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Preparation of Kunnu from Unexploited Rich Food Source: Tiger Nut (*Cyperus esculentus*)

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Abstract: The effect of preparing kunnu from Tiger nut (A) Millet (B) and sorghum (C) on the proximate composition, mineral content and sensory qualities were evaluated in a completely randomized design model. The results revealed highest fat percentage for Tiger nut based kunnu (Treatment A) and poorest for millet based kunnu (Treatment C). The crude protein content of Tiger nut based kunnu (A) was greatest ($p < 0.05$) compared to other Treatments B and C which are similar. There was similarity in the energy content of all the Treatments. The sensory qualities (flavour, colour, taste, texture, general acceptability) were however, observed to increase significantly ($p < 0.05$) in the Tiger nut based Kunnu (A) compared to other sources (B and C). Furthermore, utilization of Tiger nut in the preparation of kunnu was favoured by market price compared to sorghum and millet. Tiger nut based kunnu cost \$0.29 per Kg while millet and sorghum based kunnu cost \$0.36 per kg each, making a difference of \$0.07 per kg surplus. In conclusion, the results obtained show that preparation of kunnu from Tiger nut was cheaper while more nutritious beverage with a high level of acceptability was obtained.

Key words: Kunnu, *Cyperus esculentus*, sorghum millet, proximate composition, sensory qualities

Introduction

Kunnu is a non-alcoholic beverage prepared mainly from cereals (millet, sorghum etc). It has low viscosity, with sweet-sour taste and a milky cream appearance. It is a thirst quencher or serves as refreshment in some communities. It is also used as weaning drinks for infants (Sowonola *et al.*, 2005).

The beverages made from cereal crops are found to be poor in protein content. The poor protein content may affect the growth rate of infants who drink the beverage. The baby may be irritable listless with crack and scaly skin. The liver may be damaged and the child often dies before age of five.

To make up for the poor nutritional qualities of kunnu prepared from cereals, Tiger nut (chufa) 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 Africa Countries like Guinea, Cote d'ivoire, Cameroon, Senegal, America and other parts of the World (Irvine, 1969). The nuts are valued for their highly nutritious starch content, dietary fibre, carbohydrate (mono, di and polysaccharides) (Umerie and Enebeli, 1997). The nut was reported to be rich in sucrose (17.4 to 20.0%), fat (25.50%), protein (8%) (Kordylas, 1990). The nut is also very rich in mineral content (Sodium, Calcium, Potassium, Magnesium, Zinc and traces of Copper (Omode *et al.*, 1995).

The nut is higher in oil content and the oil was implicated as a lauric acid grade oil which was non-acidic stable, non-drying and of very low unsaturated.

The oil remained uniformly liquid at refrigeration temperature. This makes the oil suitable for salad making (Umerie and Enebeli, 1997). Tigernuts are regarded as a digestive tonic having a heating and drying effect in digestive system and alleviating flatulence. They also promote urine production. The nuts are said to be stimulant and tonic and also used in the treatment of indigestion, colic diarrhoea, dysentery and excessive thirst (David, 1986). The qualities of Tiger nut in this context (*Cyperus esculentus*) stimulates its inclusion in the preparation of kunnu so as to provide protein-rich at affordable price in place of animal protein which is scarce and expensive. Therefore, the thrust of this study was to evaluate the efficacy of Tiger nut in the preparation of kunnu (a non-alcoholic beverage) in developing countries.

Materials and Methods

Fresh Tiger nut, dried Millet, sorghum and spices were purchased from Oja-Oba market in Ilorin, Kwara State, Nigeria. Foreign materials and bad nuts and seeds which may affect the taste and keeping quality of the drink were removed. Each of the good materials (Tiger nut, dried millet and sorghum) was washed thoroughly in water so as to remove any adhering soil. Fig. 1 shows the flow chart for kunnu preparation from Tiger nut thus: 1kg of the nuts was blended with 2 litres of water to almost smooth slurry. This was later filtered using muslin cloth with gently pressure applied to the content so as to facilitate maximum liquid extraction. The filtrate was allowed to stand for about 60 minutes to

Preparation of Kunnu from Tigernut

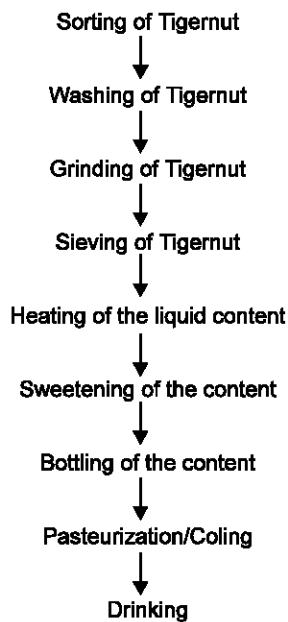


Fig. 1: Flow chart of kunnu form Tigernut

Table 1: *Proximate composition of kunnu prepared from Tiger nut, Millet and Sorghum

Composition (%)	Treatments			±SEM
	A	B	C	
Dry matter	19.00 ^a	17.00 ^a	27.00 ^b	1.45*
Crude protein	7.20 ^a	2.10 ^b	1.50 ^b	0.85*
Crude fibre	0.20 ^a	0.60 ^b	0.50 ^b	0.002*
Ash	0.50 ^a	1.30 ^b	2.40 ^c	0.98*
Fat	20.10 ^a	0.20 ^b	4.10 ^b	2.76*
Carbohydrate	66.00	67.00	68.00	6.98NS
pH	6.50 ^a	3.60 ^b	3.70 ^b	5.23*
Acidity	8.10	9.50	9.60	0.98NS
Energy (kcal/g)	6.98	6.11	5.88	0.67NS

*Average of 8 determinations, Mean along the same row with different superscripts are significantly different from each other (p<0.05)

settle out the starch fraction with subsequent removal of the top liquid portion. The resulting content was heated to 70°C while fresh (unheated) milled Tiger nut liquid with spices (dandelion, alligator pepper, ginger licorice) and about 30g of sugar were added to give taste.

