

Effects Of Roasting Time Of Maize (*Zea Mays*) And Groundnuts (*Arachis Hypogaeae*) On The Quality Attributes Of Donkua

Makanjuola .Olakunle.Moses¹ and Makanjuola,John.Olanrewaju²

¹Department of Food Technology

²Department of Science Laboratory Technology, Environmental Biology Unit

Federal Polytechnic

P.M.B.50,Ilaro, Ogun State.

Corresponding Author: kunle.makanjuola@yahoo.com.

ABSTRACT

The effects of roasting time on the quality attributes of DONKUA, a local snack commonly eaten were investigated in this present work. Dried maize and groundnut seeds were subjected to elevated temperature of 180°C for 20,30,40,50 and 60 minutes respectively for effective roasting. Other ingredients such as pepper, sugar, ginger, salts were added and blended to produce Donkua. The proximate composition and sensory characteristics of Donkua produced were carried out using standard methods. The fat contents ranged from 11.00% -18.00%, crude fibre varied between 0.53% -1.00%, moisture content for all the sample was 10.00%, ash content ranged from 4.00 -7.00%, protein content varied between 11.00 -14.00% while the carbohydrate contents of 53.00%, 57.00%, 60.00%, 61.00% and 60.00% were obtained. Sensory evaluation results showed significant differences in the samples at $\leq P.05$. However, it was evident from the result that the higher the protein content supplied by the groundnut, the lower the carbohydrate and ash contents.

Keywords: Effect, Roasting, Maize, Quality attributes, Donkua.

1. INTRODUCTION

The cereal grains are the staple food in the diet of most population groups and they are the most important of all food plants (Grist, 1959). They are staple foods of the people of the tropics, providing them with about 75% of their total calorie intake and 67% of their protein intake. The grains are eaten in many ways, sometimes as paste, roasts, porridges and pottages or other preparations of the seed, more often milled and processed into flour, starch, bran oil or breakfast or dinner cakes (Ihekoroye and Ngoddy, 1985). Maize (*Zea mays*) as a source of starch is of great importance. It is consumed in a multitude of ways i.e ground or pounded and boiled, ground or pounded and baked or fried, boiled whole, roasted whole, ground or pounded and fermented (Ihekoroye and Ngoddy, 1985). Maize (*Zea mays*) is cultivated in a region that experience period of at least 90 days of frost -free condition. Maize grain may be white, yellow or reddish in colour. Maize is deficient in the vitamin niacin and contains a low amount of protein (zein) which is deficient in lysine and tryptophan.

The legumes refers to the edible seed of leguminous plant belonging to the *Leguminosae* family. Groundnut (*Arachis hypogaea*) or pea nut is a legume which is widely grown as a food crop. It is an herbaceous plant of which there are different varieties such as Boro light, Boro red, Mokwa campala, Auta and Ela (Ayoola et al., 2012; Anyasor, 2009). Peanuts are among the oldest oil crops in Nigeria and are mostly consumed as snack after roasting (Ayoola et al.,2012; Bansal et al.,1993; Jambunatan et al., 1993).

Groundnut provides an inexpensive source of high quality dietary protein and oil. Groundnut protein is increasingly becoming important as food and feed sources, especially in developing Countries where protein from animal sources are not within the means of the majority of the populace (Ayoola et al.,2012). Donkua is a product that is commonly eaten in the Northern part of Nigeria and is produced by milling dry maize (*Zea mays*) and groundnut seeds (*Arachis hypogaea*) into powdered form after which other milled ingredients such as dry pepper, sugar, salt and ginger are added, then moulded to desired shapes and sizes. However, the purpose of this present work is to investigate the effect of roasting period (time) of maize (*Zea mays*) and groundnut (*Arachis hypogaea*), on the quality attributes of Donkua.

2. MATERIALS AND METHODS

Source of Materials:

Diseased -free dried maize (*Zea mays*) and groundnut (*Arachis hypogaea*), pepper, granulated sugar (Dangote type), ginger were bought from a local market, Sayedero in Ilaro Metropolis, South West, Nigeria and transported to the laboratories of Food Technology Department, Federal Polytechnic Ilaro, Ogun State for subsequent processing and analysis.

Methods:

Dried maize grains and groundnut seeds were first sorted, cleaned to remove contaminants, stones, adhering sands and sticks. 1kg of maize grain and 500g of groundnut seeds were then weighed into clean stainless steel bowl and subjected to roasting operation using Philip Gas Cooker.

