Formulation and Market Acceptability of Dragon Fruit (*Selenicerius undatus*) Flavored Mead

10.18196/pt.v13i1.22318

Josiefel Z. Agcaoili

Isabela State University, San Mariano, Isabela, 3332, Philippines

Corresponding email: josiefel.m.zamora@isu.edu.ph

ABSTRACT

This paper discusses the development and acceptability of Mead wine flavored with Dragon Fruit. A quantitative descriptive analysis survey was utilized among forty (40) panelists who are experts in alcohol. At the same time, 75 respondents were randomly selected as participants in the sensory analysis using a Hedonic rating scale with a 5-point Likert scale. The results of the study have shown that the product was acceptable, considering its color, aroma, taste, and even the alcohol content of both treatments. In the findings, the highest response on color is ruby with 62.5%, and responses on aroma are regarded as sweet, tangy, and even zesty nuance. The taste reveals that it is fairly acceptable, with a 2.30 mean, which accounts for its acidity and is good for food pairing. On the overall acceptability level of the three coded samples, the wine-coded control got the highest description of high acceptable and a mean of 4.38. As for the willingness to purchase the product, the commercial product got the highest mean of 4.13, acceptable, and wine with code treatment 1 got a high score of 4.03, which is also acceptable. The results of this study imply that mead with added dragon fruit has the potential to produce mead that is preferred by respondents.

Keywords: Acceptability; Dragon Fruit; Mead; Physico-Chemical; Wine

INTRODUCTION

Mead is an alcoholic drink primarily made from the combination of honey as its main ingredient, added with water and yeast and set for fermentation for two to three weeks. Its alcoholic content ranges from 8% to 18% (Harder et al., 2021). Mead is dedicated to its medicinal properties because of the high-antioxidant properties that the honey contains. It is also believed that drinking a glass of this drink each day may lower the cholesterol levels in the blood and may reduce the risks of cardiovascular diseases, atherosclerosis, hypertension, type 2 diabetes, neurological disorders, some metabolic syndromes, and certain types of cancer. Aside from that, this drink also gained attention in economic parlance due to the honey's therapeutic properties (Romano et al., 2021).

The desired quality of taste and aroma of mead depends on a primary factor, which encompasses the proportion of water, yeast, and honey. It says that the more honey you add to the mixture, the stronger the taste, while a small quantity of honey combined with the mixture along with a higher quantity of water would give a lighter taste of the mead. Variety of honey, pH level, yeast strain, and yeast nutrition also affect the outcome of mead (Senn et al., 2021).

Meanwhile, the ingredient present in mead is honey. Honey is a natural food substance that is sweet since it is composed mainly of sugars and other natural chemicals such as vitamins, aromatic

Article History
Received : 15 January 2025
Revised : 11 February 2025
Accepted : 18 February 2025

substances, organic acids, enzymes, amino acids, and carotenoids (Edo et al., 2023). It is a substance produced by honey bees from the nectar of plants. Accordingly, honey contains large benefits to all living things. It is rich in phenolic acids and flavonoids, which produce biological effects and antioxidants (Afroz et al., 2023; Mărgăoan et al., 2020)

Another notable factor that contributes to the successful production of mead is the kind of yeast that will be used in the fermentation. According to Franceschetti, (2023), some strains of yeasts are not suitable for honey mead production since they contribute to the production of off-flavor, delayed, and arrested fermentations. Literature suggests that for yeast to effectively turn sugar into alcohol and make wine, it is good to identify which yeast is to be added. Although *Saccharomyces cerevisiae* is widely popular among bakers because of its effectivity in dough emulsification, it must be noted that it has a lot of strains to which they act differently.

Meanwhile, dragon fruit is selected as flavoring because of its availability in the area where the mead is produced. This fruit has been getting so much attention worldwide because of its red-purple color and the economic benefit it provides, as well as the antioxidative activity from the betacyanin it contains (Iffah et al., 2024). There is considerable scientific and public interest in the important role that antioxidants play in health care, such as by acting as cancer chemopreventive and anti-inflammatory agents and by reducing the risk of cardiovascular mortality 2 (Iffah et al., 2024).

