

## Fermentation and Post Fermentation Chances in Cashew Wine.

Akinwale, T.O.

Cocoa Research Institute of Nigeria P.M.B. 5244, Ibadan, NIGERIA.

### Abstract

An acceptable wine (10.6 v / v alcohol) was produced from cashew juice and the effect of storage on aging of the wine for six months in the refrigerator (10°C) was studied.

Physico-chemical analyses of the wine during fermentation showed a decrease in specific gravity and pH, and a corresponding increase in titratable acidity.

However, the physico-chemical analyses of both the young and aged wines showed a decrease in total solids, and titratable acidity from 8-6% and 0.90 - 0.75% (tartaric acid) respectively after six months storage.

A decrease, from 0.045-0.02% was also obtained for volatile acids (% acetic acid) of the wine after storage. The % ethyl acetate increased from 0.58 to 0.80% after storage.

Sensory evaluation of the young and stored cashew wines in terms of color, taste, flavour and overall acceptability showed significant differences ( $P < 0.05$ ) between the two samples with the aged wine being more acceptable.

### Introduction

The fruit of cashew tree (*Anacardium occidentale*) consists mainly of the nuts, containing an embryo (Kernel) and a false fruit commonly called cashew apple. The kernel is the main product of cashew industries in Nigeria and is desired to be extracted whole from the nut without contamination with the cashew nut shell liquid (CNSL).

The apple on the other hand is five to ten times the weight of the nut. It contains about 85% water and has a sugar content of about 10% (mostly invert sugar) and 250mg vitamin C per 100g juice (Ohler, 1979).

The juice which is astringent due to its tannin content makes most consumers to complain about consuming it directly, hence making it under utilised and even wasting away. However, this astringency (or tannin) is a quality desired in wine making. This paper therefore discusses the techniques for making acceptable wine from cashew and the effect of storage on the qualities of the wine produced.

### Materials and Methods

#### Harvesting of Cashew Apples

Ripe, matured fruits were harvested at the cashew plantation, Ochaja, Kogi State (a substation of Cocoa Research Institute of Nigeria). The nuts were detached from the apples and the apples sorted and washed with sodium metabisulfite solution (350ppm) to remove any contaminant from the farm.

#### Extraction of the juice

The apples were pulped with the aid of a blender (Phillips brand) and sieved with a clean muslin cloth then squeezed tightly to ensure maximum extraction of the juice.

#### Preparation of Juice

The juice was diluted at a ratio 1:1 with water. About 0.45/liter of metabisulfite, 1% citric acid and 0.67g/litre of ammonium sulphate were added as sources of nutrient to the yeast. More sucrose was added to bring the specific gravity up to 1.080 (20% total solids), this gave about 10.6(v / v) alcohol. The juice was then pasteurised at 80°C for 10 minutes and allowed to cool down.

#### Preparation of Yeast Starter

*Saccharomyces cerevisiae* (Commercial bakers yeast) was used for fermentation. A starter was prepared using the pasteurised juice as the culture medium the magnitude representing of the juice being inoculated. About 1g litre of the yeast was used to prepare the starter culture.

#### Fermentation Process

The must was dispensed into bottles (4.5 litres each) in triplicate and fermented on room temperature (28 °C.)

During fermentation, data were collected for specific gravity, total solids, pH, acidity, ash and extract. Fermentation

process continued until all the sugar was exhausted. The wine was allowed to rest for about two weeks before racking.

#### Racking

Racking was done by siphoning the fermented liquor (supernatant) into another clean vessel. Racking was done during storage to facilitate the clearing of the wine and to prevent undesirable flavour.

**Aging:** The wine samples were stored in bottles (completely filled up) and stored in the refrigerator (10°C) for at least 6 months.

#### Chemical Analysis

The specific gravity, pH, acidity (total, volatile and fixed acidity) and total solids of the samples were determined according to AOAC (1980). The total and fixed acidity were expressed as % tartaric acid and volatile acid as % acetic acid. The pH of the samples was measured directly using pH meter model.

