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Research Article

Stored Palm Wine: Negative Health Implication of its Unwholesome Consumption

Osuji Malachy Ikeokwu[1]*, Mmadubulum Nnamdi Elijah[2], Nkwonta Rosemary Celestine[2] and Bernard Ebube Miracle[3]

[1]*Department of Microbiology Spiritan University, Nneochi Abia State, Nigeria*

[2]*Department of Microbiology, Legacy University, Okija Anambra State, Nigeria*

[3]*Department of Biochemistry, Legacy University, Okija Anambra State, Nigeria*

***Corresponding Author:** Osuji Malachy Ikeokwu, Department of Microbiology Spiritan University, Nneochi Abia State, Nigeria.

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Abstract

This research work was carried out investigate the microbiological and biochemical changes taking place in stored palm wine. microbiological examination of the stored samples revealed that as the storage time increases, the fugal (yeast) cell increases from 2.3×10^2 to 4.7×10^5 cfu/ml. Also, analysis on the sugar level showed that fresh palm wine which forms day 1 sample has sugar level of 38% which makes it sugary. As fermentation process occurs, the sugar is been converted to alcohol. Subsequently, the alcohol formed during fermentation is further oxidized to Aldehyde. There is the possibility of formation of carboxylic acid and ketone. These chemicals formed as a result of sugar fermentation are harmful to human. This work is recommending that as the storage time increases, the number of yeast cell increases. The yeast isolated from these palm wine can be, purified using appropriate ascetical method, molecularly identified and put in type culture center for further studies. They can also be sold for human consumption. Consumption of palm wine above four (4) days should be discontinued as the consumer is loading his body with alcohol and aldehyde. This long storage time will also lead to the formation of carboxylic acid and ketone which are harmful to the body.

Keywords: *Oxidation; Fermentation; Storage; Alcohol; Dilution; Incubation*

Introduction

Palm wine is a liquid product of tapped palm tree. It can be defined as a collective of beverages that are gotten from the fermentation of saps of palm trees. Palm wine can be tapped once or twice in a day (morning and evening). In most cases can be taken as soon as it was tapped or kept for sale till the next day [1]. Palm wine is a sugary, it has a milk colour. It is effervescent an alcoholic beverage. Fresh palm wine is highly nourishing and sweet due to the high content of in fermentable sugar. At the end of its fermentation, it becomes low in alcoholic content and hence only very neatly intoxicating [2].

The Palm wine is made up of amino acids, proteins, vitamins, and sugars. Palm wine microbial analysis has been done both by culture and nonculture methods to identify the microorganisms present during fermentation. The most common and widely identified microbial species in wine were: *Saccharomyces cerevisiae, Saccharomycodes ludwigii, Zygosaccharomyces bailii*, *Hanseniaspora uvarum, Candida parapsilosis, Candida fermentati, and Pichia fermentans*. The main chemical composition of palm wine includes; glucose, fructose, maltose, raffinose, and malto-oligosaccharides are also present. Palm wines have complex microbial community which include, *Zymomonas*, *Lactobacilli*, and *Acetobacter* [1].

Materials and Methods

Sample collection

Freshly tapped palm wine was collected directly from the local palm wine tapper using a capped test tube. This was done one for each from day 1 to day 14. At the end of the 14th day, the samples were analyzed for simple sugar content, alcohol level, yeast and Aldehyde content. All these were done in Microbiology and Biochemistry Laboratory of Legacy University Okija.

Sample processing

An 1 ml of each of the 14 samples was aseptically collected and ten-fold serial dilution was done using sterilized distilled water. The ten-fold serial dilution was done up to the 5th diluent. A 0.1 ml of 10^{-2} was spread plated out on SDA amended with 0.1 g/ml of a broad spectrum antibiotic (Chloramphenicol). This was done in duplicates, labelled appropriately. The plates were incubated at the temperature of 28°C for 2 days.

Simple sugar test

All the 14 samples were tested for the presence of sugar. This was done using the basic Benedict solution reagent method.

Alcohol test

Also, test for alcohol was done on the 14 samples. This is to ascertain the presence of alcohol since the fermentation of simple sugar will yield alcohol.