Traditionally, although mead is made from the combination of three ingredients, namely, honey, water, and yeast, flavoring is also added to give a twist to the mead (Saša et al., 2022). Some recorded mead styles are Braggot, Capsicumel, Cyser, Melomel, Metheglin, Morat, Omphacomel, Oxymel, Pymet, Rodomel, Tej, and Ypocras. Each of the mead styles written is unique depending on the added flavoring present on it. Braggot, for instance, is a mead flavored with malt; Capsicumel is a mead made from Chile pepper and honey; Cyser is a honey and apple extract/apple juice which is combined; Melomel is a mixture of honey and other fruit juices, Metheglin is a mead combined with herbs and spices such as cloves and cinnamon; Morat is a mead with the addition of mulberry; Omphacomel mead with verjus; Oxymel is with wine vinegar; Pymet is mead with honey and wine juice and may sometimes refer as wine sweetened with honey; Rodomel is a combination of honey and rose petal or the rose petal oil called attar; Tej somehow is a mead that came from Ethiopia and referred as white wine; and the last is Ypocras a mead added with spices. No matter what flavoring is added to the mead, the final strength and sweetness of this drink depend on the proportion of the honey and water a mether or mead maker used.

However, there is no recorded mead flavored with dragon fruit yet. Hence, the study is focused on developing a mead flavored with dragon fruit and assessing its acceptability in the market. In order to do that, the researcher has made use of two treatments to see which one is preferred by consumers, which will enable the researcher to set a standard ingredient for mead.

MATERIALS AND METHODS

Preparation of the Dragon Fruit Must

The fruit must of the Dragon fruit was obtained by washing the fruit, cutting it in half, scooping it, and crushing it until the juice came out. Making the must of the dragonfruit is the first process in making the mead. You can also include its peeling if you desire since it is smooth and can be added.

Honey Preparation

The honey added to the treatment was bought from the province of Quezon, Philippines. Based on the literature, the honey must be simmered at 185 degrees Fahrenheit with water to eliminate the scummed floating in the honey. Besides, the selection of honey must be taken into consideration because there are those honey that are tampered with water or added with sugar or citrus, making it adulterated. The honey used was produced by a natural beehive of the cliffs and trees in the forests. It was harvested by the local bee hunters from the place. The honey is unprocessed, unfiltered, unheated, and unpasteurized, ensuring that all natural ingredients, living enzymes, and other nutritional elements are preserved.

Yeast Inoculation

The yeast used in the study was a commercialized Red Star Premier Blanc Wine Yeast, which was manufactured in Belgium by Fabriqué en Belgique par Algist Bruggeman N.V. Langerbruggekaai 37, 9000 GENT for pour. Its ingredients are *Saccharomyces bayanus*, emulsifier: sorbitan monostearate (E941). This yeast is an all-purpose and vigorous, moderately foaming, and sulfite-tolerant strain. This brand is suitable for making Mead, Cider, Cabernet, Dry Whites, other Fruits and Sodas. It has a 15% alcohol tolerance with a fast rate of fermentation.

Dragon Fruit Mead Fermentation Process

Two compositions are selected for the treatments during the fermentation process, as shown in Figure 1. The fermentation process was done for about 3 weeks in 3 gallons of water or 13.64 liters, considering the favorable conditions of the environment, where temperature must not exceed thirty degrees Celsius to avoid possible risk of off-flavor or spoilage. The fermentation process was conducted from sterilization of materials used up to bottling. Necessary steps were conducted before the mixture of the must, inoculation of yeasts, and simmering of honey-water. Observation of the fermentation process was employed, and changes in the appearance and aroma were recorded.