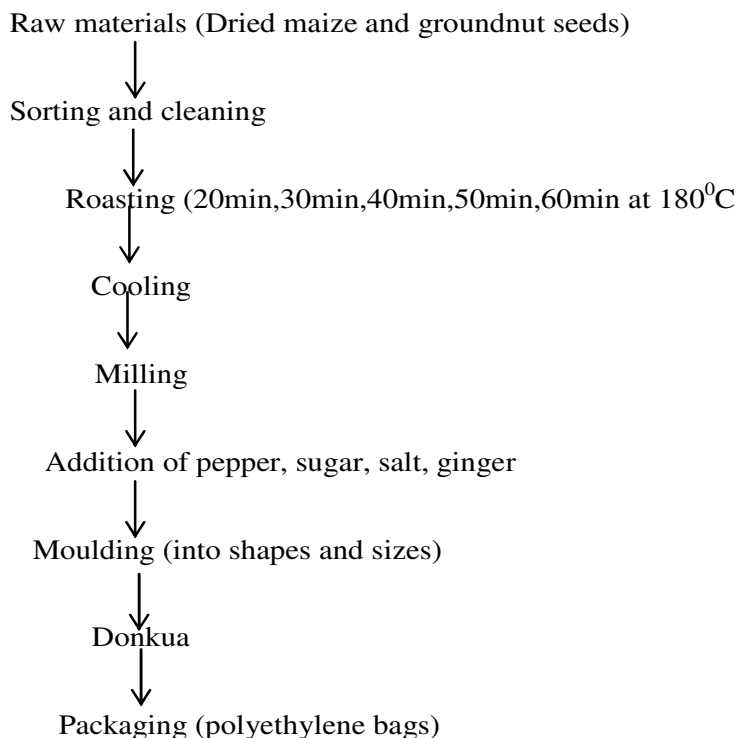


Fig 1: Flow chart for the production of Donkua.

The roasting times were 20minutes, 30minutes, 40minutes, 50minutes and 60minutes respectively at 180°C. The roasted maize and groundnut seeds were allowed to cool to room temperature and then milled into powder with the aid of attrition mill. Addition of other ingredients such as sugar (granulated), milled dried pepper, pinch of salt and ginger (milled) was then carried out after which it was pounded using laboratory mortar and pestle, blended very well and then moulded into desired shapes and sizes.

Analysis: Proximate analysis of the Donkua was carried out according to the method described by AOAC (2000). All analyses were carried out in triplicates. All reagents and chemicals used were of analytical grade.

Sensory Analysis: The sensory characteristics of Donkua produced from roasted maize and groundnut were assessed by 30 panelists drawn among the Polytechnic community who are familiar with the product. The panelist rated the product on a nine – point hedonic scale where 9 represent like extremely and 1 represent dislike extremely. The products were assessed for flavour, texture, colour, taste and overall acceptability.

Statistical Analysis: Data generated were analyzed using analysis of variance (ANOVA) to determine differences in sample means. Duncan’s Multiple Range Test (DMRT) was employed to separate the means at $P \leq 0.05$ with Statistical Package for Social Science Version 16.0 for Windows (SPSS inc. illinois, USA)

3. RESULTS AND DISCUSSION

Results

**Table 1: Effect of Roasting Time on the Chemical Analysis of Donkua
PARAMETERS**

Roasting Time (mins)	Fat %	Crude fibre %	Moisture %	Ash %	Protein %	Carbohydrate %
20	11 ^c ±0.01	1.00 ^a ±0.02	10 ^a ±0.01	7 ^a ±0.01	11 ^c ±0.01	60 ^b ±0.02
30	12 ^d ±0.02	1.00 ^a ±0.02	10 ^a ±0.02	6 ^b ±0.01	10 ^c ±0.01	61 ^a ±0.02
40	14 ^e ±0.02	0.76 ^b ±0.02	10 ^a ±0.02	5 ^c ±0.02	10 ^c ±0.02	60 ^b ±0.02
50	16 ^b ±0.02	0.57 ^c ±0.02	10.2 ^a ±0.02	4 ^d ±0.02	12 ^b ±0.02	57 ^c ±0.01
60	18 ^a ±0.02	0.53 ^c ±0.02	10 ^a .4±0.02	4 ^d ±0.02	14 ^a ±0.02	53 ^d ±0.01

Values represent means of triplicates. Values with the same superscript are not significantly different at $P \leq 0.05$

Table 2: Results Showing the Sensory Quality of Donkua PARAMETERS

Roasting Time (mins)	Flavour	Texture	Colour	Taste	Overall acceptability
20	5.9 ^a	5.7 ^a	5.8 ^a	5.5 ^b	5.2 ^a
30	5.7 ^a	5.7 ^a	5.7 ^b	6.2 ^a	5.9 ^a
40	5.3 ^a	5.7 ^a	5.6 ^c	5.6 ^b	4.5 ^b
50	5.3 ^a	5.8 ^a	5.3 ^d	5.6 ^b	5.4 ^a
60	5.5 ^a	5.9 ^a	5.2 ^e	5.3 ^b	4.8 ^b