The alcohol content was expressed as parent alcohol by volume from the specific gravity according to AOAC (1980). The ester was determined using Pearson (1979) method and calculated as % ethyl acetate.

#### Microbial Count

Total plate count was determined on Nutrient Agar. Yeast and coliforms were also examined on Potatoe Dextrose Agar and MacConkey Agar respectively. The samples were incubated over a period of

48 hours at room temperature (28°C).

**Organoleptic Quality Test**

Total of 20 panelists from the senior staff of Cocoa Research Institute of Nigeria and National Youth Service Corp members were used for quality assessment. Panelists were presented with identical wine glasses coded with 3 digit random numbers. They were asked to evaluate samples on 9 point Hedonic scale, where, 9 corresponds to "like extremely" and 1 "dislike extremely". Obtained data were statistically analysed using analysis of variance (ANOVA)

**Results and Discussion**

Table 1 and 2 showed the physical examination, microbiological, and chemical characteristics of the aged cashew wine respectively. The examination showed that the wine had some acceptable attributes or characteristics expected of fruit wine.

The results presented in figures 1 and 2 all fall within the range expected for wine. The fermentation characteristics indicated that specific gravity decreased during fermentation while the total acidity increased as the fermentation progressed (Goreinsterin *et al* (1984); Obisanya, *et al* (1987); Aderiye *et al* (1991)). That is as the yeasts utilize the sugar, which it converted to alcohol, there was a fall in the specific gravity and total solids which simultaneously resulted in a drop in pH and increased total acidity.

However, after six months of storage there was a drop in acidity and a slight increase in pH. During maturation (ageing) at 10°C, more deposits settled from the wine and became clearer, the taste was less harsh. The result obtained from the sensory evaluation of the aged wine compared with the young wine indicated that the aged wine was preferred and more acceptable in terms of color taste, flavour and overall acceptability. The result obtained for the sensory evaluation of the wine samples is presented on Table 3. There was a significant difference at (P<0.05) with the aged wine having a higher mean of 7.1 and the young wine 5.9.

The total microbial count of zero on the nutrient agar, potatoes dextrose and MacConkey agar, indicated that wine fermented and aged without any bacterial spoilage.

Table 1 Physical Examination of cashew wine after 6 months aging at 10° C.

Attributes	Condition of wine
i. Appearance	Bright and Clear (No. sediment)
ii. Condition when opened	Still
iii. Colour	Deep yellow
iv. Odour	Distinct and peculiar of cashew apple
v. Taste of flavour	Dry and slightly acidic

Table 2 Characteristics of Cashew Wine After 6 months Storage in the Refrigerator at 10°C.

1. pH	3.40
2. Specific gravity	0.992
3. Total solids (%)	6.0%
4. Total acid (%tartaric acid)	0.750
5. Fixed acid (% tartaric acid)	0.670
6. Volatile acids (%acetic acid)	0.020
7. % Glycerol	0.270
8. Ester (%Ethyl acetate)	0.80%
9. % Alcohol (v/v)	10.6%
10. % Extract	5.50
11. Growth on Nutrient Agar	No growth
12. Growth on MacConkey Agar	No growth
13. Growth on Potatoe Dextrose	No growth

Table 3 ANOVA for the Statistical Analysis of Results obtained from sensory Evaluation of Cashew Wine.