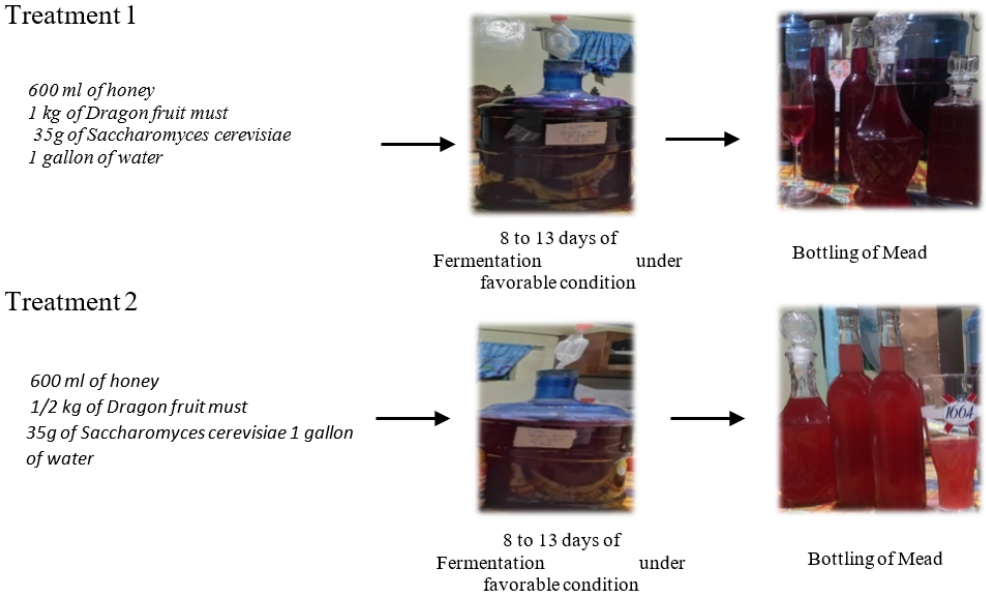

Figure 1. Dragon Fruit Mead Fermentation Process

Data Gathering Tool

The researcher utilized a quantitative descriptive analysis survey, which was clustered into two parts. The first part is intended to elicit the panelists' experience and knowledge of drinking alcoholic beverages, while the second part is to determine the physical characteristics of the product based on its aroma/odor, color/appearance, texture, and taste. The survey was conducted among 40 panelists who are alcohol experts. Another tool used in gathering needed data is the Consumer Preference Test where panelists and the other participants were assessed for their willingness to purchase the product and the total acceptability of the product. Furthermore, the consumer preference test was given to the 75 panelists who are not alcohol experts. The tools used in this study underwent pilot testing to make sure that the data gathered were valid and reliable.

Data Gathering Procedures

The researcher was not able to secure the Institutional Review Board Approval; however, before conducting the study, the samples were tested at the Department of Agriculture - Cagayan Valley Integrated Laboratory for safe consumption. Before gathering data, a consent form was presented and given to them, along with the assurance that their responses would be solely used in the study.

Data Analysis

The first part of the problem reflects the demographic profile of the respondents, which was analyzed using frequency and percentage to determine the distribution of the participants in the study. The quantitative descriptive analysis and the acceptability level of the participants were computed using a weighted mean. The use of the mean as the statistical tool is beneficial in determining the average responses and their variation from one another. In the study, there were forty (40) panelists composed of 10 females and 30 males, ranging in age from 18 to 65 years, who were treated as experts and asked to give their judgment on the mead. They were purposively selected because of their knowledge and expertise to give constructive evaluative judgement when it comes to food and beverage. There were three samples of Dragon fruit mead with 5 ml presented to them, including the controlled sample, which is a commercialized mead. Each sample was given a code like WCo1 (Treatment 1), WCo2 (Treatment 2) and WCo3 (Control). There were another 75 panelists who were randomly selected in the sensory analysis using a Hedonic rating scale with a 5-point Likert scale. They were treated as non-experts in the wine tasting, and somehow, their level of acceptability of the produced mead is equivalently important in assessing their overall impression of the mead. The hedonic rating scale was chosen because of its popularity in eliciting responses or the degree of consumer acceptance of a product (Ribeiro et al., 2024). The study employed 2 to 3 sensory evaluation tools. This technique somehow provides substantial information compared to just using a single sensory evaluation like a Hedonic rating. Integration of 2 or 3 techniques can be a powerful tool in quality evaluation.

RESULTS AND DISCUSSIONS

The percentage of alcohol present in the two-sample mead is presented in Table 1. The US standard drink, however, recommends that wine must have 12% Alcohol by Volume (12% ABV). The alcohol by volume of the two-sample wine complements the result of the test conducted by the Department of Science and Technology (DOST), where Dragon Fruit Wine A (Red) has 9.01 % alcohol, and Dragon Fruit Wine A (Yellow) has 8.88% alcohol content. This implies that the results of the two sample wines are the same and will still fall within the alcohol content in wine ranges of 5.5% to 25% ABV. This result is supported by the argument (Berger & Zelman, 2022) that the higher the concentration of alcohol, the lower the number of consumers who will choose the product because many believe that it is associated with health damage and social responsibilities (Petticrew et al., 2020; Gutan, 2024).

Table 1. Percentage of Alcohol present in the two-sample mead

Sample code	Sample Description	Result (g/100g)
CHE – 0695	Dragon Fruit Wine A(Red)	9.01
CHE – 0696	Dragon Fruit Wine A(Yellow)	8.88

The frequency and percentage distribution of the respondents as to their experience drinking alcoholic beverages were illustrated in Table 2. As shown in the table above, the percentage of males, which is 75%, compared to females, which is only 25%, implies that males are more into drinking alcoholic beverages. Although this was purposively selected, it implicitly implies that the male status when it comes to drinking is greater than the female. This supports the many studies composed mostly of men that focus on alcohol consumption and alcohol-related problems compared to women (Jaswal et al., 2025). Drinking per se and high-volume drinking were consistently more prevalent among men than among women, but lifetime abstention from alcohol was consistently

Table 2. Frequency and Percentage distribution of the respondents as to their Experience Drinking Alcoholic Beverages.

