



# QUALITY CHARACTERISTICS OF CASSIA SIEBERIANA L. SEED OIL

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## Abstract

Oil was extracted from the seed of *Cassia sieberiana* using Soxhlet apparatus. The oil yield was  $9.26 \pm 0.01\%$  and the colour of the seed oil was dark yellow. The results of the physico-chemical analysis revealed the following; acid value, iodine value, saponification value, peroxide value, relative density and refractive index of  $0.35 \pm 0.01$  mgKOH/g,  $135.60 \pm 0.10$  gI<sub>2</sub>/100g,  $235.62 \pm 0.01$  mgKOH/g,  $1.8 \pm 0.10$  meq H<sub>2</sub>O<sub>2</sub>,  $0.8185 \pm 0.00$  (g/cm<sup>3</sup>) and  $1.4415 \pm 5.77$  respectively indicating the suitability of the seed oil for pharmaceutical and cosmetic applications.

**Keywords:** *Cassia sieberiana*, seed oil, quality characteristics, cosmetics, pharmaceutical

## 1.0 INTRODUCTION

*Cassia sieberiana*, drumstick tree, is a tree in the Fabaceae family native to Africa. It ranges from 10-20 metres in height and has very bright yellow flowers [1]. In Hausa language it is called "Màrgáá" or "Malgaa" [2]. It is a plant of pharmacognostic importance from among Nigerian plants [3]. Pharmacognostic studies and standardization of *Cassia sieberiana* roots has been reported [4]. Medicinally its leaves, root bark was reported to be useful antimalarial [5]. One of the uses of *Cassia sieberiana* seeds is roasting for beverage [6]. Acaricidal activity of aqueous extract of *Cassia sieberiana* stem bark on *Hyalomma* larvae using the immersion technique was reported [7]. Oil extraction and production of biodiesel from *Cassia sieberiana* seeds using the trans-esterification method was also successfully reported [8]. This research work was carried out to physico-chemically analyze *Cassia sieberiana* seed oil and show its potential in pharmaceutical and cosmetic preparations.

## 2.0 MATERIALS AND METHOD

### 2.1. Sample Collection and Identification

The *Cassia sieberiana* L. seed was obtained from the premises of Kebbi State University of Science and Technology, Aliero, Nigeria. The taxonomic identification was authenticated by Dr. Dharamendra Singh of the Botany unit Biological Sciences Department, Kebbi State University of Science and Technology, Aliero in comparison with voucher specimen Voucher Number 71A kept at Herbarium. The dried seeds were crushed into powder using mortar and pestle and were stored in a dried plastic container prior to oil extraction.

### 2.2 Oil Extraction Procedure

The hexane extract was obtained by complete extraction using the Soxhlet extractor (GG-17, SHUNIU). The 50 g of each powdered kernel sample was put into a porous thimble and placed in a Soxhlet extractor, using 150 cm<sup>3</sup> of n-hexane (with boiling point of 40- 60°C) as extracting solvent for 6 hours repeatedly until required quantity was obtained. The oil was obtained after evaporation using Water bath at 70°C to remove the excess solvent from the extracted oil. The oil was then stored in refrigerator for subsequent physicochemical analysis.

### 2.3. Percentage Yield

The oil which was recovered by complete distilling of most of the solvent on a heating mantle was transferred to a beaker. The beaker was then placed over water bath for complete evaporation of solvent for about 2 hours and volume of the oil was recorded and expressed as oil content (%) in line with literature report [9].

$$\text{Oil content (\%)} = \frac{\text{Weight of the oil}}{\text{Weight of sample}} \times 100$$

### 2.4. Determination of Colour

The colour of the oil samples was determined by observation using several independent competent individuals. Oil colour was correlated using colour charts [10].

## 2.5. Determination of Relative Density

This was performed according to literature report [11]. The 10ml of the oil was measured in a pre-weighed measuring cylinder. The weight of the cylinder and oil was measured, the weight of the oil was then obtained by subtracting the weight of the cylinder from the weight of the oil and cylinder. The density of the oil was obtained using equation below.

$$\text{Density of oil} = \frac{W_1 - W_0}{V_0}$$

Where  $W_1$  = weight of empty measuring cylinder + oil.

$W_0$  = weight of measuring cylinder,  $V_0$  = volume of oil used.

## 2.6. Physico-Chemical Analysis

The physico-chemical analysis of the *Cassia sieberiana* L. seed oil was carried out using the methods reported [12; 13; 14].



