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Wine Potential of Different Philippine Fruits

Rainer R. Fiscal[1], Aimee Concepcion C. Chavez[2]

[1,2]Laguna State Polytechnic University, College of Teacher Education,
L. de Leon St., Siniloan 4019, Laguna, Philippines

Abstract: ***Grapefruit is the most common source of wine around the globe. With the help of research and development, other fruits can also be an excellent source of wine. This study is conducted to determine the alcohol content and pH of the produced alcoholic beverage. It also aims to determine the sensory evaluation of wines based on the respondent's perception. Star Fruit (Averrhoa carambola), Dalanghita (Citrus nobilis), Guava (Psidium guajava), Indian Mango (Mangifera indica), Rambutan (Naphelium lappaceum), and Passion Fruit (Passiflora edulis) were the fruits used to produce wine. The result after three weeks of fermentation and four months of aging, among the six different fruits, Rambutan (11.08%), Passion Fruit (11.00%), Guava (10.97%), and Indian Mango (10.25%) fell into the category of wine (with 10-22% alcohol content) with a pH ranging from 3.17-3.81. Sensory evaluation revealed that the six fruit wines were evaluated as like slightly to like moderately by the taste panelists.***

Keywords: alcohol content, pH, Philippine fruits, wine.

1. Introduction

For the whole year round, fruits in the Philippines have harvested abundantly. During its peak season, bulks of it are thrown to waste because of spoilage. Such waste is caused by the absence of other uses or products for the fruits aside from consuming it in its fresh state. Even though Philippine fruits are not as preferred as grapes, these fruits have potential in being processed to wine. The most commonly and frequently encountered types of wine produced in the country are from rice, sugar cane, coconut, and nipa palm.

The Philippine wine industry as studied by Euromonitor International is still in its infancy compared to other alcoholic drinks like beer and spirits [1]. Philippine importations of drinks such as grape-based wine are very much higher than the production. The wine consumption of the Filipinos increases by 10 percent every year. Local production of wine is minimal due to lack of marketing and promotion, poor packaging, and labeling. With these problems, the Department of Science and Technology launched the DOST High Impact Program on Tropical Fruits and Distilled Spirits to reintroduce, upgrade and promote the various wines and spirits of the country [2].

Reports on the production of wine from Philippine fruits are limited in the literature, and yet limited significant scientific work has been reported. Because of the tradition that grapes produced wine, it seems to be promising for the production of alcoholic beverage such as wine from Philippine fruits.

This study is conducted to develop and produce wine from different Philippine fruits. Specifically, it aims to determine the alcohol content (% ethanol) and pH of the produced alcoholic beverage. The study also seeks to determine the sensory evaluation of wines based on respondent's perception.

2. Materials and Methods

2.1 Research Design

The method of research employed in this study was the experimental method. The quality of different fruit wines was determined through alcohol content, pH and sensory evaluation.

2.2 Special Techniques and Procedure

Collection of Raw Materials
Different fruits such as star fruit, dalanghita, guava, Indian mango, rambutan and passion fruit were obtained directly from the vendors of fruits at various markets in the province of Laguna. The wine yeast *Saccharomyces cerevisiae bayanus* was obtained from the Food Science Cluster, College of Agriculture, University of the Philippines Los Banos, College, Laguna.

Extraction of the Different Fruit Juices
Fresh, ripe and matured fruits were washed, peeled, and then extracted with the aid of a blender. The juices were strained using cheesecloth.

Preparation of the Must
One liter of each extracted fruit juices was measured then added to 3 liters of water and 1 kg of sucrose. The mixtures were pasteurized for 10 minutes then allowed to cool down. All the samples were prepared in triplicate.

Preparation of Yeast Starter
Ten percent of the must was taken from each of the samples and used as yeast starters. A swab of yeast inoculums was taken from the yeast culture and added to the pasteurized must as yeast starters. Fruit musts mixtures and the yeast starters were left covered using cheesecloth and stored in a cool, dry place for 24 hours. After 24 hours the yeast starters slurry were swirled slightly then ten mL was taken and added to each of the samples.

Fermentation, Harvesting, and Ageing

Fermentation was allowed to be held in an aerated container at room temperature for seven days. The mixtures were transferred to fermentation glass bottles and filtered twice with an interval of 7 days apart. On the third filtration, the solutions were transferred to a wine bottle and filled to its brim and covered tightly, stored for four months in a dark area for aging.

Physicochemical Analyses of Wines

The pH of the wine samples was determined using a digital pH meter. The alcohol content was determined using the alcohol distillation and specific method and conversion table.

Sensory Evaluation of Wine

The physical properties of wines such as aroma, clarity, color, and taste were determined through organoleptic testing or evaluation of consumer acceptability of wine. To assess the consumer acceptability of the final product, thirty male and female drinkers who claimed to be physically fit acted as taste panelists and were selected using purposive sampling to evaluate the produced wines using a five-point Hedonic Scale Quality Scoring where 1-dislike very much, 2-dislike moderately, 3-like slightly, 4-like moderately, and 5-like very much. The taste panelists were asked to rate the wine samples using the score sheet rubrics as they perceive it. Three testing were conducted where each testing composed of six wine samples and was served in clean, transparent wine glasses which is randomly labeled.