Gender		Frequency	Percent
	Male	30	75.0
	Female	10	25.0
	Total	**40**	**100.0**
Type of Drinker		Frequency	Percent
	Alcoholic Beverage Consumer	28	70.0
	Expert Wine Consumer	3	7.5
	Non Expert Wine Consumer	9	22.5
	Total	40	100.0
Age		Frequency	Percent
	18 - 25 years old	10	25.0
	26 to 35 years old	7	17.5
	36 to 45 years	12	30.0
	46 to 55 years old	2	5.0
	56 to 65 years old	9	22.5
	Total	40	100.0
Experienced Drinking Alcoholic Beverage		Frequency	Percent
	Yes	39	97.5
	No	1	2.5
	Total	40	100.0

more prevalent among women (Zhao et al., 2023). On the Type of Drinker Variable, 70% of the respondents are Alcoholic Beverage Consumers. While 7.5% have said that they are experts when it comes to wine, 22.5% of them are expert wine consumers. As the literature has said, flavor and sensory perception are highly variable across individuals (Bertelsen et al., 2020). Although there was a minimal percentage of non-expert respondents compared to non-expert wine consumers, the data still supports the findings of the researcher that their responses are helpful in the overall taste impression and acceptability of the mead product. When it comes to age as an indicator of the general profile of the respondents, the findings revealed that the respondents are mostly from ages 36 to 45 years old. A higher prevalence of high-frequency drinking in older age groups of drinkers is reported also in at least a few other surveys (Ranker et al., 2023). On their experience of drinking alcohol, almost all the respondents, which accounts for 97.5% of the population, have said that they already consumed alcohol. Kilian et al. (2022) conducted a large population survey between men's and women's drinking behavior, showed that the prevalence of high drinking is higher in men than women and the high volume of frequent drinking is higher in the oldest age group, and finally, the frequency of drinking did not decline instead it tends to become increasing especially in Europe and other English-speaking countries like the Philippines.

Table 3. Responses of the respondents in rank style as to the type of Alcoholic Beverage they consumed

Data	Rank
Beer	1
Brandy	4
Mead	8
Rum	5
Spirits	3
Tequila	7.5
Vodka	6
Whiskey	7.5
Wine	2

The responses of the respondents in rank style as to the type of alcoholic beverage they consumed are shown in Table 3. The result shows that among the alcoholic beverages included in the choices on the type of alcohol they consume, beer got the first rank and the least Mead. In a study, 'Influence of information about manufacturing process on beer acceptability,' the results show the mean acceptability liking for beer has been confirmed by the author's findings (Hernández-Mora et al., 2022). The study where two-way ANOVA was used to assess the differences between actual liking mean scores and the baseline shows that manufacturing processes have a significant effect on beer acceptability (Orden et al., 2023).

The frequency and percentage distribution of the respondents as to how often they consumed alcoholic beverages were revealed in Table 4. The results have shown the frequency of the respondents drinking alcohol, and obviously, they are only more into drinking alcohol on special occasions, which garnered 60%, while the least have 2.5% who drink alcohol every day. This only implies the awareness of the respondents on the effect of alcohol on our health, especially if they do it on a daily basis of consuming it. High levels of alcohol consumption (2 drinks per day) are associated with an increased risk of hypertension (Vacca et al., 2023). The frequency and percentage distribution of the respondents as to their knowledge about mead were shown in Table 5. Gleaned from the table

above is the response of the respondents regarding their knowledge of Mead. It shows that there were 34 respondents who knew this wine already, which accounts for 85% of the respondents, while 6 of them, which accounts for 15%, have said that they do not know about Mead. The decision to consume alcohol has been associated with factors like variety seeking, experience, product involvement, demographic characteristics, and sources of information. Additionally, subjective knowledge is related to one's own preferences and other sources like acquaintances, sales personnel, and friends (Pickering, 2024; Gorman et al., 2024).

Table 4. Frequency and Percentage distribution of the respondents as to how often they consumed Alcoholic Beverage

	Frequency	Percent
Everyday	1	2.5
3 to 5 times a week	7	17.5
Once a week	4	10.0
Only on weekend	4	10.0
On special occasion	24	60.0
Total	40	100.0

Table 5. Frequency and Percentage distribution of the respondents as to their knowledge about Mead

