

Development of Young Coconut (*Cocosnucifera*) Wine

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Abstract - The study aimed to develop wine from young coconut water. This investigated the acceptability of the quality attributes of young coconut wine compared with commercial wine. Using a 5-point hedonic scale, sensory evaluation test was done by the panelists (N=30) to evaluate the acceptability of the product quality attributes such as color, aroma and taste. Results of the sensory evaluation showed that young coconut wine has a pale light color, powerful aroma and sweet taste. Results also showed that panelists choose the color and taste of the young coconut wine as its desirable attributes. Statistical analysis ($p < 0.05$) showed significant difference in the color and aroma between young coconut wine and commercial wine but no significant difference in terms of taste.

Keywords– coconut, sensory evaluation, wine, young coconut water

INTRODUCTION

Coconut is the fruit produced by the coconut palm (*Cocosnucifera*) which belongs to the family of Areaceae. Coconut is found in tropical regions generally within 22°N and S of the equator and most commonly near the sea coast. The coconut palm is found throughout the west tropical lowlands but will grow anywhere if there are sufficient rain and warmth. It has been known for thousands of years and nobody knows its original home. Perhaps the most likely places are Malaysia or Indonesia, but one thing is certain, it has been spread through the tropics almost entirely by man and has become a typical feature [1].

There is increasing scientific evidence that supports the role of coconut water in health and medicinal applications. Coconut water is one of the world's most versatile natural product[2]. This beverage is well-known for its health and medicinal value. This contains unique chemical composition of sugars, vitamins, minerals, amino acids and phytohormones and a rich source of electrolytes and natural salts, especially potassium and magnesium. It is low calorie and nearly fat-free, low in sugar as well as containing a little fiber to moderate absorption and is rich in cytokinins, or plant hormones, which have anti-aging, anti-cancer, and anti-thrombolytic effects in humans [2]. Through these nutritional values on

hand, young coconut water can be considered valuable food product.

When the nut is opened and exposed, the pH of the juice, usually between 5.0 and 6.0, stimulates rapid microbial growth and discoloration due to polyphenol oxidase (PPO) and peroxidase (POD) enzymes [3]. Preservation of this kind of beverage includes freezing, pasteurization, ultrafiltration, or the use of additives [4],[5],[6]. The use of stabilization technology which involves shorter periods of high temperature can result to undesired physicochemical modifications in food [7]. Thus, there is a need to innovate preservation techniques in order to add value to the young coconut water and the coconut itself, in general.

There are many literatures about wine making from many fruits but little or no work on wine production from the coconut water is available. Researchers have tried producing wine out of pineapple, watermelon, grapes, strawberry, orange and other fruits [8],[9], [10], [11]. The wine that is widely drunk out of coconut is well-known as tuba wine but they are produced from the fermented coconut sap [12].

Typically, commercial wine and locally homemade wine is an alcoholic beverage made from fermented fruit juices, various types of yeast, sugar, and additives. In the absence of oxygen, yeast

consumes the sugar and converts them into alcohol known as ethanol through the process of fermentation. Moreover, additives contribute by giving distinct taste or flavor to enhance the quality of the wine [13]. Additionally, temperature and pH are the factors influencing yeast autolysis. In wine, the process occurs at low pHs (3 to 4), and at relatively low temperatures (e.g., 15 to 18°C). Permitting the wine to be in contact with the yeast for a longer period makes the beneficial effects of autolysis [14].

It is at this point that the possibility of producing wine from young coconut water is considered in this study. The positive result of this study will hopefully catalyze similar researches on other fruit juices, thus, making them a quality new product that will open doors for sustainable development and economy not only in the province of Oriental Mindoro but as well as the entire country.

OBJECTIVES OF THE STUDY

This study aimed to describe the quality attributes and level of acceptability of pasteurized young coconut wine and commercial wine in terms of color, aroma and taste. Moreover, it also aimed to compare the acceptability differences of pasteurized young coconut wine and commercial wine in terms of its quality attributes.

MATERIALS AND METHODS

Materials, Tools and Equipment

The materials used were pasteurized young coconut water, brown sugar, wine yeast, fresh lemon grass, and honey. The tools and equipment used were spoon, mixing bowl, measuring cup and spoon, funnel, stainless casserole, pasteurized bottle, cotton, cheesecloth, gas stove and pressure cooker.

