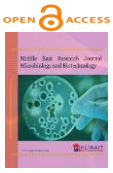

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Stored Palm Wine: Negative Health Implication of Its Unwholesome Consumption

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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 x 10^2 to 4.7 x 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. All these chemicals are toxic to the body. This work is recommending that as the storage time increases, the number of yeast cell increases. This yeast can be extracted, purified and kept for use or sale. 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.

Research Paper

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INTRODUCTION

Palm wine is a liquid product of tapped palm tree. Palm wine is referred to as a collective group of beverages that are obtained after the fermentation of sap of palm trees. Palm wine is the sap fermented from the Raphia palm (Raphia hookeri) and oil palm (Elaeis guineensis). It is thought that the two species originated in West African marshes. Palm wine is collected twice a day, in the morning and evening where is can be consumed immediately or stored for sale the same day or next day (Nwibu *et al*., 2012). Palm wine is a sweet, milky, effervescent, and alcoholic beverage. Fresh palm wine is sweet because of the high content of in fermented sugar, It is consequently low in alcoholic content and hence only very neatly intoxicating (Santiago 2014). However, fermentation proceeds rapidly, as a result of which the wine rapidly loses its' sweet taste due to a fall in the sugar content, it also becomes sourer and more intoxicating owing to a rise in the alcoholic Content. When fully fermented, it is very sour and strongly alcoholic.

The Palm wine is composed of amino acids, proteins, vitamins, and sugars. This traditional beverage is elaborated in different regions, such as Ghana, Cameroon, and West Africa regions; but in India three types of palm wine called sendi, tari, and nareli are produced, too (Tamang, 2010). Palm wine microbiota has been analyzed by culture and nonculture methods to identify the microorganisms present during fermentation; the main yeasts identified were: *Saccharomyces cerevisiae*, *Saccharomyces ludwigii*, *Zygosaccharomyces baili*, *Hanseniaspora uvarum*, *Candida parapsilopsis*, *Candida fermentati*, *and Pichia fermentans*; but some *LABs* were identified, too. The main constituent of palm tree sap is sucrose, though small amounts of glucose, fructose, maltose, raffinose, and malto-oligosaccharides are also present. Palm wines have rather complex microflora, among which are Saccharomyces, Zymomonas, lactobacilli, and Acetobacter (Nwibu *et al*., 2012.

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 1ml 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 5^{th} diluent. A 0.1ml of 10^{-2} was spread plated out on SDA amended with 0.1g/ml of a broad spectrum antibiotic (Chloramphenicol). This was done in duplicates, labelled appropriately. The plates were incubated at 28^0C for 48 hrs.

Simple Sugar Test

Each of 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

A2-3 drops of Schiff's reagent into a test tube containing 3-4 drops of the sample. Formation of pink colour indicate presence of Aldehyde.

Figure 1: Colour Change based on percentage of sugar present

RESULT: The following results were obtained from the analysis.

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

Sample (day)	Total fungal counts (cfu/ml)	Percentage of sugar (%)	Alcohol content (g/100ml)	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

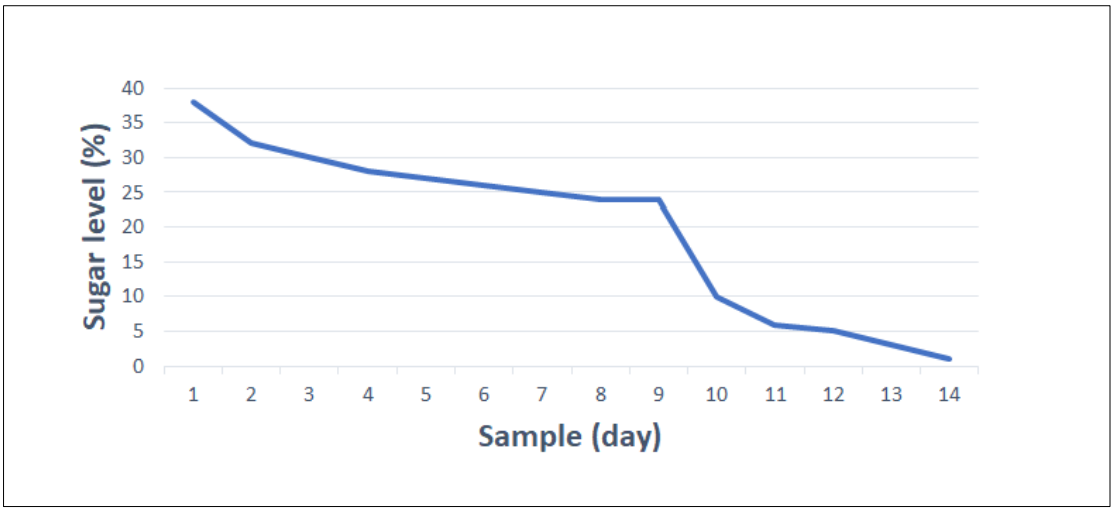

Figure 2: Graph of percentage of sugar per day

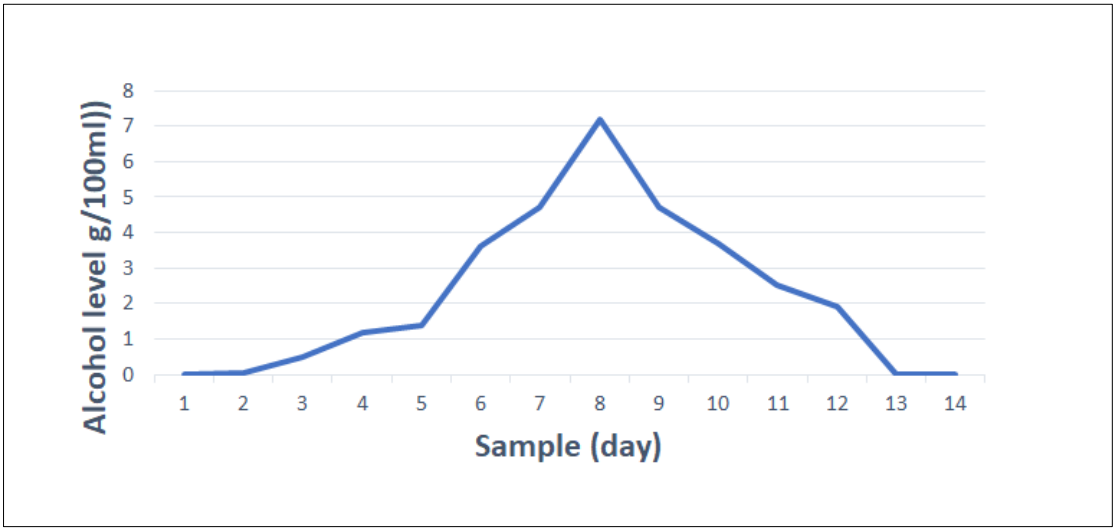

Figure 3: Graph of Alcohol per day

DISCUSSION, CONCLUSION AND RECOMMENDATION

Discussion

In the result of this research work as shown in the graphs and table, it was discovered that the number of fungal count increased with count. As the level of yeast cell increases, the level of sugar reduces. In the first days of tapping the palm wine is very sugary and does not contain substantial concentration of alcohol (Ezeagu *et al*., 2003; Amoa-Awua *et al*., 2007; Karamoko *et al*., 2012; Santiago-Urbina *et al*., 2013). As storage time increases, the sugar level reduces because the yeast is fermenting the sugar alcohol. The decrease in sugar content is a clear indication that a large portion of the sugars is fermented especially during the early stages of tapping. 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 (Santiago-Urbina *et al*., 2013).

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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