	Frequency	Percent
Yes	34	85.0
No	6	15.0
Total	40	100.0

The frequency and percentage distribution of the respondents as to their assessment of the color of the product are presented in Table 6. Among the color options associated with red, Ruby got the highest, at 62.5%. According to research, the color red is eye-catching and triggers appetite. It's useful for packaging design; this is likely because the color, when found in natural foods like berries, indicates ripeness or sweetness (Romeh et al., 2024). The aroma/odor of mead was revealed in Table 7. Generally, the respondents associated the aroma or odor of the mead product with a red berry aroma, which was sweet, tangy, and even zesty nuance. In a study of the aroma of wine, various volatile compounds have been seen to interact with each other and create the final aroma and flavor palette of the product. The aroma also is affected by the amount of ethanol present in a wine. It shows that a decrease in the ethanol concentration in a model wine from 10 to 9% had no effect on the flavor or aroma profile. When the ethanol was lowered to 7%, there was an increase in the strength of the flowery, fruity, and acid flavors and aromas. However, when ethanol concentration was lowered to 3%, the wine no longer resembled a wine anymore (Gabler et al., 2024). In another study, the reduction of the alcohol levels in wine affects the bouquet by intensifying the fruity odor and woody odor of wine. Consequently, modification of their chemical ratio also affects the odor of the alcoholic beverage (Silva, 2024).

The results on product taste acceptance are shown in Table 8. The findings revealed that the product's taste was fairly acceptable, with 1.83 as a categorical mean. In assessing the results, the researcher is supposed to enhance the quality of the product's taste by considering factors such as the correct proportion of ingredients, the quality of the ingredients, and even the condition of fermentation. This

is because a 1.83 hgb using a qualitative technique to explore the perception of the drinkers when it comes to quality wine, and they found out that quality is based on intrinsic and extrinsic factors. Extrinsic factors include the kind of fruits, production, and marketing, while Intrinsic factors are appearance, pleasure, and gustatory (taste, smoothness, body, drinkability, balance, concentration, complexity, and interest).

Table 6. Frequency and Percentage distribution of the respondents as to their Assessment on the color of the product

	Frequency	Percent
Purple	5	12.5
Ruby	25	62.5
Garnet	6	15.0
Orange	4	10.0
Total	40	100.0

Table 7. Aroma/odour of Mead

Data	Rank
Citrus	2
Tropical	4/5
Red berry	1
Blue berry	5.5
Black berry	5.5
Apple	3
Pear	6.5
Stone Fruit	6.5

Table 8. Product Taste

Variable	Mean	Description
Sweetness	1.60	Fairly Acceptable
Acidity	2.30	Fairly Acceptable
Mouthful/Tannin	1.65	Fairly Acceptable
Alcohol	1.53	Fairly Acceptable
Finish	1.63	Fairly Acceptable
Food Pairing	2.30	Fairly Acceptable
Categorical Mean	1.83	Fairly Acceptable

The acceptability level of the three coded samples is shown in Table 9. Control treatment or the commercialized product garnered the highest mean average when it comes to color and appearance. Between the two mead products, Treatment 1 got higher, with 4.11, than Treatment 2, with 3.93 as the mean. This implies that color affects the acceptability of the respondents when it comes to choosing a product, and the two created samples from Treatment 1 tend to have a ruby color, which is brighter and reflects the vibrant color of the wine. When it comes to the aroma/smell, Control treatment still got the highest, well, obviously, since this was already commercialized. Between treatments 1 and 2, the latter got 1 point higher, 3.88, acceptable, while treatment 1 got 3.87, acceptable. The difference is not by far big. Hence, it would still imply that the two created mead products are acceptable when it comes to their Aroma/Smell. On the other hand, regarding taste/flavor, the control treatment still got the highest, with 4.41, which is highly acceptable. Treatment 1 is higher in terms of mean, which is 4.04, acceptable; however, Treatment 2 was also noted to be acceptable at the same time,

although the mean is lowered compared to the former code. Generally, respondents have assessed control treatment to be highly acceptable. This is because people tend to accept a product when they have experienced it already (Rauschnabel et al., 2024).

Table 9. Acceptability level of the three coded samples

Treatment 1		
Variable	Mean	Description
Color/Appearance	4.11	Acceptable
Aroma/Smell	3.87	Acceptable
Taste/Flavor	4.04	Acceptable
Categorical Mean	4.00	Acceptable
Treatment 2		
Color/Appearance	3.93	Acceptable
Aroma/Smell	3.88	Acceptable
Taste/Flavor	3.81	Acceptable
Categorical Mean	3.88	Acceptable
Control		
Color/Appearance	4.35	Highly Acceptable
Aroma/Smell	4.39	Highly Acceptable
Taste/Flavor	4.41	Highly Acceptable
Categorical Mean	4.38	Highly Acceptable

The willingness of the respondents to purchase the product is presented in Table 10. An alcoholic beverage is a product that is noted to be an information-experience product because the quality cannot be assessed until one has actually been involved in consuming it (Faro, 2021; Petticrew et al., 2020). The olfactory factors of alcohol are part of the total experience of a consumer (Betancur et al., 2020). Hence, marketers must have a deep understanding of the consumers' sensory preferences when it comes to the alcoholic beverage that they are buying, and this somehow is an area that has not yet been extensively researched (Betancur et al., 2020). Surprisingly, the findings above have shown that the three coded samples have an acceptable impression among respondents, with a categorical mean of 3.97. Although Control got the highest, treatment 1 is not by far, with 4.03 as the mean average. This shows that respondents are willing to purchase the products, although 85% know mead.