Preparation of Coconut Wine

Young coconut water was separated from the shell, strained using a clean cheese cloth or fine sieve. Using gas stove, fresh young coconut water was pasteurized in a clean and sanitized pressure cooker for 10 minutes at 100 °C. It was then removed from the flame and let the young coconut water become warm. The desired amount of sterilized young coconut water and brown sugar and honey were combined, stirred and set aside. The mixture was transferred in a prepared sterilized container using a funnel. The required instant dried wine yeast was added to mixture. It was sealed with clean cotton and put in a cool dry place for at least one (1) month before

harvesting period comes. Fermented young coconut was transferred into individual bottles and aging process lasted for three (3) months to become wine completely. After the aging process, fresh lemon grass and ginger was infused to the wine for at least one (1) month. Wine was filtered in a clean sterilized bottle using funnel and fine cheese cloth to get more clear wine. Bottling, packaging and labeling was done afterwards.

Sensory Evaluation

The sensory evaluation was performed according to acceptance method. Wine evaluation was done in a well-ventilated lighted room where 30 panelists were chosen to evaluate both the developed young coconut wine and the commercial wine. Panelists are not trained but are representatives of potential consumers of the product and considered as occasional wine drinkers. To determine the level of acceptance, samples were given to 30 male and female panelists with ages 35-60 separately and they were asked to evaluate the product and fill out the form according to quality attributes of the product. To determine the quality attributes of young coconut wine and commercial wine, sensory evaluation was used. In terms of color, the indicators used were clear, dull or cloudy, bright, dark and pale light. In terms of aroma, the indicators used were fruity, powerful, subtle, putrid and floral while in terms of taste, the indicators used were sweet, bitter, sour, salty and dry. In terms of describing the acceptability of the quality attributes of young coconut wine and commercial wine, 5-point scale was used where 5 was interpreted as liked very much and 1 as disliked very much.

Statistical Analysis

The 5-point Hedonic Rating Scale was used in sensory evaluation in determining the acceptability of the two wines. T-test Analysis was used to test the differences of quality attributes between young coconut wine and commercial wine.

Table 1. Five-point Hedonic Rating Scale

Scale	Range	Description
5	4.5-5.0	Liked Very Much
4	3.5-4.49	Liked Moderately
3	2.5-3.49	Neither Liked nor Disliked
2	1.5-2.49	Disliked Moderately
1	1.0-1.49	Disliked Very Much

RESULTS AND DISCUSSION

Table 2. Acceptability of the Quality Attributes of Young Coconut Wine and Commercial Wine in terms of Color

Color	Young Coconut Wine		Commercial wine	
	Frequency	%	Frequency	%
Clear	4	13.33	0	0
Cloudy	4	13.33	1	3.33
Bright	7	23.33	4	13.33
Dark	5	16.66	24	80
Pale	10	33.33	1	3.33
Light				

As shown in Table 2, color of young coconut wine with indicator described as pale light got the highest frequency of 10 or 33.33 percent while commercial wine with indicator described as dark color got the highest frequency of 24 or 80 percent from the total number of panelists who evaluated the wine. Results show that pasteurized young coconut wine is pale light in color and commercial wine is dark in color as evaluated by the panelists. It implies that color of young coconut wine vary from the sugar used, bottle used and the area were wine is being fermented. On the other hand, color of commercial wine varies from the grapes which tend to be darker in color due to the addition of its skin during fermentation.

Table 3. Acceptability of the Quality Attributes of Young Coconut Wine and Commercial Wine in terms of Color

Aroma	Young Coconut Wine		Commercial Wine	
	Frequency	%	Frequency	%
Fruity	2	6.66	6	20
Powerful	11	36.66	14	46.66
Subtle	10	33.33	8	26.66
Putrid	6	20	1	3.33
Floral	1	3.33	1	3.33

Table 3 presents the acceptability of the quality attributes of young coconut wine and commercial wine in terms of color.

