ACCEPTABILITY, PERCEIVED BENEFITS AND CONSTRAINTS OF HOME-MADE PLANTAIN WINE (*AGADAGIDI*)

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ABSTRACT

Despite the nutritional advantages of indigenous wine from overripe plantain (agadagidi), like many other indigenous foods, it has suffered neglect and gradual extinction resulting in consumers' preference for imported and industrial drinks. This study aimed at promoting home-made production of plantain wine for immediate consumption by rural households, thereby, enhancing their nutritional status. Three samples were used for the study namely: the wine produced from plantain, wine from banana and the commercial wine (the control). Proximate analysis was carried out on the plantain and banana wines while sensory evaluation was carried out on the three samples. The perceived benefits of plantain wine and the limitations to its acceptability were also investigated. Proximate analysis results show that banana wine contains lesser ash (0.18%) than plantain (0.32%), almost equal amount of fat (0.11%) with plantain (0.10), lesser crude protein (0.44%) than plantain (0.56%) and lesser carbohydrate (0.22%) than plantain (3.79%). At p≤ 0.05, there was no significant difference in the overall acceptability of plantain and banana wines produced whereas, a significant difference exists between the commercial wine and the two wines produced. Commercial wine has the highest acceptability (mean =7.5) followed by plantain wine (mean = 6.1) while banana wine has the least acceptability (mean = 5.3). The majority (83.3%) of the respondents favourably perceived the health benefits of plantain/banana wines and several constraints limiting their acceptability were identified. It was concluded that plantain/banana wine was unable to compete with commercial wine in terms of consumer acceptability despite the various perceived benefits. It was recommended that the processing technique for the production of plantain/banana wine be disseminated to rural households to enhance their nutrient intake and prevent the extinction of the drink.

Keywords: ***Consumption, constraints, perception, indigenous wine***

INTRODUCTION

Plantain (*Musa paradisiaca*) is one of the major staple foods in Nigeria. It is a cheap source of energy and rich in vitamin A precursor (carotenoid), vitamin B, C and minerals including potassium, phosphorus, calcium and magnesium while it contains low level of fat and sodium (Kayode *et al.* 2013; Ibeanu *et al*., 2016; Bhuiyan *et al.*, 2020). It has been reported that vitamin C, B6, and carotene (pro-vitamin A) are part of the six vitamins that form the recommended daily allowances of the Food and Nutrition Board of the National Research Council (Ogazi, 1996 cited by Alao *et al*., 2020). Its high potassium content, low sodium (17 mg/100 g) and fat (0.1%) make it suitable for controlling blood pressure (Kanazawa & Sakakibara, 2000; Mohapatra *et al.*, 2010). At every stage, plantain fruit is useful as food in one form or the other. For instance, the unripe fruits can be eaten as boiled, steamed, baked, pounded, roasted or sliced and fried into chips. They can also be peeled, sliced, dried and milled into plantain flour for making a Yoruba delicacy

popularly known as "*amala ogede*", the ripe plantain can be consumed fresh, boiled or fried into '*dodo*'. At the same time, the overripe are processed into local snacks (*dodo-ikire*) (Alao *et al*., 2020) and the indigenous wine (*agadagidi*) consumed in some parts of Nigeria. In recent times it has been used in the production of composite flour for baking and confectioneries (Malomo *et al*., 2013).

Like plantain, banana (*Musa sapientum*) is also a good source of energy because of its sugar and fibre contents (Komal *et al*., 2023). It is a well-valued fruit across the world due to its flavour and high nutritive value (Kandhare *et al*., 2023). It is eaten fresh as ripe or raw fruit and has a lot of nutritional benefits, and is often recommended by medical doctors for patients who have low potassium levels due to its high potassium content (Dalal and Kumar, 2023). Potassium is an important aspect of cell and body fluids which helps to control the heartbeat and the blood pressure by fighting against the effects of sodium (Bilhman *et al*., 2023). Banana pulp at maturation comprises 75%water and it's among the most calorie-rich (with 90 kcal/100 g) of non-oil fresh fruits and contains approximately 20 g of carbohydrates per 100 g of fresh pulp (Wall, 2006). According to Harvard School of Public Health (2023), banana contains vitamin B6, vitamin C, fibre, potassium, magnesium and manganese with one serving (i.e., one medium ripe banana) providing about 110 calories, no fat, 1 gram protein, 28 grams carbohydrate, 15 grams sugar (naturally occurring), 3 grams fibre, and 450 mg potassium.

Wines can be produced from almost all fruits (Rajković, *et. al.*, 2007). Idise and Odum (2011) reiterated that any fruit with a good proportion of sugar is good for wine production while the wines produced are named after the fruit used. In Nigeria, wine production is not a major activity. However, it has been reported that NIFOR (Nigerian Institute for Oil Palm Research) have been involved in the production of bottled palm wine using chemical preservatives which pose potential dangers to consumers (Idise and Izuagbe, 1988; Svans, 2008).

