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Production and Sensory Evaluation of Tigernut Beverages

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Abstract: The acceptability of roasted and non-roasted tiger nut beverages has been investigated. Forty panelists were used in the sensory evaluation study. The panelists compared the two beverages on the bases of mouth feel, texture, taste, aroma, consistency, appearance and general acceptability. Correlation analysis of the results showed that although the texture, aroma, appearance and consistency were important for consumers, mouth feel and taste were more important for the overall acceptance of the beverages. The mouth feel of the non-roasted tiger nut beverage was more acceptable than that of the roasted tiger nut beverage. The taste of the roasted tiger nut beverage, however, was more acceptable to the panelists than that of the non-roasted tiger nut beverage. General preference is given to the roasted tiger nut beverage.

Key words: Tiger nut beverages, Ghana, diet

INTRODUCTION

Ghana in recent times has witnessed increasing awareness of the dietary intake of the ordinary Ghanaian and its effect on his health status. Despite this awareness, however, Biritwum *et al.* (2005) reports that the country is still faced with continued rise in the prevalence of obesity alongside high levels of diet related health conditions. Enough evidence notable in speeches of most health practitioners points out that substantial changes in our diet at the micro-level would decrease the reported cases of various health related conditions such as cardiovascular disease, diabetes and cancer, as well as obesity.

Since a change in the diet of a population is difficult and often requires a shift in the food habit of the people, small changes in the intake of various nutrients from mixed food sources may confer health benefits that may possibly improve the nutritional status of most Ghanaians.

The prevalence of obesity and the high level of diet related health conditions have generated a lot of concern about our dietary intake and its effect on our health. The need to make more informed choices regarding food preferences among the Ghanaian folks cannot be overemphasized. In the light of these problems, the tiger nut has been recognized as one of the best nutritional crops that can be used to augment the diet (Afenu, 2008). The tiger nut crop is one of the cash crops, which is not given due recognition and patronage possibly because many people do not know its nutritional benefits.

Tiger nut, (*Cyperus esculentus* L.), is a vigorous plant with leaves in rosette and measures from 40-50 centimeters. It possesses a rhizomatic radicular system, from which depart small roots in which extremes the tiger nuts are formed. The tiger nuts acquire two forms: "langueta" (prolonged) and "armela" (rounded). Initially,

the root crop produces leaves and flourishes as plants do but as the days become shorter and cooler, leaf production will cease and tubers will be formed. High temperatures and low nitrogen levels increase tuber production.

Tiger nuts, according to Abodunrin and Belewu (2008) was found to be a good substitute for cereal grains. The nut which is cultivated throughout the world are also found in the Northern part of Nigeria and other West African Countries like Guinea, Cote d'ivoire, Cameroon, Senegal, America and other parts of the world (Irvine, 1969 in Abodunrin and Belewu, 2008). The nuts are valued for their highly nutritious starch content, dietary fibre and carbohydrate. The nut is reported to be rich in sucrose (17.4-20.0%), fat (25.50%) and protein (8%) (Kordyias, 1990 in Abodunrin and Belewu, 2008) The nut is also rich in mineral content (sodium, calcium, potassium, magnesium, zinc and traces of copper (Omode *et al.*, 1995, in Abodunrin and Belewu, 2008).

The tiger-nut crop has been found to be a healthy tuber with a high content of oleic acid, positive effects on cholesterol levels and high content of Vitamin E. It is highly recommended for diabetics, children, older persons and sportsmen. This study was conducted to extract and formulate milk from roasted and non-roasted tiger nut into palatable beverage and to evaluate the qualities and consumer acceptability of these beverages.

