

Sacoglottis Gabonensis as a Potential Preservative for Palm-Wine

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Abstract

The work focuses on prolonging the shelf-life of palm –wine with the stem bark extract of *Sacoglottis gabonensis* as preservative. The work shows that there is increase in acidity of pasteurized palm-wine with time. The rate of increase in acidity is drastically lowered in the presence of *Sacoglottis gabonensis* stem bark extract. This is concentration dependent as increase in the level of the extract resulted in decreased acidity. There is also an overall decrease in pH with time hence an overall crease in acidity. The organoleptic properties like mouth feel, taste and flavour were also preserved in the wine in the presence of *Sacoglottis gabonensis* extract. The degree of retention of these organoleptic properties is also increased with increase in the level of the extract in the palm-wine. The work therefore shows that the *Sacoglottis gabonensis* stem bark extract will serve as a suitable preservative for palm wine and a local substitute for imported preservatives for wine making.

Keywords: *Sacoglottis*; *gabonensis*; palm-wine; preservative.

1. Introduction

Palm-wine is a generic name for a group of alcoholic beverages obtained by fermentation of the sap of palm trees. Nigerian palm-wine is produced from *Elaeis guineensis* (oil-palm tree) and *Raphia species*. The palm-wine is very popular amongst the inhabitants of West Africa. It is consumed by more than ten million Africans [1]. *Raphia* palm-wine is made from the sugary sap of the *Raphia* palm-tree. The sap is collected from slit along the trunk near the apex. The sap contains sugars such as sucrose, glucose, fructose, cellobiose, maltose, xylose, arabinose and galacturonic acid [2]. The sugar present in the sap is fermented by wild yeast into palm-wine [3,4]. In addition to palm-wine yeast, a number of microorganisms, some of which are pathogenic, have been isolated from the Nigerian palm-wine.

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These include *Lactobacillus*, *Micrococcus*, *Lieuconostoc*, *Klebsiella*, *Streptococcus*, *Racillus*, *Zymomonas*, *Brevibacterium*, *Acetobacter* and *Sereratia* species as well as *Eschereichia coli* [3,5,6,7]. *Raphia* palm-wine is commonly diluted with water of questionable quality which is believed to be the source of these microorganisms [4]. *Sacoglottis gabonensis* stem bark infusion in palm-wine or gin prevents fever and eradicates body pain [8]. It is also used in southern Nigeria for treatment of diarrhea, gonorrhoea and vaginal infections. The bark extract has been shown to inhibit the growth of these microorganisms found in palm-wine [3,5]. Palm-wine is commonly taken fresh. The present work is therefore aimed at preservation of the organoleptic properties of palm-wine and extension of its shelf-life which is naturally about twenty four hours with *Sacoglottis gabonensis* stem bark extract.

2. Materials and Methods

Raphia palm-wine was obtained fresh and undiluted from local palm-wine tappers in Idundu, Akpabuyo Local Government Area, Cross River State, Nigeria. The *Sacoglottis gabonensis* stem bark was obtained from full grown tree in the costal forest of Idundu. The dried stem bark was ground and Soxhlet extracted with ethanol. The solvent was distilled off to give the syrupy concentrate. Five levels of the concentrate in the palm-wine ranging from 0.29gdm⁻³ to 2.03 gdm⁻³ as well as the control with zero level of the concentrate in the palm-wine were prepared. Each of these was place in different bottles, corked, pasteurized at 80⁰C for 20 minutes and stored at room temperature.

A bottle of the palm-wine at each of these levels was analysed at four or eight week intervals. The pH was measured with a pH meter and the acidity determined by titration with standard sodium hydroxide solution. The acidity (%w/v) was calculated based on acetic acid which is the dominant acid of the palm-wine. A panel of seven judges (palm-wine drinkers) was set up for evaluation of the following organoleptic properties mouth feel, taste and flavour.

3. Results and Discussion

Variation of pH and acidity of the palm-wine with different levels of *Sacoglottis gabonensis* stem bark extract over a period of five months are given in table 1, figures 1 and 2. Acidity of the palm-wine increased very significantly throughout the period of investigation. This is mainly due the activity of *Acetobacter* species, present in the palm-wine, which converts ethanol into acetic acid [3, 7,10]. Addition of *Sacoglottis gabonensis* stem bark extract lowered the rate of increase in acidity. This lowering effect, which is concentration dependent, is mainly due to the fact that the extract inhibits the growth of bacteria responsible for the conversion of ethanol into acetic acid [3,7] and hence the preservative effect. The conventional preservatives used for wines, sodium metabisulphite, acts in a similar way [7]. The pH of the palm-wine became lowered with time. There was also an increase in pH with addition of the extract which is concentration dependent. This is in accord with effect on acidity as increase in acidity corresponds to decrease in pH.