Sources	SS	df	MS	F
Between treatment	4.3565	1	4.3565	8.8117*
Within treatment	5.9328	12	0.4944	-
Total	10.2893	13	-	-

There is a significant difference at 5% probability level between the aged and the young wine. The difference between the two means is 1.1571; which is greater than LSD at 5%. Thus there are significant differences at the specified LSD probability level

Fig. 1. Changes in specific gravity and total acidity (% tartaric acid) during cashew must fermentation

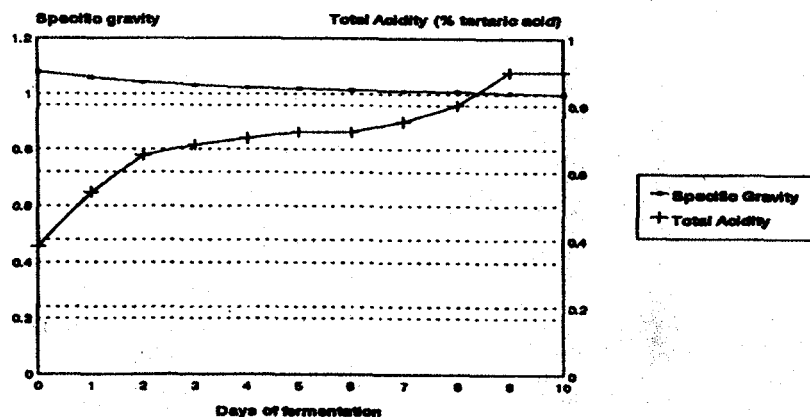
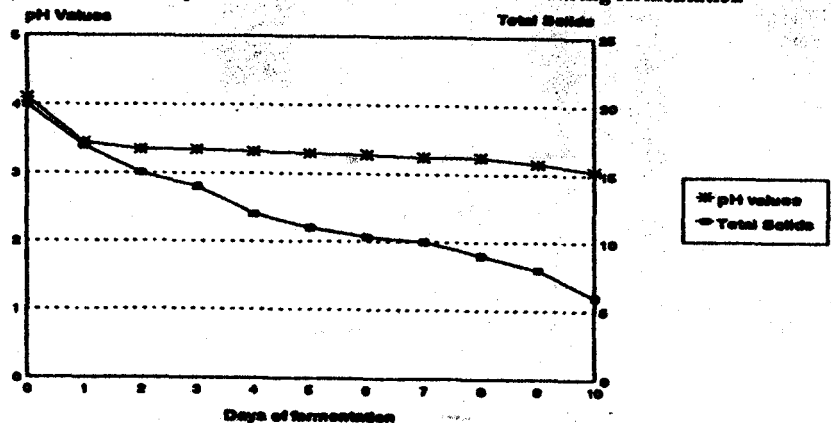


Fig. 2. The trend of pH and Total Solids values of cahew during fermentation



**Conclusion**

Cashew apples can be used to produce an acceptable dry table wine and has actually proved a vital substrate for the wine industry. Since the Cashew apples are still underutilised it can be exploited commercially and this may eventually conserve foreign exchange and also increase the income of cashew farmers. Cashew wine requires at least six months ageing as this affects the attributes of the wine.

**Acknowledgement**

The author wishes to acknowledge Dr. Ayoola Fasina, Director of Cocoa Research Institute of Nigeria for granting the permission to publish this paper.

**References**

Aderlye, B.I.I., Akparuna, M.A. and Akubor, P. (1991): Effect of Fermentation Variables on the Quality of Cashew Wine. *J. Agric. Sci. Technology*.(I) (I) 66 -69 1991.

AOAC (1980): Official Methods of Analysis Association of Official Analytical Chemistry. 13th Edition, Washington, DC. USA.

Goreinstern, Goldblum: A. KTOV: and Deutshe, J. (1984) Fermentation and post changes in Israeli Wines *J. Fd. Sci.* 49: 251-155.

Obisanya, M.O., Aina, J.O. and Oguntimhin G.B. (1987): Production of Wine from Mango Juice (*Mangifera indica*) using *Saccharomyces* and *Schizosaccharomyces* species isolated from palm wine. *J. Appl. Bact.* 63: 191-196.

Ohler, J.G. (1979); Cashew: Royal Tropical Agriculture. Amsterdam.

Pearson, D. (1970): The Chemical Analysis of Foods. 7th Ed. Churchill, Livingstone Edinburgh, pp. 331 -332.