Statistical Analysis

Data on the alcohol content, pH and sensory evaluation of wines developed from different Philippine fruits were analyzed using mean.

3. Results and Discussion

Alcohol Content

Results revealed that after three weeks of fermentation and four months of aging, rambutan produced the highest alcohol content of 11.08% followed by passion fruit with 11.00%, guava with 10.97%, and Indian mango with 10.25% (Table 1). The alcohol content of the four samples of fruits is considered as wine. Wine is a type of alcoholic beverages with 10 – 22% of alcohol [3]. Wine is chemically composed of two main ingredients, water, and ethanol. Ethanol in wine is important because ethanol is indispensable for the aging, stability and organoleptic characteristics of wine and it gives health benefits [4]. Wine is also categorized as low alcohol wine (below 10%), medium-low alcohol wine (10-11.5%), medium alcohol wine (11.5-13.5%), medium-high alcohol wine (13.5-15%), and high alcohol wine (over 15%) [5]. The result of the study is similar to the studies of Singh and Kaur [6] on litchi wine with 11.60% ethanol; Okoro [7] on roselle and pawpaw red wine with 10.50% ethanol; and Tatdao et al. [8] on white cheese wood wine with 11.90 – 12.60% ethanol.

pH

The pH of the produced wines ranges from 3.17-3.81 (Table 2). Wines must have acids for longevity. White wines generally have a pH of 2.80-3.40 and red wines with 3.41-3.80 [9]. Indian mango produced the lowest pH with 3.17, followed by passion fruit with 3.22 and guava with 3.35. The pH of three wines is the lowest among all six wines, and it fell under the category of white wine since all the wines produced in this study are categorized as white wine. The pH of the produced wines is similar to the pH of jamun fruits red wine (3.30) [10], orange wine (3.60) [11], and roselle and pawpaw red wine (3.57) [12].

Sensory Evaluation

Results of the sensory evaluation showed that the panelists rated six fruit wines as like slightly to like moderately. The aroma of guava wine was evaluated with detectable pleasant fruity odor. On the other hand, the aroma of passion fruit, dalanghita, rambutan and Indian mango wines was evaluated with moderately detectable fruity odor while star fruit wine was evaluated with a pleasant odor. Clarity of the six fruit wines was evaluated with clear and no floating particles. The color of the dalanghita, passion fruit, rambutan, Indian mango, and guava wines were evaluated with yellow shade to slightly orange color while star fruit wine was evaluated with clear appearance and residues. Taste of the passion fruit, dalanghita, Indian mango, rambutan and guava wines were evaluated with tart taste while star fruit wine was evaluated with a bitter taste. The result of the study is similar to sweet potato wine with a color of yellowish white with little transparency, with very good taste and aroma with the good body [13].

Table 1: Alcohol Content of Different Samples of Wine

Fruit	*Alcohol Content (% Ethanol*
Star Fruit	3.67
Dalanghita	2.67
Rambutan	11.08
Passion Fruit	11.00
Guava	10.97
Indian Mango	10.25

Table 2: pH of Different Samples of Wine

Fruit	*pH*
Star Fruit	3.75
Dalanghita	3.60
Rambutan	3.81
Passion Fruit	3.22
Guava	3.35
Indian Mango	3.17

Table 3: Sensory Evaluation of Different Samples of Wine

Fruit Wines	*Aroma*	*Clarity*	*Color*	*Taste*
Star Fruit	3.23	3.83	3.03	3.13
Dalanghita	3.77	3.66	3.67	3.77
Rambutan	3.94	4.06	3.94	4.14
Passion Fruit	3.54	3.89	3.93	3.57
Guava	4.22	3.94	3.97	4.14
Indian Mango	3.97	3.86	3.95	4.06

* 1.00 – 1.80 (Dislike Very Much), 1.81 – 2.60 (Dislike Moderately), 2.61 – 3.40 (Like Slightly), 3.41 – 4.20 (Like Moderately), 4.21 – 5.00 (Like Very Much)

4. Conclusion and Recommendation

Rambutan, passion fruit, guava, and Indian mango can be a great source of wine. However, other fruits of the Philippines aside from this study are suggested to develop into wine.

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Author Profile

Rainer R. Fiscal received the B.S. degree in Education major in General Science from the University of Rizal System in 2003 and M.A. in Teaching Science and Technology from Laguna State Polytechnic University in 2014. He is now with LSPU as College Instructor.

Aimee Concepcion C. Chavez received the B.S. degree in Chemical Engineering from Saint Louis University in 2001 and M.A. in Teaching Science and Technology from Laguna State Polytechnic University in 2012. She is now with LSPU as College Instructor.