Table 10. Willingness to purchase scale

Variable	Mean	Description
Treatment 1	4.03	Acceptable
Treatment 2	3.75	Acceptable
Control	4.13	Acceptable
Categorical Mean	3.97	Acceptable

The nutritive value content of mead is listed in Table 11. With the use of proximate analysis, nutrient content on mead was identified. In comparison, Treatment 1 has a total kcal content of 71 while Treatment 2 has a 90 kcal content. This means that Treatment 1B is greater when it comes to its intensity of providing more energy to the body. The nutritional information of the mead product is necessary for giving nutritional data of the products to potential consumers. The results have shown that while mead is not commonly known to many, findings revealed that it is a source of vitamin C, has anti-oxidant, and calorie content which is at the minimum level (Medina & Medina, 2025; Essiedu & Kovaleva, 2024). The relationship between the level of willingness of the consumers and

the overall taste acceptability is exemplified in Table 12. The three samples have illustrated highly significant results in the respondents' willingness to buy the products. Furthermore, there is a positive correlation between the overall taste preferences and their willingness to purchase the product.

Table 11. The Nutritive Value content of Mead

Treatment 1 Sample net. Weight: 1000ml		
Nutrition Facts		
Serving size: 147 ml No.of servings per container:7 % of alcohol: 9%		
Amount per serving		
		%RENI
		3%
Calories (kcal) 71		
Calories from fat 0 kcal		
Total fat (g)	0.0	-
Total Carbohydrates (g)	2.3	-
Sugar (g)	2.3	-
Total Protein (g)	0.0	0%
*Percent RENI values are based on 2015 RENI PDRI reference male adult requirement of 19-29 years old		
Treatment 2 Sample net. Weight: 1000ml		
Nutrition Facts		
Serving size: 147 ml No.of servings per container:7 % of alcohol: 12%		
Amount per serving		
		%RENI
		3%
Calories (kcal) 90		
Calories from fat 1 kcal		
Total fat (g)	0.1	-
Total Carbohydrates (g)	3.4	-
Sugar (g)	3.4	-
Total Protein (g)	0.0	0%
*Percent RENI values are based on 2015 RENI PDRI reference male adult requirement of 19-29 years old		

Table 12. Test of Relationship between the Level of Willingness of the Consumers and the Over-all Taste Acceptability

Variable		Willingness to Purchase Scale
Treatment 1	r – value	.760*
	p – value	.000
Treatment 2	r – value	.743*
	p – value	.000
Control	r – value	.564*
	p – value	.000

CONCLUSION

In the present study, only when these two treatments were being correlated to a commercially available product, undeniably, the commercialized product was highly accepted by the respondents. This is because, according to literature, people tend to purchase a good that they have already experienced, considering the extrinsic and intrinsic factors that affect the product. On the other side of the findings, the physicochemical properties of meads were also analyzed, and chemical elements were found to be responsible for sensory properties like color, taste, and aroma. This method is essential in determining the quality of mead. When it comes to the respondents' willingness to purchase the product, it was noted that there is a positive correlation, which is highly significant for the respondents. The results of this study imply that mead with added dragon fruit has the potential to produce mead that is preferred by respondents.

RECOMMENDATION

The researcher highly recommends further investigation of mead wine, particularly on the possibility of mixing those fruits available in the study setting. Furthermore, since the foregoing study has a high chance of being an alternative option among consumers, future research may include a return on investment.

ACKNOWLEDGEMENT

The author is grateful to the Department of Agriculture - Cagayan Valley Integrated Laboratory for their expert support and technical assistance in letting the researcher use their laboratory facilities to analyze data needed to elicit information on the samples. Gratitude is also given to the Isabela State University - San Mariano Campus for financing the expenses of this research study.

