in a calm, dark environment with a stable temperature (preferably 20–25°C) to allow fermentation to occur over the desired period (typically 7–14 days, depending on the desired alcohol content and flavor development).

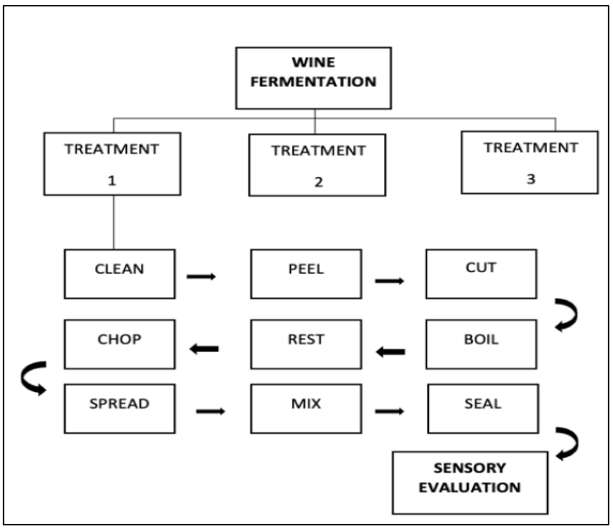

Figure 1. *Local Production Technique for Cassava Wine*

Other studies have studied the fermentation techniques for cassava wine, which encompasses a variety of traditional and modern techniques, each contributing to the unique characteristics of the final product. Traditional methods, such as those used for beverages like chicha and cauim, rely on spontaneous fermentation, which enhances flavor, aroma, and nutritional value while degrading harmful cyanogenic compounds present in cassava (Chacon-Mayorga et al., 2021). In contrast, modern approaches utilize controlled environments, such as the Temperature And Fermentation Controlled Chamber (TFCC), which allows for precise monitoring of pH, temperature, and alcohol levels, optimizing the fermentation process (Rofi'i et al., 2022). Additionally, innovative techniques like simultaneous saccharification and fermentation (SSF) and vacuum fractionation have been explored to improve ethanol yield and purity from cassava roots and peels, achieving concentrations of 8-12 wt%

and up to 86 wt% respectively (Phakping et al., 2014). These diverse methods highlight the adaptability of cassava fermentation, catering to both traditional practices and contemporary industrial applications (Aguiar et al., 2020).

3.2 Sensory Evaluation for Cassava Wine

Table 1 presents the level of acceptability of cassava wine (Treatment 1) based on appearance, taste, aroma, texture, and overall acceptability. Notably, 40% of the respondents moderately and slightly liked the appearance of cassava wine, describing its color as light yellow-brown, which may have influenced their perceptions of its visual appeal. Regarding taste, the responses were evenly distributed, with 20% of the respondents each indicating that they liked the taste immensely, very much, moderately, and slightly. The cassava wine was characterized by respondents as sweet with a somewhat alcoholic flavor, suggesting that while the sweetness was appealing, the alcoholic undertone may have contributed to the mixed responses. The aroma of the cassava wine received a favorable response, with 30% of respondents immensely liking its smell, which was described as a combination of sweet cassava and beer. This pleasant aroma may have positively influenced the overall sensory experience.

Table 1. *Frequency and Percentage Distribution on the Level of Acceptability of Cassava Wine (Treatment 1)*

Indicators	**9**	**8**	**7**	**6**	**5**	**4**
Appearance	10%	10%	40%	40%	-	-
Taste/Flavor	20%	20%	20%	20%	20%	-
Smell/Odor	30%	10%	10%	20%	20%	10%
Texture	10%	40%	40%	10%	-	-
Overall Acceptability	**10%**	**40%**	**30%**	**20%**	**-**	**-**

Legend: Like extremely **= 9**, Like very much **= 8**, Like moderately **= 7**, Like slightly **= 6**, Neither like nor dislike **= 5**, Dislike slightly **= 4**, Dislike moderately **= 3**, Dislike very much **= 2**, Dislike extremely **= 1**.

Regarding texture, 40% of respondents either liked or moderately liked the texture, noting that the cassava wine provided a smooth sensation when swallowed, which is a desirable quality in fermented beverages. The overall acceptability of the cassava wine was generally positive, with 10% of respondents indicating they liked it, 40% very much liked it, and 30% moderately liked it. Although 20% of the respondents slightly liked the wine, no negative responses were recorded, indicating that cassava wine holds promise as an acceptable beverage option.

