

# Palm Oil Quality and Productivity of Local Varieties of Fruits of *Eleais guinensis* in Owerri, Imo State

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**Abstract:** Palm oil from *Eleais guinensis* is a major source of income to the people of Owerri Imo state. Many local varieties of the fruit exist and farmers are poorly advised on the choice of strains to cultivate. This work compared the oil production ability as well as quality parameters of oils from the three local fruit types, “ABUBA”, “EBEKE” and “OKPURUKA”. Five grams of each fruit type were cooked and processed locally adopting the same method of oil extraction. Results indicate that ‘Abuba’ yielded the highest oil (70mg/5g) followed by ‘Ebeke’ (60mg/5g) and ‘Okpuruka’ (54mg/5g). Analyses of the oils from the three strains show that Acid value were 11.78mg/g, 39.27mg/g and 32.26mg/g; Iodine(%), 20.94, 16.50 and 14.50; Moisture(%), 3.40, 3.10 and 3.20; Peroxide(mg/g), 7.40, 5.40 and 6.40; Refractive index/g, 1.464, 1.463 and 1.462 in ‘Abuba, ‘Ebeke’ and ‘Okpuruka’ oils respectively. Value of specific gravity(mg/g) was 1.91 in the three strains. The results indicate that the “Abuba” fruit variety was the best fruit variety in oil production and physicochemical content especially for consumption.

**Keywords:** Strains, Peroxide, Specific Gravity, Refractive Index, Iodine.

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## I. INTRODUCTION

Palm oil is an edible oil, reddish in colour derived from the fruits of the oil palm *Elaeis guineensis*, which is indigenous in West Africa (16). The oil palm tree is a perennial tree crop, which produces the highest quantity of oil when compared to other oil producing plants (8). The crop is unique, in that it produces two types of oil. The fleshy mesocarp produces palm oil, which is used mainly for its edible properties and the kernel produces palm kernel oil, which has wide application in the oleochemical industry (18). Palm oil consumption in 2015 was estimated at 35% globally (17) making it the highest consumed vegetable oil. Like most vegetable oils, palm oil is mainly composed of triglycerides or triacylglycerols which represent 95% of the total weight constituents (1). It also contains minor compounds such as diacylglycerol, mono glycerol and free fatty acids (FFA) (issued from the biosynthesis and / or hydrolysis of triacylglycerols), sterol, tocopherol, pigments and metal ions.

The majority of fatty acids are palmitic acid followed by oleic acid (20). All modern commercial planting material

consists of Tenera palms or DxP hybrids which are obtainable by crossing thick shelled, Dura with shell-less *Pisifera*. (5). Although common, commercial germinated seed is as thick-shelled as the *Dura* mother palm, the resulting palm will produce thin-shelled *Tenera* fruit (6). An alternative to germinated seed, once constraints to mass production are overcome, is tissue-culture or 'clonal' plants which provide 'true copies' of high yielding DxP palms (5).

The production of palm oil is mostly based on semi-natural groves, which have an estimated area of 106,690 hectares (15). The medium and smallholder plantations and the large estate plantations represent a very small share of the production system with estimated area of 67,690 hectares and 3,410 hectares respectively (15). As at 2009, 150-200,000 Metric tonnes of palm oil are produced in Imo state (NIFOR, 2012). The production in Imo is comparable with Abia and Rivers state, while lower in productions to Akwa Ibom and Cross river states (>250, 000 Metric tonnes) and higher than Ondo, Edo, Delta, Bayelsa states respectively with productions ranging from 0 to 150,000 Metric tonnes. However, Imo has a

potential to increase its production through the application of improved processing methods, better yielding fruit varieties and better marketing (14)(10)

The unregulated cultivation of the various fruit varieties of *Elaeis guineensis* in Owerri area has impacted on the volume and quality of palm oil produced in the area and the need to streamline cultivation choices based on productivity of the available fruit varieties in the study area necessitated this study.

The aim of this work thus is to determine palm oil quality and productivity of the local varieties of palm fruits obtained in Owerri, Imo state.

## II. MATERIALS AND METHODS

### ➤ Study Area

This work was carried out in Owerri, the capital of Imo state, Nigeria. The town is located between latitude 5.48<sup>0</sup> and longitude 7.02<sup>0</sup> with mean annual rainfall ranging from 1641.5mm to 2914.6mm with rainy season occurring from March to October and this affects the productivity and yield of palm oil.

