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Comparism of Physico-Chemical Properties of Lagenaria Breviflora and Lagenaria Sicenaria Seed Oils

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Abstract: *Leganariabreviflora and Leganariasiceraria fruits have been found to be alternative remedies in medicinebut there is little documentation of the oil from their seeds. This research was carried out to determine the composition of oils extracted from the two seeds, compare and ascertain the oils are edibile . Oils were extracted from dehusked seeds of the two samples,washed , sun dried, the dried seeds were blended into powdery forms and oil extraction was done using sohxlet extractor. The result showed that acid , Iodine,peroxide and free fatty acid values were slightly higher in Leganariabreviflora compared to L.siceraria which had higher content of unsaponifiable matter,peroxide and free fatty acids. It was also observed that L. breviflora seed oil had higher values of stearic acid(14.8 %) and oleic acid (13%).The oils are classified as non- drying because the iodine value is less than 115g/100g). The peroxide value indicates that the oil is less prone to rancidity with iodine value less than 30 meq/kg. The high saponification value qualifies it for use in the manufacture of soaps and shampoos. Four classes of fatty acid were identified in the oils of the studied samples ofLagenariasicerariaand Lagenariabreviflora respectively: Linoleic acid was the most abundant fatty acids observed in the two extracted oils.The low acid and peroxide values coupled with high linoleic acid level observed in Leganariasiceraria suggests that it will be a good source of edible oil, while Leganariabrevifloraoil may be useful in soap and surface coating industries.*

Key words*: Lagenariabreviflora, Lagenariasiceraria, fatty acids, Physico-chemical properties,Cucurbitaceae*

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I. Introduction

Leganariabreviflora and Leganariasiceraria are members of Cucurbitaceae or cucurbit family , the family is a major source of medicinal agents since acient times. The plant family comprises of 118 genera and 825 species of wide distribution tropical regions.Leganariabreviflora is aperennial climber,the fruits are dark green with creamy blotches and are ovoid its seeds have been used have been used in folk medicine.the fruit hasanti-tubercular and antiseptic properties, it is also used in, dropsy,nephritis, chronic bronchitis, also to treat jaundice, biliary,intestinal colitis,enlarged spleen and fever..The seed oil is reported to be used for skin infections. Yoganandamet al.2010, observed that leganaria seed oil can be used to treat skin infections, the fruit is used in the treatment of ascites,jaundice,biliary, intestinal colitis,fever and enlarged spleen. Leganariasicenaria fruits are edible, found to be rich in vitamin C, ß-carotene, vitamin B complex, pectin and choline level. It also contain some alkaloid like saponins,vitamins and some essential oils (Raham (2003). The seeds are widely cultivated, they are used as containers and storage storage vessels. Several reports have been made on the medicinal and nutritional importance of the seeds of Leganariabreviflora and Leganariasiceraria while there is little information about their oils, hence, there is need to study the nutritive contents of these oil may be it can be used as an alternative to cooking oil with saturated fats.

II. Materials and methods

Sample collection and preparation

The fruits ofL.brevifloraand L.Sciceraria were purchased from Itoku market, Abeokuta, Ogun state, Nigeria. The fruits were manually broken with a sharp object and the seeds were washed to separate them from the spongy part of the fruit. The seeds were then sun-dried;the dried seeds were packed in an airtight container prior analysis.

Oil extraction

The seeds were poured on the receiving funnel of the cold presser; the oil dripped from the outlet and was collected in a container which has been previously weighed. The difference gave the weight of the extracted oil.The analysis was carried out using standard methods described by AOAC. 2010.

Physico-chemical analysis of the extracted oils

The refractive index was measured using a refractometer, the specific gravity and viscosity were determined by filling the density bottles with the oils and weighed at 60^0C

Acid value

One gram(1 g) oil of the samples extracted was weighed added to 10 ml carbon tetrachloromethane (CCl_4), 2 ml phenolphthalein indicator was added to the mixture, the mixture was titrated with 0.1 M NaOH until the end point is reached with purple colouration. A blank titration was done.

Sapoonification value

2 g was weighed into a conical flask, 25 ml of alcoholic KOH was added, the mixture was placed inside the water bath to boil. On cooling, 3 drops of phenolphthalein indicator was added to the mixture, this was titrated against 0.5 M HCl until the end point was reached.

Iodine value

1 g of each oil sample was weighed into a conical flask and 25 ml of HANUS solution and 10ml chloroform were added , the mixture was kept in the dark for 6hours. 10 ml of KI was added with few drops of starch indicator, tblank and the sample were titrated against 0.1 M $Na_2S_2O_3$ until the end point is reached.

Peroxide Value

A solution containing 2 g of the sample , 6ml of choloform (CH_3Cl) and 9 ml ethanoic acid was added to 2 ml saturated potassium iodide (KI), it was allowed to stand for 2 mins before 3 ml and 2 ml starch indicator were added. The resulting mixture was titrated against 0.1 M $Na_2S_2O_3$.

Fatty acid

The extracted oil (1.5 g) was added to 25 ml ethanol in a conical flask, the mixture was brought to boil; the warm mixture was titrated against 0.1 M NaOH until a purple colouration was observed. Phenolphtalein was used as the indicator.

Determination of unsaponifiable matter

25 ml of alcoholic KOH was added to 1 g of the oil extract in a flask and refluxed for 1 hour at 30^oC, 50 ml of distilled water was added and the whole content was placed in 250 ml separating funnel, it was allowed to stand until the formation of two layers were observed. The aqueous layer was drained off while the organic layer was transferred into a flask and evaporated to dryness using ether as solvent. The ether extracted was pre-weighed in a beaker and heated to a constant weight at 100^oC.

