

THE EFFECT OF DIFFERENT DRYING CONDITIONS ON THE NUTRITIVE VALUE OF TRECVLIA AFRICANA

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Abstract

The extraction of oil from Treculia africana (breadfruit) under three different conditions was studied using cool method. The saponification value, acid value, peroxide value and protein contents were determined for three sample of the same species of Treculia africana using kjeldahl and wijs methods respectively. The result of the analysis show that Treculia Africana oil has a golden yellow colour in room and solar drying conditions and light brown in oven conditions. The room dried Treculia africana oil has higher protein content and percentage yield than the other conditions while the oven and solar drying conditions are healthier as they contain less saponification value, acid value and free fatty acid values. In all the analysis, the three drying conditions vary with the standard.

Key words- Treculia africana, protein, saponification, peroxide, fatty acids.

Introduction

African breadfruit (*Treculia africana*) is one of naturally nutritive species. It belongs to the mulberry family moraceae (³ & ⁴). In unripe stage the fruit is hard and the interior is white, starchy and somewhat fibrous. When fully ripe the fruit is some what soft; the interior is green coloured or fragrant. The seeds are irregularly oval rounded at one end and pointed at the other, about 2cm long, dull brown with darker stripes (⁴) it has been reported that the breadfruit tree requires a temperature ranged of 60° F to 100° F (15.56 °C – 37.78 °C), an annual rainfall of 203-254cm (80-100 inches) and a relative humidity of 70 to 80 percent [^{3,5,8}]. There are two enzymes in breadfruit, papayotin and artocarpine. Breadfruit flour contains 40.5% protein, 70% carbohydrate and 33.1 % calories while cassava flour contains 1.16 % protein, 83.8% carbohydrate and 34% calories per 100 grams showing that breadfruit contains approximately 3.5 times the amount of protein in cassava. The aim of this research is to characterize the breadfruit oil under three different conditions to know the most nutritional one for medical, health and easy recommendation to the consumers or patient [^{3,5}].

The samples were properly dried under three drying conditions namely sun, oven and room conditions. Characterization of these oils after extraction was made with various parameters; iodine value, peroxide value, protein content, percentage oil yield, saponification value, acid/free fatty acid values. After the characterization, the

proximate analysis was conducted with the three samples based on moisture content, ash content, fibre, carbohydrates and calories [^{1,2,3,6}].

Experimental

African breadfruit (*Treculia africana*) nut was collected from, the parent plant located in Oba Anambra State of South – East Nigeria. The brown colored seeds (Nuts) were dehusted and allowed to dry under three different conditions (sun, oven, room) [^{10,11}], for two days (48 hours) and was ground to paste form before the analysis were carried out. The oil samples were extracted using cool method. The three oil samples were obtained and analyzed for percentage oil yield, peroxide value, saponification value, acid value/free fatty acid value and iodine value, using wijs methods. For the proximate analysis, after the samples were dried, the moisture content, fat content, ash content fibre, carbohydrate, calories were determined with the method [^{7, 9, 10}].

Result

The results obtained were compared with a freshly prepared breadfruit as standard. Results are shown on table 1 and 2

Discussion and recommendation

The results of chemical analyses of the breadfruit oil at different conditions indicate that all the oils are semi drying oil. From table 1 the result of chemical characterization showed that these three conditions are made for different people.

The saponification values are 170.40, 148.60 and 150.21 compared with 196.20 standards. The protein content are 18.10 percent, 16.50 percent and 17.15 percent compared with 19.25% standard. The acid values are 9.96, 6.01 and 9.82 compared with 10.20 standards. Peroxide values are 8.0, 6.10 and 7.0 compared with 8.50 standards. Iodine values are 19.60, 20.20 and 19.70 compared with 17.30 standard. Free fatty acid (FFA) 4.96, 3.90 and 4.23 compared with 2.10 standards. Percentage oil yield are 18.50%, 16.80% and 18.50% compared with the standard of 20.40%. Iron III elements are 0%, 2%, 0.5% compared with 1.5% standard. Iron II element 2%, 0, 1.5% compared with 5% standard. Temperature 34°C, 10°C and 47°C compared with 21°C of the standard

In summary, the results obtained for the sample studied under room condition compare more favorably with standard on protein contents, acid value, saponification value and peroxide value, but the iodine value and free fatty acid obtained for the oven condition is high compared with standard. Percentage oil yield retained by the room and sun condition compare more favorably with the standard than the oven condition. Iron III element is absent in the sample at room condition but present in oven and sun conditions while iron II is free from the sample at oven condition.