MATERIALS AND METHODS

Fresh tiger nuts were purchased from the Kotokuraba market in Cape Coast, Central region of Ghana. Preparation of the tiger nut milk was done by picking out those foreign and bad nuts that could affect the taste and keeping quality of the beverage. Two preparations were made from non roasted tiger nuts and roasted tiger nut. For the preparation of tiger nuts milk from the non

roasted, the nuts were soaked overnight for approximately 12 h after which it was washed thoroughly and blended by adding 600 ml of water to 400 g of tiger nut. It was then filtered using muslin cloth applying pressure to the content to achieve maximum liquid extraction. The filtrate was put into a clean double bottomed saucepan and brought to the boil. It was then allowed to simmer for between 15 and 20 min to avoid curdling and then allowed to cool. Figures 1a and 1b shows the flow chart for the preparation of the tiger nut milk. The cooled filtrate was poured into a sterilized bottle and further sterilized. It was then allowed to cool and refrigerated. For the preparation of the milk from the roasted tiger nuts, the nuts were roasted for approximately 15 min and then the process for the non roasted followed.

Forty untrained panelists from Cape Coast comprising both males and females were used in the sensory evaluation study. The panelists reflected the range of preferences likely to be typical of ethnic consumers. Panelists were presented with the two samples, the roasted and non-roasted tiger nuts. Panelists were asked to compare the two samples on the bases of mouth feel, texture, taste, aroma, consistency, appearance and general acceptability, using the hedonic descriptive scale 1-5 (Table 1). Assessors were instructed in the basic taste panel procedures, to make their own individual judgments after a moderate amount of consideration. The panelists were instructed to take a sip of water and pause for a few seconds before tasting each sample and to re-taste if they were not sure of their decisions.

From the data obtained, the mean values and standard error for each was calculated. The significant differences between the samples were tested using the t-test.

RESULTS AND DISCUSSION

Table 2 demonstrates the percentage score on comparative sensory evaluation of the roasted and non-roasted tiger nut samples used in this work.

The *mouth feel* of tiger nut beverage is an important factor for consumers. Of the 40 panelists who participated in the sensory evaluation 95% indicated their acceptance of the mouth feel of the non-roasted tiger nut beverage while 85% accepted the roasted tiger nut beverage. Thus, there is a slight preference for the non-roasted tiger nuts. This is confirmed by the mean values (Table 3) which are not significantly different at the 1% level.

The *texture* quality is also an important factor to consumers. Of the 40 panelists, 88 % accepted the texture of the non-roasted tiger nut beverage while 87 % indicated their acceptance for the roasted tiger nut beverage. There is no significant difference between the averages.

The *aroma* of a beverage is important to the consumer. The panelists were therefore asked to compare the

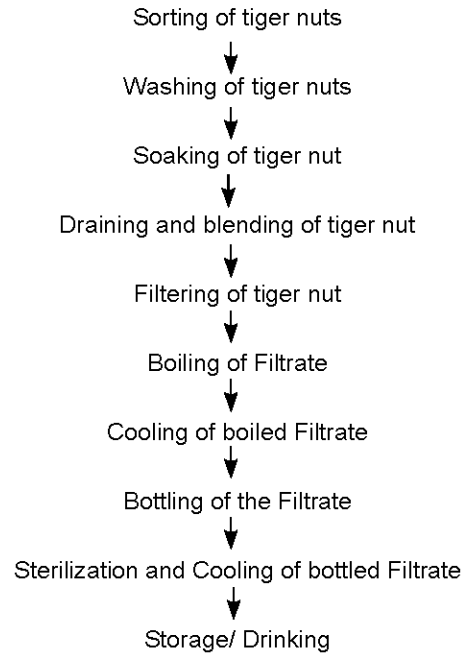


Fig. 1a: Flow chart for the preparation of non-roasted tiger nut beverage

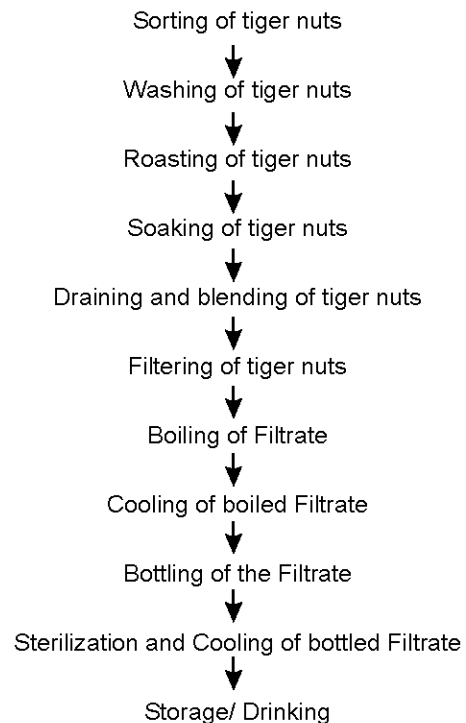


Fig. 1b: Flow chat for the preparation of roasted tiger nut beverage

aroma of the roasted tiger nut beverage and the non-tiger nut beverage. 85% of the panelists indicated their acceptance of the two beverages.