Table 1: Effect of *Sacoglottis gabonensis* on Acidity of Palm-Wine

Conc.gdm ⁻³	0.00		0.29		0.58		0.87		1.45		2.03	
time (week)	acidity (%w/v)	pH	Acidity (%w/v)	pH	Acidity (%w/v)	pH	Acidity (%w/v)	pH	acidity (%w/v)	pH	acidity (%w/v)	pH
Zero time	0.49	3.84										
4	1.50	3.60	0.48	3.63	0.42	3.64	0.39	3.65	0.36	3.66	0.30	3.68
12	1.68	3.42	1.14	3.43	1.08	3.44	1.04	3.44	1.02	3.45	0.84	3.46
16	2.28	3.28	1.92	3.36	1.56	3.32	1.38	3.31	1.26	3.33	1.08	3.24
24	2.34	3.15	2.04	3.18	1.74	3.20	1.50	3.22	1.44	3.24	1.32	3.25

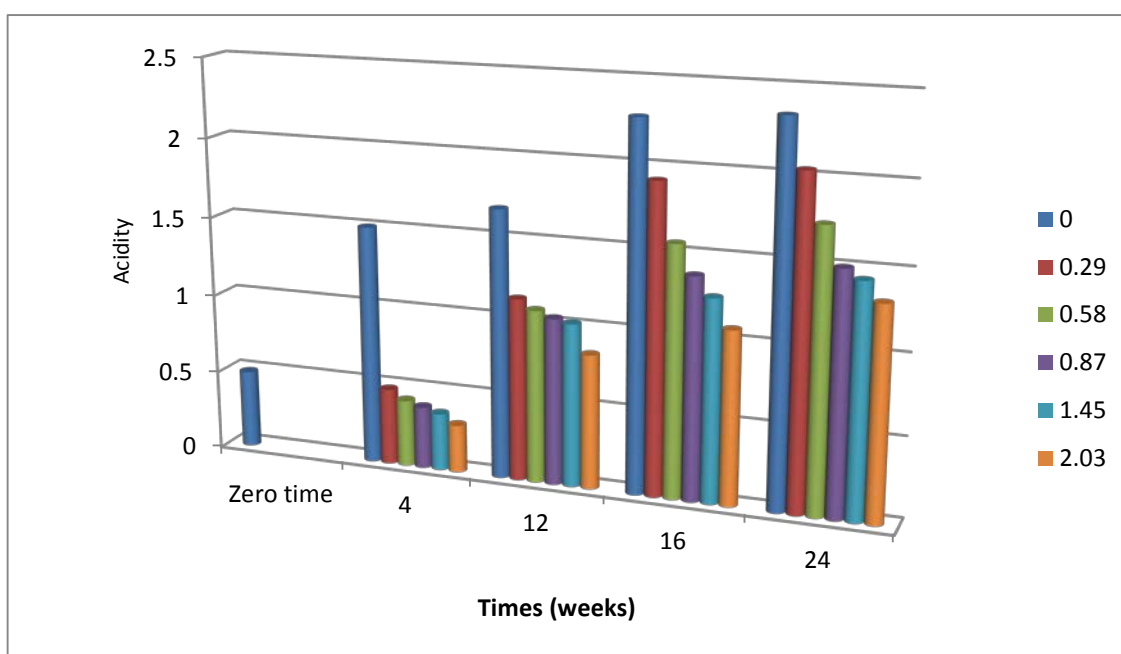


Figure 1: Variation of Acidity of Palm-wine with time

Table 2: Effect of *Sacoglottis gabonensis* on Mouth feel of Palm-Wine

Conc.gdm ⁻³ /Time (weeks)	0.00	0.29	0.58	0.87	1.45	2.03
Zero	NSL	NSL	NSL	NSL	NSL	NSL
4	SLP	SLP	NSL	NSL	NSL	NSL
12	SLP	SLP	SLP	SLP	NSL	NSL
16	SLP	SLP	SLP	SLP	NSL	NSL
24	SLP	SLP	SLP	SLP	SLP	SLP