The predominantly positive reception suggests cassava wine has strong market potential as an alternative fermented beverage. Its unique combination of sweetness and mild alcoholic flavor could appeal to consumers looking for innovative local wine options. While the taste received mixed ratings, the positive feedback on texture and aroma highlights areas of strength. Enhancing the balance between sweetness and alcohol content could improve overall acceptability, making it more appealing to a broader audience. The light yellow-brown appearance and smooth texture were well-received, indicating that maintaining these sensory qualities during production is essential. Further refining the visual presentation, such as through improved packaging, could enhance its attractiveness in the market.

Studies indicate that the sensory profiles of cassava products, such as fufu and spirits, exhibit distinct characteristics that affect consumer acceptance. Fufu from environmentally friendly processes received higher acceptance scores than traditional methods, highlighting the importance of production techniques on sensory attributes like texture and flavor (Tomlins et al., 2007). Additionally, cassava wine produced through controlled fermentation and distillation demonstrated desirable sensory traits, appealing to experienced tasters (Coelho et al., 2020). Furthermore, improved fermentation methods enhanced sensory acceptability, suggesting that advancements in processing can positively impact consumer preferences (Marcon et al., 2007). Overall, sensory attributes such as appearance, texture, and flavor play critical roles in determining the acceptability of cassava-based alcoholic beverages (Sobowale et al., 2022).

Table 2 presents the level of acceptability of cassava wine (Treatment 2) based on appearance, taste, aroma, texture, and overall acceptability. Notably, 50% of the respondents moderately liked the appearance of cassava wine, describing its light yellow-brown color as visually acceptable, though not highly appealing to all participants. Regarding taste, 40% of the respondents slightly liked cassava wine, noting its sourness and mild alcoholic flavor. While the balance of sourness and alcohol was somewhat appreciated, it did not receive strong favorable responses, indicating that the flavor profile may need refinement. The aroma of the cassava wine was moderately

liked by 30% of the respondents, who described it as having a strong alcoholic smell. Although the aroma was not overwhelmingly disliked, its strength may have influenced the mixed responses.

Table 2. *Frequency and Percentage Distribution on the Level of Acceptability of Cassava Wine (Treatment 2)*

Indicators	9	8	7	6	5	4
Appearance	-	20%	50%	30%	-	-
Taste/Flavor	-	20%	10%	40%	20%	10%
Smell/Odor	20%	10%	30%	10%	20%	10%
Texture	20%	10%	20%	30%	20%	-
Overall Acceptability	**10%**	**10%**	**20%**	**40%**	**10%**	**10%**

Legend: Like extremely **= 9**, Like very much **= 8**, Like moderately **= 7**, Like slightly **= 6**, Neither like nor dislike **= 5**, Dislike slightly **= 4**, Dislike moderately **= 3**, Dislike very much **= 2**, Dislike extremely **= 1**.

Regarding texture, 30% of the respondents slightly liked it, describing it as rough on the throat. This suggests that the mouthfeel of the cassava wine may require improvement to enhance its overall acceptability. The overall acceptability of the cassava wine was mixed, with 10% of respondents indicating they immensely liked it, 10% very much liked it, and 20% moderately liked it. However, 40% of respondents slightly liked it, 10% neither liked nor disliked it, and 10% slightly disliked it. Although most responses fell within the positive range, the varied opinions highlight areas for potential product enhancement.

The mixed acceptability ratings indicate product refinement needs, particularly in taste and texture. Adjusting the fermentation process to balance the sourness and reduce the rough texture could significantly enhance the overall sensory experience and consumer preference. Improving the aroma by controlling the fermentation duration or incorporating aroma-enhancing techniques could make cassava wine more appealing. Additionally, refining the filtration process could result in a smoother texture, addressing the rough mouthfeel reported by respondents. The production of high-quality wine relies heavily on the complex interactions between microorganisms and fermentation conditions. Yeast strains play a crucial role in developing wine aroma and flavor by producing volatile metabolites (Lambrechts & Pretorius, 2019). The microbial ecosystem, including non-Saccharomyces yeasts and lactic acid bacteria, contributes significantly to wine aroma and consumer preferences (Belda et al., 2017).

