

Varying Volume of Heated Wine with Gelatin as Clarifying Technique in Cashew Wine Processing

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ABSTRACT

The study was conducted to determine the effect of gelatin dissolved in varying volumes of heated wine on the quality and acceptability of cashew wine before and after clarification and after two months clarification. Twenty five (25) liters of eight month old cashew wine was equally distributed in 5 treatments with each treatment utilizing various volume of heated wine in clarifying wine. Ten selected panelists evaluated the quality and acceptability of wine in terms of color, aroma and clarity. Kruskal Wallis statistics method was used to test the differences of quality and acceptability among treatments.

Alcohol content ($^{\circ}$ R%) and sugar concentration ($^{\circ}$ Brix) were the same for all treatments after 2 months storage. Likewise, all treatments had statistically the same color, aroma and clarity of all treatments after two months storage. On the other hand, the specific gravity of the 5 treatments increased after 2 months storage.

Keywords: Gelatin, alcohol content, sugar concentration, specific gravity

INTRODUCTION

Cashew (*Anacardium occidentale* L.) is a crop whose potential was not utilized extensively and not fully appreciated because its benefits were not extensively publicized. It is the leading nut crop of the Philippines where 90% of cashew production comes from the province of Palawan. Cashew kernels are eaten in fried, roasted or brittle form and can be processed as whole or split. Young cashew leaves can be eaten fresh and its apples are eaten raw but can be processed into candies, jams, jellies, vinegar and wine.

Cashew apple like other fruits can be processed into wine. The process of cashew making is similar to other fruits where cashew apple's sugar will undergo fermentation in suitable conditions that enable the yeast to grow and produce ethyl alcohol or wine. After the fermentation, the new wine produced has cloudy

appearance due to the presence of yeast particles and other unwanted substances. The wine is clarified by removing the unwanted components and it can be further clarified with the addition of substances like gelatin. Gelatin is a well proven fining agent used in many wine producing areas in Europe. It enhances visual characteristics and impart delicate flavor of white wine and improves the palatability of red wine (Anonymous, 1983).

The Western Philippines University (WPU) is the only academic institution in Palawan that processed wine from cashew and holds the technology in cashew wine making. The common practice of technicians in WPU Food Processing Center is to heat 20 liters of cashew wine to clarify the wine. This practice tends to evaporate a large amount of the volatile alcohol thus making the wine clear but low in alcohol content. Hence, the researchers conducted this study to address this concern by determining a clarifying technique that utilizes lesser volume of wine and is more economical.

METHODOLOGY

Twenty five (25 liters) of eight months aged cashew wine from WPU Food Processing Center was equally distributed in 5 sterilized bottles and classified into 5 treatments (Treatment 1: 4 g unflavored dissolved gelatin + 1 liter 20°C heated wine + 4 liters unheated wine; Treatment 2: 4 g unflavored dissolved gelatin + 2 liters 40°C heated wine + 3 liters unheated wine; Treatment 3: 4 g unflavored dissolved gelatin + 3 liters 60°C heated wine + 2 liters unheated wine; Treatment 4: 4 g unflavored dissolved gelatin + 4 liters 80°C heated wine + 1 liter unheated wine; and Treatment 5: 4 g unflavored dissolved gelatin + 5 liters 100°C heated wine. The unflavored powdered gelatin used in all treatments was dissolved at 60-65°C temperature. The sediments in all present in all treatments were allowed to settle for two weeks or until the wine is visibly clarified.

Sensory evaluation of unclarified and clarified wine samples in terms of color, aroma and quality tests were determined subjectively by 10 selected panelists (5 WPU faculty/staff and 5 students). For unclarified wine samples, each panelist was provided with 10 ml wine for evaluation of sensory attributes. Likewise, the ten panelists were given 10 ml coded clarified wine samples for each treatment for evaluation of color, aroma and quality. Each treatment sample was evaluated one at a time with panelists rinsing their mouth with water after each test. The panelists recorded their responses on the score sheets cards.

The same wine tasting procedure was followed for treated wine stored for another 2 months.

The data gathered were the acceptability rate of unclarified and clarified wine samples, alcohol content before and after clarifying, and after 2 months of storage, and percent alcohol content of clarified wine. Alcohol content was determined by recording the degree Brix ($^{\circ}$ Brix) reading of one to two drops of wine in a refractometer. Percent alcohol content ($\%^{\circ}$ R) was computed by dividing the rate of sugar in brix ($^{\circ}$ Brix) to 80° Fr, the constant rate of yeast extract activity in fermentation.

Kruskal Wallis was employed to test the differences in color, aroma and quality of the sample treatments.

RESULTS AND DISCUSSION

The frequency scores of panelists on the color, aroma and clarity of cashew wine clarified with gelatin dissolved in varying percentage volume of wine before clarification, after clarification, and after two months of storage are presented in Table 1. In terms of color, the unclarified wine was perceived to be light brown. After clarification, the sample clarified with 60% by volume of heated wine was also perceived as light brown by majority of the panelists (80%) but after two months of storage, the color of the same cashew wine was perceived by the same number of panelists to have changed to brown. After clarification, sample clarified with 80% by volume of heated wine was perceived by 50% of the panelists to be light brown. The same number likewise perceived that the same wine turned dark brown after two months of storage. The same observation was noted for sample wherein 100% of wine was heated.

As to the aroma, unclarified wine was given a rating of slight to moderate alcohol flavor by 98% of the panelists. After clarification, sample with 20% by volume of heated wine was perceived to have slight alcohol flavor without changed in aroma after two months of storage. On the other hand, sample with 40%, 60% and 80% by volume of heated wine, have reduced their alcohol aroma as perceived by the panelists. Improvement of aroma was perceived by the panelists for treatment where 100% of wine was heated. This sample was perceived to have improved from moderate to extreme alcohol flavor after two months of storage.