COMPETING INTEREST

The author declares that she has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

Afroz, R., Tanvir, E. M., & Hossain, Md. M. (2023). *Honey: Composition and Health Benefits: Physical Properties of Honey* (Md. Ibrahim Khalil, Siew Hua Gan, Bey Hing Goh Ed.). Wiley. https://doi.org/10.1002/9781119113324.ch2

Berger, A. T., & Zelman, K. (2022). What Does "Moderate" Alcohol Consumption Mean?. *ADCES in Practice*, *10*(6), 36–40. https://doi.org/10.1177/2633559X221128782

Bertelsen, A. S., Mielby, L. A., Alexi, N., Byrne, D. V., & Kidmose, U. (2020). Individual Differences in Sweetness Ratings and Cross-Modal Aroma-Taste Interactions. *Foods*, *9*(2), 146. https://doi.org/10.3390/foods9020146

Betancur, M. I., Motoki, K., Spence, C., & Velasco, C. (2020). Factors influencing the choice of beer: A review. *Food Research International*, *137*, 109367. https://doi.org/10.1016/j.foodres.2020.109367

Edo, G. I., Onoharigho, F. O., Akpoghelie, P. O., Akpoghelie, E. O., Agbo, J. J., Agoh, E., & Lawal, R. A. (2023). Natural Honey (Raw Honey): Insights on Quality, Composition, Economic and Health Effects: A Comprehensive Review. *Food Science and Engineering*, *4*(2),265–293. https://doi.org/10.37256/fse.4220232713

Essiedu, J. A., & Kovaleva, E. G. (2024). Physicochemical, antioxidant activity, and sensory charac

teristics of mead produced with Hibiscus sabdariffa and Betula pendula (Birch sap). *Biocatalysis and Agricultural Biotechnology*, *58*, 103189. https://doi.org/10.1016/j.bcab.2024.103189

Faro, M. T. F. D. A. D. B. (2021). *Judging a wine by its bottle: the influence of wine packaging on consumers* [Master Dissertation, Universidade Católica Portuguesa]. Repositório Institucional da Universidade Católica Portuguesa. http://hdl.handle.net/10400.14/35305

Franceschetti, G. M. (2023). *Sensory and phenolic characterization of red wine according to the vintage year. A case study related to the red wines from the North of Italy* [Master Dissertation, Instituto Superior de Agronomia, Universidade de Lisboa]. Repositório da Universidade de Lisboa. http://hdl.handle.net/10400.5/30889

Gabler, A. M., Ludwig, A., Biener, F., Waldner, M., Dawid, C., & Frank, O. (2024). Chemical Characterization of Red Wine Polymers and Their Interaction Affinity with Odorants. *Foods*, *13*(4), 526. https://doi.org/10.3390/foods13040526

Gorman, M., Stright, A., Baxter, L., Moss, R., & McSweeney, M. B. (2024). An analysis of consumer perception, emotional responses, and beliefs about mead. *International Journal of Food Science & Technology*, *59*(10), 7426–7435. https://doi.org/10.1111/ijfs.17483

Gutan, V., Mogildea, I., Soare, I., & Zugravu, G. A. (2024). The Composition, Benefits and Risks of Wine Consumption. *Annals of the University Dunarea de Jos of Galati: Fascicle: I, Economics & Applied Informatics*, *30*(2), 146-154. https://doi.org/10.35219/eai15840409421

Harder, M. N. C., Martins Benetole, B., Pinheiro Claro Gomes, W., Paiva Generoso, E., Verde de Campos, S., Nalesso Costa Harder, L., & Arthur, V. (2021). MEAD OF NATURAL FERMENTATION. *Journal of Microbiology, Biotechnology and Food Sciences*, *11*(1), e3628. https://doi.org/10.15414/jmbfs.3628

Hernández-Mora, Y. N., Verde-Calvo, J. R., Malpica-Sánchez, F. P., & Escalona-Buendía, H. B. (2022). Consumer Studies: Beyond Acceptability—A Case Study with Beer. *Beverages*, *8*(4), 80. https://doi.org/10.3390/beverages8040080

Iffah Nadhira Madzuki, Nuradila Jin Samsudin, Rumaisa Nordin, Zahirrah Begam Mohamed Rasheed, & Aliah Zannierah Mohsin. (2024). Thermal and photostability of betacyanin from dragon fruit (*Hylocereus polyrhizus*). *Journal Of Agrobiotechnology*, *15*(S1), 88–97. https://doi.org/10.37231/jab.2024.15.S1.377

Jaswal, H., Sohi, I., Chrystoja, B., Imtiaz, S., Franklin, A., Wettlaufer, A., Rehm, J., Monteiro, M., & Shield, K. (2025). Surveillance of alcohol use through population surveys in the Americas from 2010 to 2019. *Addiction*, *120*(1), 23–47. https://doi.org/10.1111/add.16661

Kilian, C., O'Donnell, A., Potapova, N., López-Pelayo, H., Schulte, B., Miquel, L., Paniello Castillo, B., Schmidt, C. S., Gual, A., Rehm, J., & Manthey, J. (2022). Changes in alcohol use during the COVID-19 pandemic in Europe: A meta-analysis of observational studies. *Drug and Alcohol Review*, *41*(4), 918–931. https://doi.org/10.1111/dar.13446