Values represent means of triplicate. Values with the same superscript are not significantly different at $P \leq 0.05$

4. DISCUSSION

The effect of roasting times on the proximate composition of donkua samples are shown in Table 1. The fat contents for the donkua sample roasted for 20,30,40,50 and 60 minutes were 11%, 12%, 14%, 16% and 18% respectively. It was observed that as the roasting time increases, there was increase in fat contents, for example 16% and 18% fat contents were obtained at the roasting time of 50 and 60 minutes. This may be due to longer roasting time leading to more extraction of oil most especially from groundnut which are oil bearing seeds (Leguminous plant).

The crude fibre ranged from 0.53% -1.00% for all the samples roasted between 20 and 60 minutes. According to Ihekoroye and Ngoddy (1985), maize grains contains about 2 -3% fibre while groundnut belongs to the group of legumes used primarily for their oil content. However, it was observed that as roasting time increases, the crude fibre content decreases. All the donkua samples produced had moisture content of 10%, indicating that the samples will be able to keep well before getting spoilt and this is expected of a well dried product.

The ash contents varied between 4% -7% for all the donkua samples under consideration. It was observed that the micro nutrients decreases as the roasting time increases. Although legumes are generally known to contain mineral elements but the decrease in ash content may be due destructive nature of heat as the roasting time prolonged as shown in 50 minutes and 60 minutes of roasting.

Maize grains have protein content of 9-10% while groundnuts may have up to 25% protein or even more (Ihekoroye and Ngoddy 1985). The protein contents obtained in this present work ranged from 10% -14% for all the samples. This may be due to the carbohydrate content of maize (starch) which is very high.

After 20, 30, 40, 50 and 60 minutes of roasting time in the production of donkua samples, carbohydrate contents of 60%, 61%, 60%, 57% and 53% were obtained. According to literature (Ihekoroye and Ngoddy 1985), maize grains is very rich in starch (65-84%). The proportion of maize grains to groundnut seeds used in this work are in the ratio of 2:1, hence the high carbohydrate contents was unexpected. Table 2 showed the results of sensory evaluation of donkua samples after varying roasting time. The result showed significant differences in terms of all the quality parameters evaluated in the samples. In terms of flavour, all the samples ranked the same irrespective of the roasting time.

The texture of the donkua showed similar trend indicating adequate milling operation. It was observed that panelists rated the donkua samples which are subjected to 20, 30 and 40 minutes of roasting high while samples processed at 50 and 60 minutes of roasting are least preferred. This may be due to the colour intensified by milliard reaction between protein and sugar in the samples. Sample roasted at 30 minutes was highly preferred in terms of taste. The overall acceptability showed that at 5% level of significance, sample with roasting time of 30 minutes were the most preferred in comparison with other samples and this may be due to preferred colour, flavour, texture and taste.

5. CONCLUSION

This present work has vividly shown that roasting time can play a very significant role in the nutrients composition and general acceptability of donkua, a product which is very rich in protein, fat and low carbohydrate. The work is another way of providing cheap plant protein source to the human populace though in form of snacks.

REFERENCES

1. A.O.A.C (2000), Official Methods of Analyses. Association of Official Analytical Chemist.15th Edition, Archinton, USA.
2. Anyasor,G.N, Ogunwenmo K.O, Oyelana,O.A, Ajayi, D and Dangana,J (2009). Chemical Analyses of Groundnut (Arachi hypogaea) Oil, *Pakistan Journal of Nutrition*, 8 (3); 269- 272
3. Ayoola,P.B, Adeyeye.A and Onawumi .O.O (2012). Chemical Evaluation of Food Value of Groundnut ((Arachi hypogaea Seeds). *American Journal of Food and Nutrition*, 2 (3); 55-57
4. Bansal, U.K, Satiya, D.R and Ahula, K.L (1993).Oil Composition of Diverse Groundnut (Arachi hypogaea.L). Genotypes Relation to Different Environments. *Journal of Science, Food & Agric*. 63; 17-19
5. Duncan, B.O. (1955): Multiple Range and Multiple F test *Biometric*,11; 1-5
6. Grist, D.H.(1959). Rice. 3rd Edition, Published by *Longman Publishers, London*.
7. Ihekoroye, A.I and Ngoddy, P.O (1985). Integrated Food Science and Technology for the Tropics. 1st Edition, *Published by Macmillan Publishers, UK, London. pp 236-291*
8. Jambunathan,R, Raju, S.M and Barde, S.P (1993). Analysis of Groundnut content by Nuclear Magnetic Resource Spectrometry, *Journal of Science, Food & Agric*. 36: 162-166