In terms of wine clarity, 75 percent of the panelists adjudged the unclarified wine with slight to moderate clarity. After clarifying process, the

sample clarified with 80% heated wine was preferred by 70% of the panelists over the other treatments with a rating of moderate to extreme clarity. After 2 months storage, the treatments where gelatin was dissolved in 40%, 80% and 100% heated wine were given a rating of moderate clarity as judged by 70% of the panelists (Table 1). The above data indicate that heating wine at a lower volume of 40% is equally effective in wine clarified by 80% and 100% heated wine.

Table 1. Percentage scores on the color, aroma and clarity of cashew wine clarified with gelatin dissolved in varying percentage volume of wine before clarification (BC), after clarification (AC) and after two months storage (ATMS).

Two months storage (ATMS).											
Attributes	Treatments										
	BC	20%		40%		60%		80%		100%	
		AC	ATMS	AC	ATMS	AC	ATMS	AC	ATMS	AC	ATMS
Color:											
Yellow	32			20	50	80	20	50	10		
Light brown	48	30	40	30	50	10	80	10	40	70	30
Brown	4	10	40	20		10		30	50		50
Dark Brown	16	60	20	30						30	20
Flavor:											
Extreme alcohol	4	10		30	10	10	20	20	20	30	40
Moderate alcohol	52	20	20	30	30	50	40	50	30	60	30
Slight alcohol	46	60	80	30	60	30	40	20	50	10	30
No alcohol flavor	2	10		10		10		10			
Clarity:											
Extreme clarity	2			10	20		20	10	30		10
Moderate clarity	36	30	20	50	70	50	50	60	70	50	70
Slight clarity	38	60	60	40	10	40	10	30		50	10
Turbid	24		20				20				10

The degree brix ($^{\circ}\text{Bx}$), alcohol content($^{\circ}\text{R}\%$) and specific gravity of the untreated and the treated wine is shown in Table 2. The unclarified 8 month old wine has sugar concentration of 5° Brix and alcohol content of 7.5. After clarification, the sugar concentration and alcohol content of wine clarified with 40%, 60% and 80% heated wine did not change while samples with 20% and 100% heated wine exhibited reduction in sugar concentration (6° to 5° Brix) and alcohol content (7.5 to 6.25). After 2 months storage, all treatments had equal sugar concentration (5° Bx) and alcohol content (6.25).

Table 2. Degree of brix ($^{\circ}$ Brix), alcohol content (R %) and specific gravity of cashew wine clarified with gelatin which was dissolved in varying volume percentage of heated wine.

Treatments	Before Clarification			After Clarification			After 2 months storage		
	$^{\circ}$ Brix	$^{\circ}$ R%	Specific gravity	$^{\circ}$ Brix	$^{\circ}$ R%	Specific gravity	$^{\circ}$ Brix	$^{\circ}$ R%	Specific gravity
Unclearified wine	6	7.5	998						
20%				5	6.25	999	5	6.25	1.001
40%				6	7.5	998	5	6.25	1.000
60%				6	7.5	999	5	6.25	1.000
80%				6	7.5	999	5	6.25	1.000
100%				5	6.25	999	5	6.25	1.001

After 2 months storage, the specific gravity of cashew wine increased. These can be attributed to the demijohn wherein the wine were stocked for two weeks before they were transferred in individual bottle. The alcohol present in the wine may have evaporated from the vacant space in the demijohn. The slight reduction in alcohol content of wine samples may also be due to the heating process.

The acceptability ranking scores on the color, aroma and clarity of cashew wine clarified with varying percentage volume of heated wine is shown in Table 3. In terms of color, there was a significant difference in ranking among the treatments after clarification. However, after 2 months storage, no significant difference in ranking was observed among treatments. This implies that a lower volume of wine can be effective enough in maintaining the color of the cashew wine. Heating in a reduced volume of wine also has economical implications on wine processing.

On the other hand, Kruskal Wallis test revealed that the aroma of unclarified wine was significantly different from the aroma of clarified wine samples regardless of the technique used and the length of storage. This implies that the reduction in the alcoholic aroma of clarified wine maybe due to the evaporation of the alcohol during the heating and clarifying procedure.

Moreover, the rankings of the treatments in terms of aroma after clarification and after two months storage were not significantly different. This implies that aroma of all treatments were comparable after clarification and after 2 months storage.

Table 3. Acceptability ranking scores on the color, aroma and clarity of cashew clarified with gelatin dissolved in varying percentage volume of heated wine before clarification (BC), after clarification (AC) and after two months storage (ATMS).

Treatment	Attributes								
	Color			Aroma			Clarity		
	BC	AC	ATMS	BC	AC	ATMS	BC	AC	ATMS
Unclarified Wine	2.8			2.78			11.28		
20%		3.2	2.3		2.7	2.1		4.3	2.4
40%		4.0	2.4		2.3	2.5		3.3	1.7
60%		3.2	2.5		2.6	2.3		2.8	2.8
80%		2.6	2.3		3.2	2.5		1.8	2.6
100%		2.7	2.7		2.4	3.3		1.9	2.3
Kruskal Wallis Statistics	1.128 ⁿ _s	0.660 [*]	4.952 ^{ns}	1.430 [*]	7.021 ⁿ _s	9.029 ^{ns}	3.349 ⁿ _s	0.612 [*]	4.189 ^{ns}

ns - not significant

* - significant

As to the clarity of wine, the clarity of unclarified wine was significantly different from the clarity of all treatments after clarification, and after 2 months storage. Nevertheless, all treatments had significantly the same clarity after clarification and after 2 months of storage.

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