Plantain wine (*Agadagidi*) is a locally produced wine from overripe plantain through the process of fermentation. It is effervescent with a sweet-sour taste and has a cloudy appearance (Omojasola *et al*., 2012; Malomo *et al.* 2013). Overripe plantain has very little or no economic value (Areola *et al*., 2011), therefore, the production of wine is a way of preventing post-harvest loss in plantains. Likewise, banana wine is a fruit wine that is produced solely from bananas through fermentation. Efforts to produce a value-added product from plantain/banana will improve their economic values and minimise the environmental problems caused by their wastes (Lee *et. al*., 2006). This study aimed at household-based production of wine from plantain/banana for immediate consumption without chemical additives and preservatives. This is to minimise the economic loss resulting from rapid spoilage of ripped plantain/banana and enhance the nutritional status of the rural households who are the primary producers of these crops in the study area.

MATERIALS AND METHODS

Overripe plantain, banana and Commercial wine (Chi exotic) which serves as the control, were purchased from Sabo market, Ile-Ife, Osun State, Nigeria. Local wine was produced from plantain and banana following the process illustrated in Fig. 1. The proximate analysis of the wines produced was carried out using the Association of Official Analytical Chemistry (AOAC) (2006) method. The wines

produced were served to 12 taste panel members per replicate, these were people who willingly participated in the organoleptic test for sensory evaluation of the wines. The appearance, taste, colour, aroma and overall acceptability of the wines produced were evaluated on a 1-9 hedonic scale with 1 representing extremely dislike while 9 denotes extremely like. ANOVA was used to analyse the data collected and Duncan multiple range test was used to separate the means. Participants were further required to indicate the perceived benefits of plantain/banana wine by responding to perception statements on a 5-point Likert scale ranging from strongly agree to strongly disagree. They were also required to indicate the limitations affecting consumers' acceptability of the indigenous wine and the severity of these constraints on a 4-point Likert-like rating of ranging from very much to not at all.

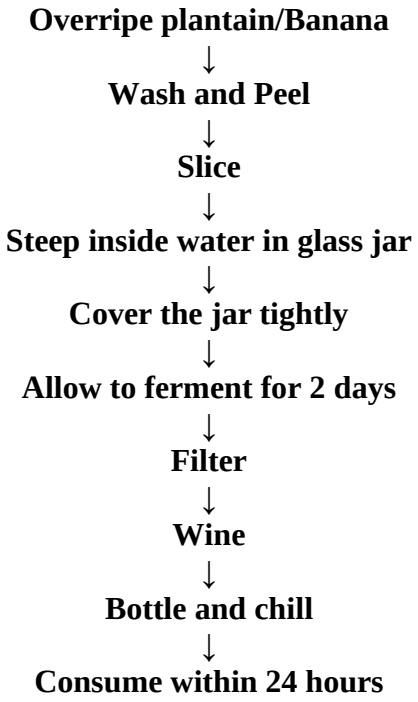

Fig 1: Production chart of plantain/banana wine (*agadagidi*)

RESULTS AND DISCUSSION

Table 1 shows the proximate analysis of the plantain wine and banana wine produced. It shows that the two wines have similar proportions of the various nutrients. Banana wine contains higher moisture content (99.05%) than plantain wine (95.23%) while it has lesser ash (0.18%) than plantain (0.32%), almost equal amount of fat (0.11% and 0.10) was contained by banana and plantain respectively, lesser crude protein in banana (0.44%) than plantain (0.56%) and lesser carbohydrate in banana (0.22%) than plantain (3.79%). None of the two wines has any fibre content. The finding agrees with those of Kanazawa & Sakakibara (2000) and Mohapatra *et al.* (2010) that plantain contains 0.1% fat; also, with Wall (2006) that banana contains not less than 75% water and Harvard school of public health (2023) report that banana contains some quantities of protein and carbohydrate.

Table 1: Proximate analysis of banana wine and plantain wine

Sample Description	Moisture (%)	Ash (%)	Crude Fibre (%)	Fat (%)	Crude Protein (%)	Carbohydrate
Banana wine	99.05	0.18	Nill	0.11	0.44	0.22
Plantain wine	95.23	0.32	Nill	0.10	0.56	3.79

Source: Laboratory analysis, 2023

The sensory evaluation result in Table 2 shows that at p≤ 0.05, there was no significant difference in the appearance of the three wines. However, commercial wine has the highest acceptable appearance (6.8) while plantain wine (6.1) and banana wine (6.1) were rated alike. In terms of taste, the control wine has the highest acceptability (7.3), followed by plantain wine (6.3) while the banana wine has the least acceptability (6.0). The colour of the control wine has the highest acceptability (6.8), followed by banana wine while plantain wine has the least colour acceptability (5.8). The aroma of the control wine was the most preferable (7.1) while the plantain wine (5.6) and banana wine (5.6) were rated equally. The overall acceptability result shows that next to the commercial wine with the highest acceptability (7.5) is the plantain wine (6.1) while the banana wine has the least acceptability (5.3). The finding implies that despite the nutritional advantages of plantain and banana, wines produced from them cannot favourably compete with industrial wine in terms of consumer acceptability. This may be due to the preference for industrial drinks above indigenous ones or the lack of ready availability of plantain/banana wines. However, plantain wine is relatively preferable to banana wine. This finding agrees with Oriola and Boboye (2018) that consumers preferred commercial wine to indigenous wine while it contradicts Akubor *et al*. (2003) who reported that banana wine was generally accepted among their respondents with no significant differences in flavour, taste and overall acceptability of banana wine and the commercial wine used.