Mărgăoan, R., Cornea-Cipcigan, M., Topal, E., & Kösoğlu, M. (2020). Impact of Fermentation Processes on the Bioactive Profile and Health-Promoting Properties of Bee Bread, Mead and Honey Vinegar. *Processes*, *8*(9), 1081. https://doi.org/10.3390/pr8091081

Medina, M. N. C. J., & Medina, P. V. J. (2025). *Microbiology and health benefits of mead: Microbiology and Health Benefits of Traditional Alcoholic Beverages*. Academic Press. https://doi.org/10.1016/B978-0-443-13322-0.00002-2

Orden, D., Fernández-Fernández, E., & Tejedor-Romero, M. (2023). Image-based evaluation of beers at an online Pint of Science festival using projective mapping, check-all-that-apply, and acceptability. *Journal of Sensory Studies*, *38*(4). https://doi.org/10.1111/joss.12834

Petticrew, M., Maani, N., Pettigrew, L., RUTTER, H., & van Schalkwyk, M. C. (2020). Dark Nudges and Sludge in Big Alcohol: Behavioral Economics, Cognitive Biases, and Alcohol Industry Corporate Social Responsibility. *The Milbank Quarterly*, *98*(4), 1290–1328. https://doi.org/10.1111/1468-0009.12475

Pickering, G. J., & Kemp, B. (2024). Understanding Sparkling Wine Consumers and Purchase Cues: A Wine Involvement Perspective. *Beverages*, *10*(1), 19. https://doi.org/10.3390/beverages10010019

Ranker, L. R., Ross, C. S., Rudolph, A. E., Weuve, J., & Xuan, Z. (2023). Identifying and describing trajectories of alcohol use frequency and binge drinking frequency among those

aged 15–30 years in a national cohort of US adolescents: A group-based trajectory modeling approach. *Addiction*, *118*(9), 1739–1750. https://doi.org/10.1111/add.16216

Rauschnabel, P. A., Hüttl-Maack, V., Ahuvia, A. C., & Schein, K. E. (2024). Augmented reality marketing and consumer–brand relationships: How closeness drives brand love. *Psychology & Marketing*, *41*(4), 819–837. https://doi.org/10.1002/mar.21953

Ribeiro, J. C., Rocha, C., Barbosa, B., Lima, R. C., & Cunha, L. M. (2024). Sensory Analysis Performed within Augmented Virtuality System: Impact on Hedonic Scores, Engagement, and Presence Level. *Foods*, *13*(15), 2456. https://doi.org/10.3390/foods13152456

Romano, R., Aiello, A., de Luca, L., Sica, R., Caprio, E., Pizzolongo, F., & Blaiotta, G. (2021). Characterization of a new type of mead fermented with *Cannabis sativa* L. (hemp). *Journal of Food Science*, *86*(3), 874–880. https://doi.org/10.1111/1750-3841.15614

Romeh, R., Elhawary, D., Maghraby, T., Elhag, A., & Hassabo, A. (2024). Psychology of the color of advertising in marketing and consumer psychology. *Journal of Textiles, Coloration and Polymer Science*, *21*(2), 427-434. https://doi.org/10.21608/jtcps.2024.259025.1272

Saša, P., Igor, P., Maja, S., Aleksandar, S., & Ana, V. (2022). Mead fermentation parameters: Optimization by response surface methodology. *Foods and Raw materials*, *10*(1), 137-147. http://hdl.handle.net/1959.7/uws:57260

Senn, K., Cantu, A., & Heymann, H. (2021). Characterizing the chemical and sensory profiles of traditional American meads. *Journal of Food Science*, *86*(3), 1048–1057. https://doi.org/10.1111/1750-3841.15607

Silva, P. (2024). Low-Alcohol and Nonalcoholic Wines: From Production to Cardiovascular Health, along with Their Economic Effects. *Beverages*, *10*(3), 49. https://doi.org/10.3390/beverages10030049

Vacca, A., Bulfone, L., Cicco, S., Brosolo, G., da Porto, A., Soardo, G., Catena, C., & Sechi, L. A. (2023). Alcohol Intake and Arterial Hypertension: Retelling of a Multifaceted Story. *Nutrients*, *15*(4), 958. https://doi.org/10.3390/nu15040958

Zhao, J., Stockwell, T., Naimi, T., Churchill, S., Clay, J., & Sherk, A. (2023). Association Between Daily Alcohol Intake and Risk of All-Cause Mortality. *JAMA Network Open*, *6*(3), e236185. https://doi.org/10.1001/jamanetworkopen.2023.6185