Table 3 presents the sensory evaluation of cassava wine in terms of appearance, taste, aroma, texture, and overall acceptability. A significant proportion of respondents (50%) expressed high satisfaction with the wine's appearance, describing its light yellow-brown hue as visually appealing, consistent with the expected color profile of fermented cassava-based beverages. Regarding taste, 40% of the respondents indicated moderate to high acceptability, noting its slightly sweet flavor with subtle alcoholic undertones. This suggests that the fermentation process effectively balanced the residual sugars and ethanol content, though slight adjustments could further enhance its palatability and complexity. The aroma received moderate to high ratings from 30% of the respondents, who likened the scent to sugarcane wine. This comparison indicates that the cassava wine's volatile compounds, likely derived from the fermentation of cassava starches, contributed to a familiar and pleasant olfactory experience. However, optimization of fermentation conditions may be necessary to achieve a more pronounced and appealing aroma.

Table 3. *Frequency and Percentage Distribution on the Level of Acceptability of Cassava Wine (Treatment 3)*

Indicators	9	8	7	6	5	4
Appearance	-	50%	30%	20%	-	-
Taste/Flavor	-	40%	40%	20%	-	-
Smell/Odor	30%	30%	10%	10%	20%	30%
Texture	20%	20%	50%	10%	-	20%
Overall Acceptability	**10%**	**40%**	**30%**	**20%**	**-**	**10%**

Legend: Like extremely **= 9**, Like very much **= 8**, Like moderately **= 7**, Like slightly **= 6**, Neither like nor dislike **= 5**, Dislike slightly **= 4**, Dislike moderately **= 3**, Dislike very much **= 2**, Dislike extremely **= 1**.

The texture was moderately liked by 30% of the respondents, who appreciated its smooth mouthfeel. This smoothness indicates a well-executed fermentation process with minimal residual particulates, though further refinement in filtration and aging could enhance the tactile experience. Overall acceptability results showed that while preferences varied, all responses fell within the positive spectrum. Specifically, 10% of respondents rated the wine as highly acceptable, 40% very much liked it, 30% moderately enjoyed it, and 20% slightly liked it. These

findings highlight the potential of cassava wine as a viable alternative in the local wine market while also underscoring the need for continuous product development to enhance sensory attributes and broaden consumer appeal.

The moderate to high acceptability of cassava wine in terms of appearance, taste, aroma, and texture indicates that the product has a strong potential—the flavor complexity and refining the aroma. Adjusting fermentation parameters, such as yeast selection, fermentation duration, and temperature control, may optimize the sensory attributes of cassava wine. The study underscores the importance of continued research into fermentation kinetics and quality control measures. Innovations such as specialized yeast strains, optimized fermentation substrates, and advanced aging techniques could improve cassava wine's overall quality and consistency, making it more competitive in the broader wine market.

Key sensory attributes include color, smell, and taste (Rebič & Horska, 2018). While physical and chemical indicators are important, aromatic substances are crucial in wine quality, emphasizing that wine evaluation cannot rely solely on these indicators (Hou et al., 2020).

3.3 Likelihood of Consumption

Table 4 presents the respondents' willingness to use cassava wine under various treatments: consuming at every opportunity, consuming frequently, occasionally, and consuming only when available without actively seeking it. Notably, 40% of respondents indicated they would consume cassava wine produced with 3 kilograms of cassava and 50 grams of yeast at every opportunity. Additionally, 20% of respondents said they would frequently consume cassava wine made from 1 kilogram, 2 kilograms, and 3 kilograms of cassava with 50 grams of yeast each. Another 10% noted that they would occasionally consume cassava wine made from 1 kilogram of cassava with 50 grams of yeast. Furthermore, 20% of respondents indicated they would consume cassava wine made from 1 kilogram of cassava with 50 grams of yeast, if available, without actively seeking it. Conversely, 40% of respondents reported consuming cassava wine made from 2 kilograms of cassava with 50 grams of yeast only during special occasions, highlighting a preference for wine consumption primarily in celebratory or social settings. These findings underscore the potential market acceptance of cassava wine, particularly the variant produced with 3 kilograms of cassava, while also revealing that consumption patterns are influenced by availability and context.

Table 4. *Frequency and Percentage Distribution on Likelihood of Consumption of Cassava Wine*

Indicators	Cassava Wine Treatment 1	Cassava Wine Treatment 2	Cassava Wine Treatment 3
I would drink it every opportunity that I have.	20%	-	40%
I would drink this now and then	20%	20%	20%
I like this and would drink it now and then	10%	-	-
I would drink this if available, but not go out of my way.	20%	-	10%
I do not like this but would drink it on occasion.	10%	40%	-
I would hardly ever drink this.	20%	20%	30%
I would drink this only if forced to.	-	20%	-

Consumer preferences for wine attributes vary, with traditional and sustainable features like geographical indications, variety, and sustainable certification ranking highly (Stanco et al., 2020). However, consumer preferences can differ across markets. In other countries, extrinsic factors like price and country of origin often outweigh sensory attributes in influencing preferences, though some consumers prioritize sensory characteristics (Williamson et al., 2018).