Table 2: Sensory evaluation of the wine

Parameter	Sample A	Sample B	Sample C	LSD
Appearance	6.1a	6.1[a]	6.8[a]	0.10
Taste	6.3[b]	6.0[b]	7.3[a]	0.75
Colour	5.8[b]	5.9[b]	6.8[a]	0.81
Aroma	5.6[b]	5.6[b]	7.1[a]	1.07
Overall acceptability	6.1[b]	5.3[b]	7.5[a]	0.98

Source: Field survey, 2023

a,b = Means in the same row followed by the same letter are not significantly different from each other at p≤ 0.05

Sample A =Plantain wine;

Sample B =Banana wine;

Sample C = Commercial wine (Chi exotic) (control)

LSD = Least Significant Difference

Perceived benefits of plantain/banana wine

Results in Table 3 show that the respondents agreed to the perception statements that consumption of plantain/banana wine can help to regulate blood sugar (mean = 3.83), lower blood pressure (3.83), boost the immune system (3.75), prevent heart disease (3.58), and aid blood circulation (3.50) while they were neutral to the statement that the drinks can improve digestion (3.42). Further analysis shows that majority (83.3%) of the respondents favourably perceived the health benefits derived from the consumption of plantain/banana drinks while 16.7 percent had unfavourable perceptions towards it. This finding agrees with the report of Odemero (2013) that overripe plantain wine has great health benefits.

Table 3: Perceived benefits of overripe plantain/ banana wine

Perceived benefits	Strongly Agreed (%)	Agreed (%)	Undecided (%)	Disagreed (%)	Strongly Disagreed (%)	Ranked Mean
Plantain/banana wine can help in regulating blood sugar	33.3	16	50	-	-	3.83
Plantain/banana wine can lower blood pressure	25	33.3	41.7	-	-	3.83
Plantain/banana wine can boost the immune system	24	33.3	33.3	8.3	-	3.75
Plantain/banana wine prevent heart disease	25	8.3	66.7	-	-	3.58
Plantain/banana wine aid blood circulation	25	25	50	-	-	3.50
Plantain/banana wine can improve digestion	25	16.7	58.3	-	-	3.42
Perception score	**%**					
Favourable	83.3					
Unfavourable	16.7					

Mean perception score = 20.17

Strongly Agreed =5, Agreed =4, Undecided =3, Disagreed =2, Strongly Disagreed =1

Source: Field survey, 2023

Constraints to acceptability of plantain/banana wine

Results in Table 4 show that lack of knowledge of the production technique of the drink (mean = 2.4) ranked the highest among the constraints affecting its acceptability, followed by scarcity of plantain during off-seasons (mean = 2.17), quality of the wine (mean = 2.17), competitiveness with industrial wine (mean= 1.75), cultural perception and preference (mean = 1.58), and taste and flavour of the drink (means = 1.50). Based on the scale of measurement, it shows that all the identified constraints were limiting the acceptability of plantain/banana wine. This finding agrees with Ibeanu *et al.*, (2016) that most people were ignorant of the proper processing technique for indigenous wine production.

Table 4: Constraints to acceptability of overripe plantain/ banana wine

Constraints	Very Much (%)	Much (%)	Little (%)	Not at all (%)	Ranked Mean
Lack of knowledge on the production technique of the drink	58.3	25.0	16.7	-	2.40
Scarcity of plantain during off-seasons	41.7	41.7	16.6	-	2.17
Quality of plantain wine	41.7	33.3	25.0	-	2.17
Market competitiveness	33.3	.25.0	41.7	-	1.75
Cultural perceptions and preference	16.7	25.0	58.3	-	1.58
Taste and flavour of the drink	8.3	41.7	50.0	-	1.50

Source: Field survey, 2023

CONCLUSION AND RECOMMENDATION

The study concluded that despite the perceived nutritional benefits of the traditional wine from overripe plantain and banana, it could not compete with the industrial wines in term of consumers' acceptability. This may be due to the various constraints associated with its acceptability. It was therefore recommended that the processing technique for the home-made production of plantain/banana wine be disseminated to the rural households by the extension workers to enhance their nutrient intake and the popularity of the wine thereby preventing it from total extinction.

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