III. Results

Physicochemical properties

The results of the physicochemical properties of Lagenariasiceraria and Lagenariabreviflora seed oils are presented in Table1. The highest value of saponification was recorded for Lagenariabreviflora(208.58 mgKOH/g) while 182 mgKOH/g was recorded for Lagenariasiceraria, the values which was slightly lower than the saponification value (221.0 mgKOH/g) reported by Olaofeet al., 2012. A higher iodine value (101.0 mgI_2/g) was obtained for Lagenariabreviflora, thiswas observed to be higher than the value obtained for Lagenariasiceraria (93.70 mgI_2/g). Olaofeet al., 2012 recorded a slightly higher value of (98.7mgI_2/g) for Lagenariasicerariawhile Esuoso, 2006 obtained a value of (100.6 mgI_2/g) forAdenopusbreviflorus oil which was a bit lower than (101.0mgI2/g) as reported in this present study. The values for the iodine fall within acceptable range (80-106gI2/100g) for edible oils (WHO, 2012). Higher values of I_2 has been reported to show an increase in the unsaturation of the oil (Hassimet al., 2007).

Table1: Physico-chemical Properties of Lagenariabreviflora and Lagenariasciceraria seed oils

Parameters	L.breviflora	L.siceraria	Literature review
Odour	Slighhtly pungent	Agreeable	
Colour	Golden yellow	Light yellow	
Acid value (mg KOH/g)	8.01 ± 0.21	6.80 ± 0.15	
Iodine (mgI_2/g)	101.00 ± 4.58	93.70 ± 0.20	93.70mgI_2/g (Olaofe et al., 2012)
Saponification (mg KOH/g)	182.00 ± 2.00	208.58 ± 0.03	221.0mgKOH,g (Olaofe et al., 2012)
UnSaponifiable matter (%)	2.32 ± 0.02	2.41 ± 0.01	
Peroxide value (Meq.O_2/kg)	7.70 ± 0.03	6.93 ± 0.02	20 meqO_2/kg
Free fatty acids (%)	4.05 ± 0.28	3.75 ± 0.03	

The highest peroxide value (7.7 meqO_2/kg) was obtained for Lagenariabreviflora, this was observed to be higher than the value recorded Lagenariasiceraria(6.93 meqO_2/kg). The peroxide values are lower than the recommended value (20 meqO_2/kg) for unrefined oil (FAO/WHO, 2003). This indicates that the degree of rancidity is high in the two oils samples which also suggest strong presence of high level of anti-oxidant.

Acid values observed in Lagenariabreviflora(8.01 mgKOH/g) and (6.80 mgKOH/g) for Lagenariasiceraria was slightly below the range of value (8.06 to 9.66 mgKOH/g) reported by Elluechet al., (

2007). These values were however were higher than the expected value (0.00 to 3.00 mgKOH/g) reported by (Ibrahim et al., 2011) for edible oil. Higher acid value suggest free fatty acid present in the oil and in turn indicates the level of deterioration by enzymatic or chemical oxidation.(El-adawy and Taha, 2001).

Table 2: % Fatty acids composition of Lagenariabreviflora and Lagenariasciceraria seed oils

Parameters	L.breviflora	L. sicereraria
Oil	44.85	46.05
Palmitic acid (C16:0)	10.41	10.55
Stearic acid (18:0)	14.89	9.00
Oleic acid (18:1)	13.01	10.75
Linoleic acid (18:2)	61.35	69.59
Saturated	25.51	19.85
Unsaturated	74.49	80.34
Unsaturated/Saturated	2.92	4.41
Monosaturated	13.01	10.75
Polyunsaturated	61.35	69.59
Oleic/Linoleic acid ratio	0.21	0.15

Fatty Acid Compositon

The fatty acid profile in the oil samples presented in the Table 2 revealed that the oils contained significant quantities of unsaturation fatty acids for both samples of Lagenariabreviflora(74.3%) and Lagenariasciceraria(80.2%) while the saturated acids values of 19.8% and 25.5% were respectively recorded for Lagenariasciceraria and Lagenariabreviflora. The oil were predominated with palmitic acid (10.4 - 10.5%), stearic acid (9.0 - 14.8%), oleic acid (10.7 - 13.0%), and linoleic acid (61.3 – 69.5%) in both samples. Oleic and linoleic acids account for most unsaturated acid in cucurbitaceae seed oils, and major fatty acids in peanut, soy beans and lentil (Olaofeet al., 2012). The oleic/linoleic acid ratio for both samples is (0.2), the index helps in determining the detrimental effects of dietary fats. The higher the ratio, the more nutritional useful is the oil (Adeyeye, 2011). The significant quantity of polyunsaturated fatty (61.5 – 69.6%) in the samples may have additional advantage over soy beans oils as these unsaturated fatty acids are essential constituents of human diets (Fox and Cameron, 2008).

Suggested applications

The acceptable acid and peroxide values and high linoleic acid levels of Lagenariasciceraria suggest that it could be a quality sources of edible oil. Additionally, the propoetionate abundance of linoleic and oleic acids which may impute on the suitability of these oils for reduced serum cholesterol, hence the fight against cardiovascular diseases. The high saponification and iodine indices ofLagenariabreviflora may be exploited by the soap and surface coating industries.

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