Table II, show the result of breadfruit seeds characterization. Food value per 100grams of breadfruit seeds was used for the determination of the amount of substances consumed. The moisture content for room, oven and sun conditions are 10.50g, 0.01g and 5.01g compared with 20.10g standard. Protein is 6.25, 10.8g and 7.72g compared with 13.00g standard. Fat are 8.59g, 6.70g and 7.30g compared with 9.01g standard. Carbohydrate is 35.60g, 15.95g and 30.20g compared with 40.50g

standard. Fibre is 1.96, 1.0g and 1.67g compared with 3.20g standard. Ash is 5.58g, 1.90g and 3.42g compared with 11.20g standard.

In summary the three drying conditions vary with the standard but the values obtained for the room conditions compare better with the standard.

Conclusion

This work showed that the breadfruit popularly called (Ukwa) by the Igbos and African breadfruit by English with botanical name of *Treculia africana*, produced and consumed especially in the Eastern part of Nigeria, is rich in nutrients.

The protein content, especially, is high and conforms to a composite analysis of the breadfruit done in some part of Central America, Mexico, Africa and India. So, it can be said that (ukwa) is a protein rich food [6] under the different conditions. On the whole samples, *Treculia africana* dried under room conditions has more nutritional values than the oven and sun dried samples [10,11,12] while the oven and sun dried samples are more healthy as they contain less saponification, acid and free fatty acid values [6, 13]

Recommendations

It is therefore recommended that breadfruit should be consumed more regularly, cooked or roasted as a quality food.

Industries are encouraged to package breadfruit in a way that will make it more appealing to people. Packaging of breadfruit for export to other countries should be encouraged as a way of yielding hard currency to the country. Breadfruit is very rich in nutrients and will reduce deficiency of very important nutrients in the body.

Furthermore, within certain limitation, edible test and chromatographical separation of *Treculia africana* oil was not done, the authors therefore recommend the following:

Further work on separation of the fatty acids in the oil under the three conditions by use of chromatography.

Intensive edibility test to be carried out on the nutritive value of the oil under various conditions.

Table 1: Comparison of the result of the characterization of the breadfruit oil samples with the standard (fresh bread fruit oil).

Properties	Values			
	Room	Oven	Sun	standard
Protein	18.10%	16.50%	17.15%	19.25%
Acid value	9.96	6.01	9.82	10.20
Saponification value	170.40	148.6	150.21	196.20
Peroxide value	8.0	6.1	7.0	8.5
Iodine value	19.60	20.20	19.70	17.30
F.F.A value	4.96	3.90	4.23	2.10

Percentage oil yield	18.50%	16.80%	18.50%	20.40%
Fe ⁺	-	2%	0.5%	1.5%
Fe ²⁺	2%	-	1.5%	5%
Temperature °C	34°C	100°C	47°C	21°C

Table 2: The comparison of the results of the food value characterization of the breadfruits seed samples with the standard (freshly prepared breadfruit)

Properties	Amounts (g)			
	Room	Oven	Sun	Freshly prop
Moisture	10.5g	0.01g	5.01g	20.10g
Protein	6.25g	10.8g	7.72g	13.00g
Fat	8.59g	6.70g	7.30g	9.01g
Carbohydrate	35.60g	15.9g	30.20g	40.50g
Fibre	1.96g	1.0g	1.67g	3.20g
Ash	5.58g	1.90g	3.42g	11.20g

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