4.0 Conclusion

Using different fermentation treatments, this study investigated cassava wine's local production techniques, sensory attributes, and consumer acceptability. The findings revealed that the traditional fermentation method utilizing Saccharomyces cerevisiae as the primary yeast strain successfully produced cassava wine with distinct sensory characteristics. The production process, which involved careful cassava preparation, fermentation, and aging, proved effective in developing a locally made alcoholic beverage. The sensory evaluation results highlighted that cassava wine was generally well-received by respondents, with moderate to high ratings across appearance, taste, aroma, texture, and overall acceptability. The wine's light yellow-brown color, smooth texture, and mild alcoholic flavor contributed to its appeal. However, variations in fermentation parameters

resulted in differences in taste and texture, with some treatments producing a slightly sour or rough mouthfeel. These findings indicate the need for further refinement of fermentation conditions to optimize the balance between sweetness and alcohol content while improving mouthfeel and aroma. Consumer preference analysis showed cassava wine has market potential, particularly with Treatment 3 (3 kg cassava, 50 g yeast), which received the highest acceptance rate. A significant percentage of respondents expressed a willingness to consume cassava wine frequently, suggesting its viability as a commercial product. However, some respondents indicated they would only consume cassava wine occasionally, implying that further product enhancement and marketing strategies may be necessary to increase its broader appeal.

Based on the findings of this study, cassava wine demonstrates promising potential as a locally produced beverage with favorable sensory attributes. To enhance its appeal and commercial viability, the fermentation process can be further optimized by exploring traditional Ifugao methods, such as the Batad style, which involves either hanging the cassava inside the fermentation jar to allow natural filtration of the juice or soaking it in the jar and filtering the wine upon extraction. These methods may enhance the flavor profile and overall quality of the wine. The initial juice extracted from the fermented cassava is perceived as the sweetest and most palatable. Future production should maximize the yield from this first extraction to ensure superior product quality. Additional studies are recommended to explore variations in cassava-to-yeast ratios, fermentation durations, and storage conditions to refine the production process and improve the sensory characteristics of cassava wine.

5.0 Contributions of Authors

Cay & Baniaga: Conceptualization, Methodology, Data Gathering, Data curation, Writing- Original draft preparation
Malinao: Supervise, Visualize, and write, reviewing, and editing.

6.0 Conflict of Interests

The authors declare no conflict of interest.

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8.0 References

Aguiar, R. O., Carrera, A. G. P., Cunha, R. L., Oliveira, I. V. de, Silva, C. R. da, Silva, V. F. A., da Silva, J. N., da Silva, J. P., Carvalho, F. I. M., Martins, L. H. da S., Silva, P. A., & Moura, E. F. (2020). Optimization of the alcoholic concentration obtained from sugary cassava (Manihot esculenta Crantz) by response surface methodology. The Journal of Agricultural Science, 12(11), 157–168. https://doi.org/10.5539/JAS.V12N11P157

Andrés-Meza, P., Aguilar-Rivera, N., Meneses-Márquez, I., Del Rosario-Arellano, J. L., Bolio-López, G. I., & Leyva-Ovalle, O. R. (2024). Cassava cultivation; current and potential use of agroindustrial co-products. AIMS Environmental Science, 11(2), 248-278. https://doi.org/10.3934/environsci.2024012

Belda, I., Ruiz, J., Esteban-Fernández, A., Navascués, E., Marquina, D., Santos, A., & Moreno-Arribas, M. V. (2017). Microbial Contribution to Wine Aroma and Its Intended Use for Wine Quality Improvement. Molecules, 22(2), 189. https://doi.org/10.3390/molecules22020189

Brito, C., Pereira, S., Martins, S., Monteiro, A., Moutinho-Pereira, J. M., & Dinis, L. (2024). A review of strategies for achieving sustainable development goals across the wine chain. Frontiers in Sustainable Food Systems, 8, 1437872. https://doi.org/10.3389/fsufs.2024.1437872

Chacón Mayorga, G. A., Arias Palma, G. B., Sandoval-Cañas, G. J., Ordoñez-Araque, R., & Ordoñez-Araque, R. (2021). Ancestral fermented indigenous beverages from South America made from cassava (Manihot esculenta). Food Science and Technology International, 41, 360–367. https://doi.org/10.1590/FST.15220

Coelho, E., Ballesteros, L. F., Domingues, L., Vilanova, M., & Teixeira, J. A. (2020). Production of a distilled spirit using cassava flour as raw material: Chemical characterization and sensory profile. Molecules, 25(14), 3228. https://doi.org/10.3390/molecules25143228

Hou, G. L., Ge, B., Sun, L. L., & Xing, K. X. (2020). A study on wine sensory evaluation by statistical analysis. Czech Journal of Food Sciences, 38, 1–10.