Table 1: Hedonic scoring for assessment of consumer acceptability of tiger nut beverages

Scale	Sensory qualities					General	
	Mouth Feel	Texture	Aroma	Taste	Consistency	Acceptability	Appearance
1	Excellent	Very Smooth	Excellent	Excellent	Excellent	Excellent	Excellent
2	Very Good	Smooth	Very Good	Very Good	Very Good	Very Good	Very Good
3	Good	Neutral	Good	Good	Good	Good	Good
4	Fair	Lumpy	Fair	Fair	Fair	Fair	Fair
5	Poor	Very Lumpy	Poor	Poor	Poor	Poor	Poor

Table 2: Percentage score on comparative sensory evaluation of roasted and non-roasted tiger nut beverages

Sample/ Hedonic description scale	Sensory qualities						
	Mouth feel	Texture	Aroma	Taste	Consistency	Appearance	General acceptability
Non-roasted	95	88	85	95	87	98	90
Roasted	85	87	85	87	92	93	98

Table 3: Comparative sensory evaluation of roasted and non-roasted tiger nut beverages

Sample	Sensory qualities						
	Mouth feel	Texture	Aroma	Taste	Consistency	Appearance	General acceptability
Nonroasted	4.300±0.089	4.075±0.090	4.250±0.123	4.375±0.093	4.077±0.093	4.350±0.084	4.300±0.103
Roasted	4.180±0.109	4.103±0.109	4.154±0.119	4.256±0.108	4.154±0.086	4.425±0.101	4.350±0.084

The taste of the beverage is also an important feature for consumers. Of the 40 panelists, 95 % accepted the taste of the non-roasted tiger nut beverage while 87% accepted the taste of the roasted tiger nut beverage. The results indicate that although there is a general acceptance for the two beverages, there is a slight preference for the non-roasted tiger-nut beverage.

The consistency of the beverage, that is how light or heavy the beverage is, is an important factor for the consumer. 13% of the 40 panelists expressed their reservations about the consistency of the non-roasted tiger nut beverage compared to 87% who accepted it as good. 92% of the panelists accepted the consistency of the roasted tiger nut beverage.

The appearance is important to consumers. The panelists thus compared the appearance of the non-roasted tiger nut beverage with that of the roasted tiger nut beverage. 98% of the panelists accepted the appearance of the non-roasted tiger nut beverage as good while 93% accepted the roasted nut beverage as good. There was insignificant difference between the mean values of the two beverages.

The general acceptability of the beverage is very important to the consumers. 98% of the panelists found the roasted tiger-nut beverage very acceptable while 90% of the panelists found the non-roasted nut beverage very acceptable. There seem to be a slight preference for the roasted tiger nut beverage.

Correlation analysis of the results showed that although the texture, aroma, appearance and consistency were important for consumers, mouth feel and taste were more important for the overall acceptance of the beverages. The mouth feel of the non-roasted tiger nut beverage was more acceptable than the mouth feel of the roasted tiger nut beverage. Also the taste of the roasted tiger nut was more acceptable to the panelists than that of the non-roasted tiger nut beverage.

Conclusion: In summary, the sensory evaluation study of roasted and non-roasted tiger nut beverages revealed that although the texture, aroma, appearance and consistency were important for consumers, mouth feel and taste were more important for the overall acceptance of the beverages. The mouth feel of the non-roasted tiger nut beverage was more acceptable than the mouth feel of the roasted tiger nut beverage. Also the taste of the roasted tiger nut was more acceptable to the panelists than that of the non-roasted tiger nut beverage. General preference, however, is given to the roasted tiger nut beverage.

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