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*F*atty Acid Composition and Physicochemical Properties of Castor (Ricinus Communis L.) Seed Obtained from Malete, Moro Local Government Area, Kwara State. Nigeria.

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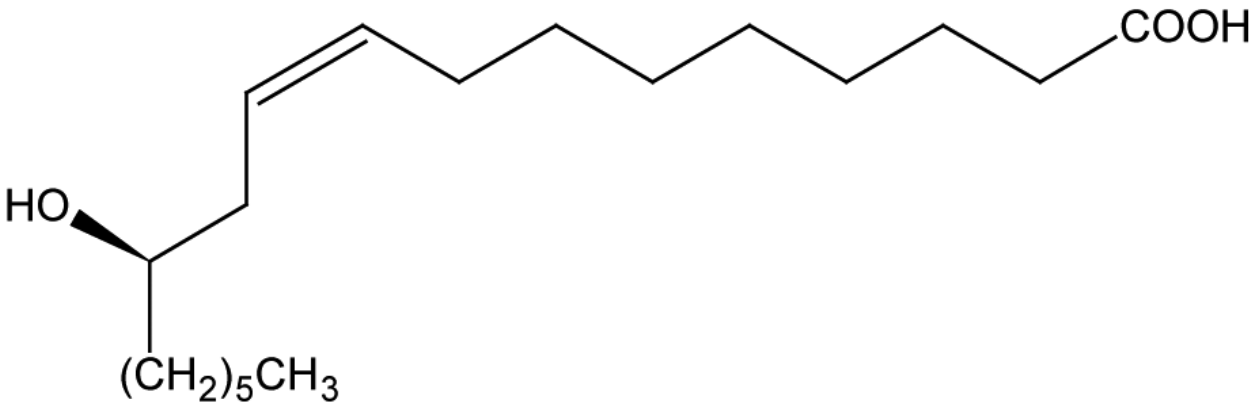
Abstract
*T*he oil of the Ricinus communis L. seed was extracted by soxhlet method using N-hexane.The physicochemical characteristics of the castor oil were evaluated. The results showed that the castor seeds contain a relatively high percentage of total lipids content ; 47.8 % , iodine value (1.061 g/g) , and saponification value (327.4 g/g). The seed oil moisture content , acid value , density and free fatty acid (% FFA) were 0.3 % , 14.42 mg/g , 880 g/cm^3 and 7.21 % , respectively.
***K*eywords** : Physicochemical properties ; Ricinus communis L ; Soxhlet method ; N-hexane ; Free fatty acid ; saponification value

1. *I*ntroduction

*C*astor plant (Ricinus communis) , a tropical plant belonging to the Euphorbiaceae family , is cultivated around the world for its non-edible oil seed.
Castor is basically a tropical crop that can survive in arid conditions. Castor oil is obtained through pressing the seeds followed by solvent extraction of the pressed cake. The uniqueness derived from this oil is the presence of a hydroxyl fatty acid known as ricinoleic acid $C_{18}H_{34}O_3$ (Cis – 12 – hydroxyoctadeca – 9 – enoic acid) , which constitutes around 90 % of the total fatty acids of the oil. It is an 18-carbon hydroxylated fatty acid having one double bond (Jumat et al 2010).
Castor oil is also distinguished from other vegetable oils by its high specific gravity , thickness , and hydroxyl value. Castor oil has a wide range of applications mostly industrial. It has got indispensable usage in many industries like cosmetics , surface coatings , soaps and perfumes.
Castor oil and its derivatives are also used in lubricant formulations. It is an excellent fertilizer due to its high nitrogen , phosphoric acid , potash contents and moisture retention capability.
The characteristics of castor oil from other countries such as Brazil , India , China have been studied.
The objective of this present work is to determine the physicochemical properties of crude Castor oil .



*F*igure 1. Chemical structure for Ricinoleic Acid ($C_{18}H_{34}O_3$)

2. *M*aterials and *M*ethods

MATERIALS

Fresh castor fruits were obtained from Malete , Moro Local Government Area , Kwara State Nigeria. The pulps were removed from the fruit by hand to release the nuts. The de-pulped nuts were sun dried on the open floor for 14 days to remove water from the seeds and to ease the detachment of the seeds from the nuts.

The castor beans were further dried in an oven at 60 ^{0}C for 7 h.

3. Oil Extraction

Oil extraction was carried out using Soxhlet extractor. About 80 g of milled castor bean was loaded into the soxhlet apparatus set. The extraction was carried out at 68 ^{0}C (boiling temperature of n-hexane) for 9 h in a water bath heater.
Supernatant solution was collected which was the mixture of the extracted oil and the n-hexane. The suspension present in the solution was removed by filtration. After filtration , the n-hexane was distilled off in a rotary evaporator at 265 rpm. The extracted seed oil was kept in a closed container and stored in a refrigerator for subsequent physicochemical analysis.

4. Chemical Analysis

The chemical properties such as iodine value (IV) , acid value (AV) , free fatty acid (FFA) and saponification value (SV) were determined by titrimetric analysis. The moisture content was also determined.

5. Physical Analysis

The physical properties such as density (ρ) , specific gravity (SG) and percentage yield of the oil extracted were determined.

Table 1. Characteristics of the Castor seed oil

Parameters	Value
Lipid content (%)	47.8
Moisture content (%)	0.3
Iodine value (I_2g/100g)	1.061
Acid value (mg/g)	14.42
% free fatty acid	7.21
Saponification value (mg/g)	327.4
Density (g/cm^3)	880

6. Result and Discussion

PHYSICOCHEMICAL PROPERTIES

The percentage of crude lipids extracted from castor beans , their physical and chemical properties are shown in Table 1. It shows that castor seeds contain a relatively high percentage of total lipids content ; 47.8 % which is in the same range as reported by Jumat et al. (2010) ; 43.3 % and Gupta et al. (1951) ; (35.7% - 51.9%) for the African castor oil.
Koutroubas et al. (1999) reported that oil content was affected by both locations and castor oil genotypes. The seed oil content depends on the genotype but is also affected by the environmental conditions , cultural practices and time of harvesting.
The acid value (14.42 mg/g) of the castor obtained by the present study is in the same range with the value obtained by Ogunniyi (2006) ; (10 mg/g) , who discovered that solvent-extracted oil was high in acid value.
The oil shows quite a high saponification value (327.4 mg/g) , which was almost two times the values obtained by Jumat et al. (2010) ; (182.9 mg/g) and Ogunniyi (2006) ; (177-182 mg/g). The difference in the saponification value may be due to the quality of the oil and unfavourable environmental conditions.
The castor oil is a pale yellowish oil. At room temperature , it is a clear and highly viscous liquid. The high viscosity of the oil is due to hydrogen bonding of its hydroxyl groups (Ogunniyi 2006).

7. Conclusion

In this present work , the Lipid content , moisture content , acid value , saponification value and the free fatty acid of the castor seed obtained from Malete , Moro Local Government Area , Kwara State. Nigeria have been outlined.
The castor bean oil is very unique with its high Lipid content. This makes it an indispensable raw material in most industries.

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