Result showed that aroma of young coconut wine with indicator described as powerful got the highest frequency of 11 or 36.66 percent from the total number of panelists who evaluated the wine. Similarly, the aroma of commercial wine described got the highest frequency of 14 or 46.66 percent from the total number of respondents who evaluated the wine. Results showed that the acceptability of the quality attributes of young coconut wine and commercial wines in terms of aroma have both

powerful aromas due to the additives being used during fermentation.

Table 4. Acceptability of the Quality Attributes of Young Coconut Wine and Commercial Wine in terms of Taste

Taste	Young coconut wine			Commercial wine	
	Frequency	%	Frequency	%	
Sweet	12	40	0	0	
Bitter	4	13.33	20	66.66	
Sour	3	10	3	10	
Salty	3	10	1	3.33	
Dry	8	26.66	6	20	

Table 4 presents the acceptability of the quality attributes of young coconut wine and commercial wine in terms of taste

The taste of young coconut wine with indicator described as sweet got the highest frequency of 12 or 40 percent from the panelists while the taste of commercial wine with indicator described as bitter got the highest frequency of 20 or 66.66 percent from the total number of panelists who evaluated the wine. This result implies that young coconut wine is literally sweet even only little sugar is being added and commercial wine is bitter in taste due to the natural bitterness of grape skin.

Table 5. Level of Acceptability of Young Coconut Wine and Commercial Wine in terms of Color, Aroma and Taste

Quality Attributes	Young Coconut Wine		Commercial Wine	
	Mean	Description	Mean	Description
Color	3.57	Liked	4.06	Liked
		Moderately		Moderately
Aroma	2.9	Liked nor	3.63	Liked
		Disliked		Moderately
Taste	3.50	Liked	3.37	Neither
		Moderately		Liked nor
Composite Mean	3.32	Liked nor	3.69	Liked
		Disliked		Moderately

Table 5 presents the acceptability of the young coconut wine and commercial wine in terms of color, aroma and taste. The quality attributes of the young coconut wine which were appealing to the panelists were its color and taste rated as liked moderately. On the other hand, the quality attributes of commercial wine which were appealing to the panelists were its color and aroma rated as liked moderately. However, the aroma of the young coconut wine was not so appealing to the panelists which can be attributed to

the short fermentation process unlike the commercial wine. The taste of the commercial wine was also not appealing to the panelists due to its bitter taste unlike the young coconut wine which has sweet taste. Generally, results showed that the commercial wine was more acceptable which falls to the description of Liked Moderately.

Table 6. T-Test Analysis on the Difference between the Quality Attributes of Young Coconut Wine and Commercial Wine

Variables	Computed T-value	Critical T-value α 0.05	Result
Color	3.0597	2.003	Significant
Aroma	3.5244	2.003	Significant
Taste	3.009	2.003	Not Significant

Data on Table 6 revealed that acceptability differences in color and aroma were significant in the evaluations for samples since the computed T-value of 3.0597 and 3.5244 respectively exceeded the critical T-value of 2.003 using 58 df at 5% level of significance. This is because the quality of young coconut wine and commercial in terms of color and aroma were both distinct. On the other hand, result showed that differences in taste between the young coconut wine and commercial wine were not significant since the computed T-value of 0.4329 failed to exceed the critical T-value of 2.003 using 58 df at 5% level of significance. This shows that young coconut wine has similar level of acceptability with that of commercial wine in terms of taste.

CONCLUSION AND RECOMMENDATION

The developed young coconut wine has light pale color, powerful aroma and sweet taste. Its taste and color are the most appealing attributes of the young coconut wine. On the other hand, acceptability differences in the quality attributes of aroma and color are comparable, with the commercial wine having a darker color and more powerful aroma which make it more appealing. However, in terms of taste, the young coconut wine is more acceptable due to its sweet taste. Generally, the commercial wine is more acceptable. Local farmers and processors will be encouraged to gather more coconut to be utilized into a valuable product which is the coconut wine. Additionally, commercialization and standardization of this product may give a big contribution to the economy of the province, given that it is abundant and has a quality and distinct taste. Moreover, this study

can serve as a basis for other related researches regarding wines. Further studies regarding coconut wine production should also be conducted to strengthen its market value.

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