Kunnu prepared from sorghum and millet followed similar procedures as aforementioned. The samples were subjected to physico-chemical analyses using the method of AOAC (1990) while sensory qualities were determined using a nine point hedonic scale.

All data collected were subjected to analysis of variance of a completely randomized design model (Steel and Torrie, 1980) while means were separated using Duncan (1955) multiple range test.

Results and Discussion

The proximate composition and mineral content of kunnu prepared from Tiger nut (A), Millet (B) and Sorghum (C) are shown in Table 1. Kunnu prepared from Tiger nut (A) had the highest fat content which was superior to that of Millet (B) and Sorghum (C).

The fat percentage of kunnu prepared from millet was lowest than the result of Sowonola *et al.* (2005) who used similar ingredients. The variation in the results might be due to the addition of soymilk to the kunnu prepared from millet by these authors.

The crude protein content of Tiger nut based kunnu (A) was five times higher than that of sorghum (C) and three times that of millet (B). This result was in line with the report of Defelice (2002) and Adekunle and Badejo (2002) who reported that *Cyperus esculentus*, crude protein was as high as 7%.

But, the result reported herein was in contrast to the report of Sowonola *et al.* (2005). The poor protein content of kunnu reported by these authors could be due probably to the types of ingredients used (pearl millet plus sorghum). However, the protein content of kunnu prepared from millet and sorghum agreed with the report of (Sowonola *et al.*, 2005).

The result of the mineral content was significantly higher in Treatment A (Tiger nut based kunnu) compared to other Treatments B and C (Table 2). The higher mineral content of Treatment A (Tiger nut based kunnu) concurs with the reports of Omode *et al.* (1995) who found that the nut is very rich in mineral content.

The dry matter content reported in this study was higher than the value reported elsewhere (Sowonola *et al.*, 2005). The energy content was numerically higher in Treatment. A (Tiger nut based kunnu) compared to other Treatments B and C.

The pH value for Tiger nut based kunnu (A) was higher than that of other Treatments (B and C) which are similar (p>0.05). This shows that Tiger nut is less acidic than millet and sorghum and thus preparation of kunnu from Tiger nut will increase its pH value. This also implies that kunnu prepared from Tiger nut will be more acceptable to patient with ulcers and other related problems since it is less acidic. This confirms the assertion of David (1986) that Tiger nuts are regarded as stimulant and tonic and it can be used in the treatment of indigestion, colic and diarrhoea.

The sensory evaluation revealed that kunnu prepared from Tiger nut was more acceptable with the best taste, flavour, colour and texture (Table 3). The result was in support of the findings of Abdel (2001) who found Tiger nut (Chufa) drink being highly acceptable. The resultant blend of Tiger nut based kunnu is more nutritious and its sensory qualities make it more acceptable than kunnu made from millet and sorghum.

The feasibility of least cost production from the utilization of Tiger nut in the preparation of kunnu

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Table 2: *Mineral composition of kunnu prepared from Tiger nut, Millet and Sorghum

Content (%)	Treatment			±SEM
	A	B	C	
Sodium	1.20 ^a	1.20 ^a	0.80 ^b	0.12*
Calcium	0.40 ^a	0.30 ^a	Trace	0.005
Potassium	1.90 ^a	1.30 ^b	1.20 ^b	0.18*
Magnesium	0.20 ^a	Trace	0.10 ^b	0.006*
Phosphorus	0.30 ^a	0.10 ^b	0.20 ^a	0.03*

*Average of 8 determinations, Means along the same row with different superscripts are significantly different from each other (p<0.05)

Table 3: *Sensory Evaluation of kunnu prepared from Tiger nut, Millet and Sorghum

Parameters	Treatment			±SEM
	A	B	C	
Colour	8.38 ^a	7.79 ^b	7.20 ^b	0.95*
Taste	7.67	7.50	7.17	0.56NS
Texture	8.33 ^a	7.46 ^b	6.79 ^b	0.94*
Flavour	7.25 ^a	6.71	7.04	0.82*
General Acceptability	8.13 ^a	7.50 ^b	7.13 ^b	0.91*

*Average of 20 determinations, Means along the same row with different superscripts are significantly different from each other (p<0.05)

indicates that it is usually feasible, improves the nutritive content and makes the beverage more acceptable and economical by reducing the cost to the farmers.

Conclusion: The result revealed that kunnu prepared from Tiger nut could be used as a beverage for both the young and old persons due to the high nutrient contents (protein, fat, fibre, mineral etc). It is noteworthy that the high lauric acid content of the nut is an added advantage to the consumer of the product.

Based on the sensory evaluation, the blend from Tiger nut was highly acceptable compared to kunnu from

millet and sorghum. This indicates that utilization of Tiger nut in the preparation of kunnu could enhance the nutritional status of the beverage which will help in solving the problem of protein-calorie malnutrition in Africa in particular and the world in general.

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