Key: NSL = not slappy; SLP = Slappy

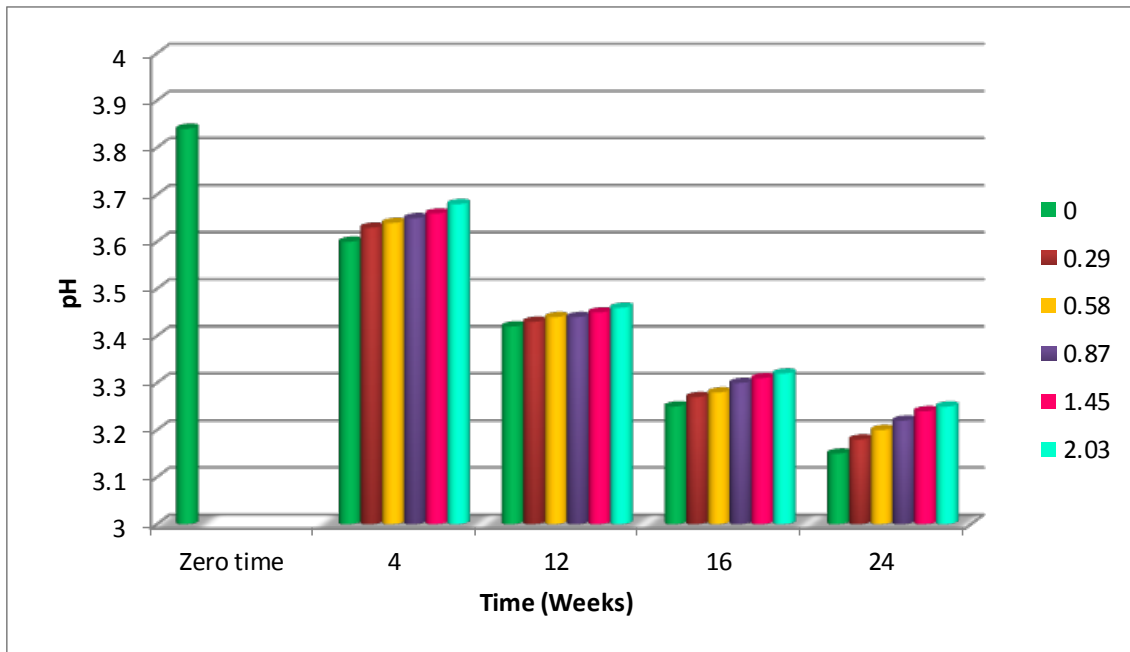


Figure 2: Variation of pH of Palm-wine with time

Table 3: Effect of *Sacoglottis gabonensis* Extract on the Taste of Palm- Wine

Conc.gdm ⁻³ /Time (weeks)	0.00	0.29	0.58	0.87	1.45	2.03
zero	SWE	SWE	SWE	SWE	SWE	SWE
4	SWE	SWE	SWE	SWE	SWE	SWE
12	SOU	SOU	NSW	SWE	SWE	SWE
16	SOU	SOU	SOU	SOU	NSW	NSW
24	SOU	SOU	SOU	SOU	SOU	SOU

KEY: SWE = sweet; NSW = not sweet; SOU = sour

Table 4: Effect of *Sacoglottis gabonensis* Extract on Flavour of Palm-Wine

Conc.gdm ⁻³ /Time (weeks)	0.00	0.29	0.58	0.87	1.45	2.03
zero	UNA	UNA	UNA	UNA	UNA	UNA
4	SLA	UNA	UNA	UNA	UNA	UNA
12	ALT	ALT	ALT	SLA	UNA	UNA
16	ALT	ALT	ALT	ALT	SLA	UNA
24	ALT	ALT	ALT	ALT	ALT	SLA

KEY: UNA = unaltered; ALT = altered; SLA = slightly altered

Effect of *Sacoglottis gabonensis* on the changes in organoleptic properties of the palm-wine with time is given in tables 2,3 and 4. Mouth feel, taste and flavour of the untreated palm-wine were completely altered within the first month of the experiment. The wine developed slappy mouth feel, off flavour and lost its sweet taste. The developed slappy mouth feel and sour taste is as a result of produced acetic acid while the off flavor resulted from introduced microbial metabolites. The loss in sweet tasted is because of depiction of palm-wine sugars due to activity of palm-wine microflora. The deterioration resulting in changes in organoleptic propertic was drastically reduced in the presence of the *Sacoglottis gabonensis* extract. The decrease in deterioration with the extract is concentration depended. The *Sacoglottis gabonensis* extract therefore preserves the organoleptic properties of the palm-wine and this becomes pronounced at higher concentrations.

There is an insignificant quantity of bottled palm-wine in the Nigerian palm-wine market. Imported conventional preservatives like sodium metabisulphite and benzoates are employed in bottled palm-wine. The work therefore recommends *Sacoglottis gabonensis* extract a cheap, natural and environmentally friendly and locally available preservative for the Nigerian palm-wine. It will serve as a suitable alternative to the conventional preservatives for large scale bottling of palm-wine.

4. Conclusion

The study shows that *Sacoglottis gabonensis* stem bark extract is able to extent the shelf-life of palm-wine. The organoleptic properties of the fresh palm-wine is preserved in the presence of the stem bark extract. The study therefore shows that *Sacoglottis gabonensis* stem bark extract can serve as a natural substitute to the conventional preservatives for wine making.

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