### ➤ Collection of Samples

Samples used for the analysis included; locally available kinds of palm fruits. ('Okpuruka', 'Ebeke' and 'Abuba') obtained from parts of Owerri, and Ngor Okpala areas.

### ➤ Production of Palm Oil From Local Fruit Varieties

Five grams of each variety of locally available palm fruits- 'Okpuruka', 'Ebeke' and 'Abuba' were locally processed by boiling, pounding in a wooden mortar and extraction using water as described(3). Using measuring cylinder, the quantity of oil yielded by each variety was measured and the results recorded.

### ➤ Determination of the Physicochemical Parameters

Some physicochemical qualities of the oils from the three local varieties of palm fruits were analyzed. The parameters tested were Acid value, iodine, moisture, saponification, peroxide, specific gravity and refractive index using standard methods described by (2).

## III. RESULTS

The results of oil productivity and physicochemical properties of the locally available strains of palm fruits notably 'Abuba', 'Ebeke' and 'Okpuruka' indicate that 'Abuba' yielded the highest volume of palm oil per gram of ripe fruit. The physicochemical properties of the palm oils produced from the fruit varieties are also shown below.

Table 1: Oil Quality and Productivity of Palm Fruit Varieties ('Abuba', 'Ebeke' and 'Okpuruka')

OIL PALM STRAIN	'Abuba'	'Ebeke'	'Okpuruka'
QTY OF OIL PRODUCED ml/5g	70± 0.01	60±0.01	54±0.01
ACID VALUE Mg/g	11.78±0.00	39.27±0.00	32.26±0.00
IODINE %	20.94±0.01	16.50±0.02	14.59±0.02
MOISTURE CONTENT %	3.40±0.02	3.10±0.01	3.20±0.02
PEROXIDE /g	7.4±0.00	5.4±0.01	6.4±0.01
SPECIFIC GRAVITY /g	0.91±0.01	0.91±0.00	0.91±0.00
REFRACTIVE INDEX	1.464±0.01	1.463±0.2	1.462±0.01

Values showing smean ± standard deviation. p< 0.05

## IV. DISCUSSION

The results of the oil quality and productivity of the different local varieties as shown in table 1 showed that the quantity of oil produced by the "Abuba" local variety was the highest with 70ml/5g of oil being produced. The least quantity was produced by "Okpuruka" variety which gave 54ml/5g of palm oil while the "Ebeke" variety yielded 60ml/5g of palm oil. SoyStats (18) reported high productivity of Tenera fruit variety in comparison with Okpuruka (Dura). The outcome of this study compares with that results gotten by Surma *et al.* (21). The results of the physicochemical parameters of the different varieties as shown in Table 1 also showed that "Ebeke" was highest in acid value with the value of 39.27mg/g which indicated high thermal stability and it may be less prone to thermal oxidation or degradation and spoilage (21). The low

acid value of the oil samples produced from "Abuba" thus suggests its low oxidation and thermal stability. The iodine value was however highest in "Abuba" with the value of 20.94% while the "Okpuruka" had the least iodine value (14.59%). This may suggest that the oil from the "Abuba" variety had higher unsaturation. This may also suggest higher shelf life and stability. (8). The high peroxide value obtained with the "Abuba" fruit variety may indicate high oxidation and low storage keeping ability (2). However, studies have shown that unsaturated oils are more acceptable for consumption than for industrial purposes. (11). Statistically, there is no significant difference in the productivity and physicochemical contents of the three fruit varieties at 95% confidence interval.

## V. CONCLUSIONS

The outcome of this work has shown that oil of good physicochemical quality can be produced from different local varieties of palm fruit. The "Abuba" variety yielded highest quantity of palm oil probably because of its larger mesocarp and larger surface area while the "Okpuruka" yielded the least probably because of its larger kernel content in comparison with its mesocarp size. The physicochemical parameters of the oil showed that the high acid content of the "Okpuruka" oil confers high thermal and oxidation stability to the oil compared to the other oils assessed in this study. It also yields oil suitable for higher industrial usage.

The cultivation of the "Abuba" variety of palm fruit should be encouraged due to its high oil yield as well as the appreciable unsaturation nature of the oil that makes it more suitable for consumption.

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