Lambrechts, M.G., & Pretorius, I.S. (2019). Yeast and its importance to wine aroma – A review. South African Journal of Ecology and Viticulture, 21(1), 97-129. https://doi.org/10.21548/21-1-3560

Lekics, V. (2021). Sustainable innovation in wine industry: A systematic review. Regional and Business Studies, 13(1), 55-73. https://doi.org/10.33568/rbs.2817

Mahapatra, S., Barbieri, P., & Rahimian, S. (2020). A content-analytic understanding of factors contributing to the success of proactive environmental strategy. The International Journal of Environmental Sustainability, 16(1), 1-28. https://doi.org/10.18848/2325-1077/CGP/v16i01/1-28

Marcon, M. J. A., Vieira, G. C. N., De Simas, K. N., Santos, K., Vieira, M. A., Amboni, R. D. de M. C., & Amante, E. R. (2007). Effect of the improved fermentation on physicochemical properties and sensorial acceptability of sour cassava starch. Brazilian Archives of Biology and Technology, 50(6), 1073–1081. https://doi.org/10.1590/S1516-89132007000700018

Martínez-Falcó, J., Martínez-Falcó, J., Marco-Lajara, B., Sánchez-García, E., & Visser, G. (2023). Aligning the sustainable development goals in the wine industry: A bibliometric analysis. Sustainability, 15(10), 8172. https://doi.org/10.3390/su15108172

Rofi'i, A., Purnomo, F. E., & Afriansyah, F. L. (2022). Pemodelan Matematika Fermentasi Alkohol Pada Tape Singkong Dengan Monitoring Technology Temperature And Fermentation Controlled Chamber (TFCC). Jurnal Ilmiah Inovasi, 22(3), 277–285. https://doi.org/10.25047/jii.v22i3.3509

Phakping, S., Ketudat-Cairns, M., & Boontawan, A. (2014). Extractive Fermentation of Ethanol from Fresh Cassava Roots Using Vacuum Fractionation Technique. Advanced Materials Research, 931–932, 1096–1100. https://doi.org/10.4028/www.scientific.net/amr.931-932.1096

Rebic, T., & Horska, E. (2018). Attributes of wine assessment. International Scientific Days Proceedings. https://doi.org/10.15414/isd2018.s2-3.07

Shahrajabian, N. (2023). Developing sustainable agriculture systems in medicinal and aromatic plant production using chitosan and chitin-based biostimulants. Plants, 12(13), 2469. https://doi.org/10.3390/plants12132469

Sobowale, S., Olatidoye, O., Animashaun, H., & Odunmbaku, L. (2022). Production and comparative assessment of alcoholic drinks produced from cassava, maize, and plantain flour using locally produced and imported enzymes. Food and Environment Safety, 20(4), 360-370. https://doi.org/10.4316/fens.2021.038

Stanco, M., Lerro, M., & Marotta, G. (2020). Consumers' Preferences for Wine Attributes: A Best-Worst Scaling Analysis. Sustainability, 12(7), 2819. https://doi.org/10.3390/su12072819

Wagner, M., Stanbury, P., Dietrich, T., Döring, J., Ewert, J., Foerster, C., Freund, M., Friedel, M., Kammann, C., Koch, M., Owtram, T., Schultz, H. R., Voss-Fels, K., & Hanf, J. (2023). Developing a sustainability vision for the global wine industry. Sustainability, 15(13), 10487. https://doi.org/10.3390/su151310487

Williamson, P.O., Mueller-Loose, S., Lockshin, L. and Francis, I.L. (2018), More hawthorn and less dried longan: the role of information and taste on red wine consumer preferences in China. Australian Journal of Grape and Wine Research, 24, 113-124. https://doi.org/10.1111/ajgw.12309

Tomlins, K. I., Sanni, L. O., Oyewole, O. B., Dipeolu, A. O., Ayinde, I., Adebayo, K., & Westby, A. (2007). Consumer acceptability and sensory evaluation of a fermented cassava product (Nigerian fufu). Journal of the Science of Food and Agriculture, 87(10), 1949–1956. https://doi.org/10.1002/JSFA.2941