Aldehyde test

A 2-3 drops of Schiff's reagent into a test tube containing 3-4 drops of the sample. If the color changes to pink, this shows the presence of aldehyde.

Figure 1: *Colour change based on percentage of sugar present.*

Result

The following results were obtained from the analysis.

Discussion

In the result of this research work as shown in the graphs and table, it was discovered that the number of fungal counts increased with count. As the level of yeast cell increases, the level of sugar reduces. When tapped at the first day, the sugar level of fresh palm wine

Sample (day)	Total fungal counts (cfu/ml)	Percentage of sugar (%)	Alcohol content (g/100 ml)	Schiff's test for Aldehyde
14	2.3×10^2	1	0.001	Insignificant
13	2.5×10^2	3	0.008	Insignificant
12	2.5×10^3	5	1.9	Present
11	2.6×10^4	6	2.5	Present
10	3.8×10^4	10	3.7	Present
9	3.1×10^5	24	4.7	Present
8	3.3×10^5	24	7.2	Present
7	3.4×10^5	25	4.7	Present
6	3.6×10^5	26	3.6	Present
5	3.7×10^5	27	1.4	Present
4	3.9×10^5	28	1.2	Present
3	4.1×10^5	30	0.5	Insignificant
2	4.4×10^5	32	0.04	Insignificant
1	4.7×10^5	38	0.01	Insignificant

Table 1: *Fungal count and the level of sugar, alcohol and aldehyde in during the 14 days of storage.*

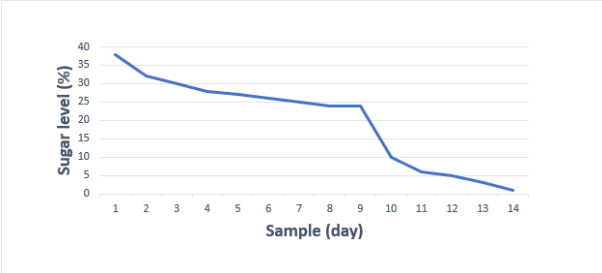

Figure 2: *Graph of percentage of sugar per day.*

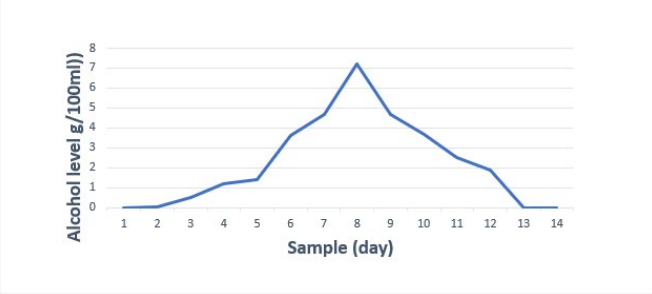

Figure 3: *Graph of alcohol per day.*

is usually high. The alcoholic content is very low if not zero [2-5]. As storage time increases, the sugar level reduces because the yeast is fermenting the sugar alcohol. The reduction in sugar level is a clear evidence that a large amount of the sugars had been converted via fermentation especially during the foremost stages of tapping of palm wine. On the other hand, during the 15 days of tapping of *Acrocomia aculeata* was found an initial concentration of sucrose in the palm wine of 11.36%, this concentration dropped through-out the tapping process to 0.22%, as a result of the microbial metabolic activity [2].

On the alcohol level, the first-2 days of storage showed very low level of alcohol and high level of sugar. this explains why palm wine is very sugary when fresh. The level kept on increasing until the eight (8) day when it declines. This is due oxidation of alcohol to aldehyde. The level kept on declining until the 14th day when the result shows little or no presence of alcohol. Between the 4-12 days, the Schiff's test showed significant level of aldehyde.

Conclusion

Storage is a way of increasing the yeast cell number in palm wine. It is also a perfect way of allowing oxidation to take place thereby reducing the sugar level, increasing alcohol level.

Recommendation

This research recommend as follows:

1. As the storage time increases, the number of yeast cell increases. This yeast can be extracted, purified and kept for use or sale.
2. Consumption of palm wine above four (4) days should be discontinued the consumer is loading his body with alcohol and aldehyde.
3. This long storage time will also lead to the formation of organic acid with is harmful to the body.

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