Figure 1. *Cassia sieberiana* tree with fruits Figure 2. *Cassia sieberiana* seeds



Figure 3. *Cassia sieberiana* ground seeds Figure 3. Hexane extract of *Cassia sieberiana* seed oil



### 3.0 Results

Table 1: Physicochemical properties of *Cassiasieberiana* Seed Oil\*

Parameters	Values
Oil yield (%)	9.26±0.01
Colour of oil	Dark yellow
Acid value mgKOH/g	0.35±0.01
Iodine value gl <sub>2</sub> /100g	135.60 ±0.10
Saponification value mgKOH/g	235.62 ±0.01
Peroxide value meq H <sub>2</sub> O <sub>2</sub> , 1.8 ±0.10	
Relative density (g/cm <sup>3</sup> )	0.8185±0.00
Refractive index	1.4415 ±5.77

Values are expressed as mean and ± standard deviation of triplicate determinations \*

### 4.0 DISCUSSION

Oil yield was 9.26±0.01%, the value obtained is lower than 19.23±0.07% reported for *Ipomoea carnea* ssp. *fistulosa* L. seed oil [15] and 29.33±0.01% value reported for *Adansoniadigitata* L. seed oil [16], higher than 3.5%, 6.2%, 4.2%, 4.9%, and 5.6% reported for five *Cassia* species (*Cassia absus*, *Cassia alata*, *Cassia javanica*, *assialaevigata*, and *assiaroxburghii*) seeds respectively containing important unsaturated fatty acids mainly Oleic and linoleic acids [17]. Colour of the oil was dark yellow, Acid value was 0.35±0.01 mgKOH/g lower value than 2.39 ± 0.065 reported for castor seed oil [18] and 12.97 ± 0.01 reported value for *Neocaryamacrophylla* seed oil [19] higher than 0.03±0.01 reported for onion seed oil [20] recommended for soap making and other cosmetic preparations., Iodine value was 135.60 ±0.10

gl<sub>2</sub>/100g, higher than 84.8 gl<sub>2</sub>/100g reported for groundnut seed oil [21] and 76.93 ± 0.397 gl<sub>2</sub>/100g reported for castor bean [22] which is within a range of semi-drying oils consisting predominately polyunsaturated fatty acids mainly oleic and linoleic fatty acids. This class of oils whose iodine value is between 100 – 150 possesses the property of absorbing oxygen on exposure to the atmosphere; though do not do so sufficiently to qualify them as drying oils. They become thicken and remain sticky but do not form a hard dry film. They are used in the production of margarine and soap [23]. Saponification value was 235.62 ±0.01 mgKOH/g, higher than Saponification values (mgKOH/g): 172.59 ± 0.33 and 141.12±1.19 reported for Traditional and hexane extracts of shea nut fat respectively [24] indicating high saponification value and suitability for soap making. Peroxide value was 1.8 ±0.10 meq H<sub>2</sub>O<sub>2</sub>, which is lower than 37.79 ± 0.02 reported for *Moringa oleifera* Lam seed oil [25] and Peroxide value (meq H<sub>2</sub>O<sub>2</sub>) 45.48 ± 0.02 for *parinarimacrophylla* seed oil [26]. Higher peroxide value indicate deterioration or not of seed oils. Fresh oils have values less than 10 mEq kg<sup>-1</sup> values between 20 and 40 mEq kg<sup>-1</sup> results to rancid taste [27]. Relative density was 0.8185±0.00 g/cm<sup>3</sup> lower than 0.94 reported for *Cucumis melo* Linn Seed oil [28], 0.93± 0.00 reported for *Blighiasapida* fruit oil [29] and 0.9241 ± 0.003 for Chia seed oil [30]. Refractive index was 1.4415 ±5.77 lower than 1.4750 and 1.4750 reported for Corn oil and Sunflower oil respectively [31]. Higher than 1.412 reported for Palm Kernel Oil [32]. Increase in refractive index values in the triacylglycerols or degree of unsaturation result in increase in chain length of fatty acids [33].

### 5. CONCLUSION

Conclusively, the results of the physicochemical analysis of seed oil of *Cassiasieberiana* L. indicated its potential for soap making and other cosmetic industries.



## Acknowledgement

The author wish to acknowledge the effort of Mr Ibrahim of the Central Laboratory National Institute of Chemical Technology (NARICT), Zaria, Nigeria in carrying out the physico-chemical analysis..

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DOI : 10.24297/jns.v3i3.3967