

Short Communication

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PHYSICO-CHEMICAL AND METAL COMPOSITION OF *CALOPHYLLUM INOPHYLLUM* SEED AND SEED OIL

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Calophyllum inophyllum Linn, is a beautiful ornamental tree with long stalked white flowers at the ends of the branches. Its glossy broad elliptic leaves with numerous parallel lateral veins are most distinctive. *C.inophyllum* belongs to Guttiferae which are trees or shrubs occurring chiefly in the tropics. They have simple opposite leaves, often with translucent lines or dots. All of the Nigerian species yield resinous juice when slashed and most of them have distinctly whorled branches (Keay *et al* 1966).

Conventional edible oils are becoming very scarce and there is need to establish alternative oil bearing seeds as their substitute (Agbaji *et al* 1993). However there is no published information on the seeds of *C.inophyllum* growing in Nigeria. Chemical composition of plants varies according to the variety and the district where the plant is grown.

Hence in search of new vegetable oils (Oderinde *et al* 1989, 1991, 1998), seeds of *C.inophyllum* have been examined for physico-chemical and metal composition and the results are reported in this communication.

For the study fresh mature samples were collected from the botanical garden of the University of Ibadan, Nigeria. The fruits were cracked to remove the whitish (with tinge of green) coloured seeds. Oil was extracted from fresh seeds in a Soxhlet extractor using purified hexane as the solvent.

Crude protein (N% \times 6.25) was determined by the Micro-kjeldhal Method while the procedures for determination of the iodine value (Wij's method) saponification values, hydroxyl value, acid and peroxides values of the oil were carried according to the methods described by Cocks and Rede (1966). Proximate analysis of the seed was according to the methods of the AOAC (1984).

Elemental analysis was performed according to the method described by Oderinde *et al* (1989) and Olaofe *et al* (1994). The instruments condition, were as per manufacturers specifications.

Viscosity measurement was performed with the Oswald Kinematic Viscometer (Omode *et al* 1995). The refractive index

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of the oil was determined with an Abbe refractometer while the specific gravity was measured with the specific gravity bottle. Both parameters were determined at room temperature. The energy values of the seed and oil were determined with the use of bomb calorimeter.

The proximate composition of *C.inophyllum* is given in (Table 1).

Oil from the *C. inophyllum* seeds (49.12 ± 1.20) makes up about half of the fresh seed (Table 2). It is similar in value to the oils from groundnut (46 – 52%) and palm kernel (46.4 - 50.8) (Rossel and Pritchard 1991). The greenish yellow oil is liquid at room temperature.

The colour Saponification value of the oil 227.98 ± 2.00 closely resembles that of *Lageraria siceraria* oil 238 (Table 3) and tobacco seed oil 229.9 (Agbaji *et al* 1993). Other characteristics of the oil are viscosity (17.75 ± 0.05) which is slightly lower

Table 1
Proximate composition of *C.inophyllum* seeds

Parameters	Range(%)	Mean
Crude oil	47.92 - 50.32	49.12 \pm 1.20
Crude protein	5.46 - 7.46	6.46 \pm 0.45
Crude fibre	23.05 - 24.95	24.00 \pm 0.95
Ash	1.04 - 1.06	1.05 \pm 0.01
Carbohydrates	12.21 - 14.23	13.72 \pm 0.51
Moisture	5.40 - 5.90	5.65 \pm 0.25
Energy	364.37 - 368.	366.37 \pm 2.

Table 2
Physico-chemical characteristics of *C.inophyllum* seed oil

Characteristics	Range	Mean
Oil content (%)	47.92-50.32	49.12 \pm 1.20
Saponification number		
mg KOH g^{-1}	225.98-229.98	227.98 \pm 2.00
Peroxide value	0.70-1.00	0.85 \pm 0.15
Acid value	30.82-32.94	31.88 \pm 1.06
Iodine value	67.21-70.21	68.71 \pm 1.50
Free fatty acid(% as Oleic)	15.03-17.03	16.03 \pm 1.00
Ester value	195.16-197.54	196.35 \pm 1.19
Hydroxyl value	1.28-1.30	1.29 \pm 0.01
Oxidized fatty acids	0.020-0.023	0.0215 \pm 0.0015
Unsaponifiable matter	1.46-1.48	1.47 \pm 0.01
Refractive index (25°C)	0.4674	
Viscosity (centipoise, 25°C)	17.70-17.80	17.75 \pm 0.05
Smoke point	200- 204	202 \pm 2
Energy	857.0- 860.0	858.5 \pm 1.5

Table 3
Characteristics of various vegetable fats and oils

Characteristics	<i>C.inophyllum</i>	Corn	Soyabean	Cotton seed oil	Olive oil	Esculental	<i>Lageraria siceraria</i>
Oil in seed	49.12	4.5	21.0	22.9	-	22.8	38.0
Saponification value	227.00	190.6	193.0	195.0	189.0	194.4	238.0
Iodine value	68.71	128.0	126.0	105.0	81.1	82.1	104.7
Refractive index	1.474	1.472	1.473	1.470	1.4679	1.4674	-

Table 4
Mineral composition of *C. inophyllum*

Element	ppm
Calcium	6.0
Magnesium	11.2
Potassium	836.0
Sodium	336.0
Manganese	0.16
Iron	0.08
Copper	0.27
Zinc	0.69

than that of *C. pulcherrima* (19.50 ± 0.3) (Omode *et al* 1995). The iodine value of the oil of *C. inophyllum* shows it to be non-drying and preponderance of unsaturated fatty acids. It is less than that of corn, soya-bean and cottonseed oils (Oderinde and Tairu 1991) but is fairly close to that of *T. belliricia* that is 76 (Nag and De 1995).

Potassium and sodium have the highest values in the seeds of *C. inophyllum* being 836.0 and 336.0 ppm respectively (Table 4). Thus the seed can be a good source of these elements. The value of potassium in the seed is higher than 710 ± 4.2 ppm found in *C. pulcherrima* but it is lower than 1050 ± 4.2 ppm of *G. kola* (Omode *et al* 1995).

Key word: Seed oil, *Calophyllum inophyllum*, Physico-chemical composition.

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