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Original Research Article

Biochemical Properties and Nutritional Value of *Balanites aegyptiaca* (laloub) Seed Oil

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Abstract: The main goal of this research was to study the physical and chemical properties of *Balanites. Aegyptiaca* (laloub) oil. Two kilograms of *Balanites aegyptiaca* fruit were purchased from local market in Omdurman, Sudan. Fruits were then crushed using a steel hammer and seeds were then obtained. One kilogram of seeds was collected and was then ground using grinding machine ground seeds was then eventually ready for further analysis. The seeds of *Balanites aegyptiaca* were collected, washed and prepared. The seed oil was extracted using soxhlet apparatus with n-hexane as solvent. The percentage yield of oil extraction was (41.9%). The results revealed that *B. aegyptiaca* seed contain considerable percentage of moisture (3.27%), fat (41.9), protein (30.9%), fiber (11.34%), ash (3.55%) and carbohydrate (8.9%). Physicochemical analysis of the seed oil was conducted using standard procedures and the following results were obtained; density (0.9091 g/cm^3), viscosity (42.71%), refractive index (1.4734), iodine value (98.09 g/100g), saponification value (194.33 mg KOH/g) and peroxide value (3.08meq/kg), acid value (0.53 mg KOH/g), free fatty acid value (0.26 %) and un-saponification (3.08). This reveals that *Balanites aegyptiaca* seed oil could be a rich source of oil for domestic and industrial purposes if richly exploited.

Keyword: *Balanites. Aegyptiaca* (laloub), fruit, Seed Oil, protein.

INTRODUCTION

Balanites aegyptiaca is used for firewood, charcoal, poles, timber, utensils, tool handle, food, fodder, mulch, shade, windbreak and gum. The plant may be grown for its fiber, oil and for medicinal values; it is also used in treatment ofseveral diseases and disorders since ages. Balanites aegyptiaca seed kernel oil falls in the group of such oils termed as vegetable oils since it is extracted from a plant source. The chief importance of vegetable oils lies in their food value.

The seed kernel is considered as an extremely useful edible product, it is rich in oil, protein, minerals and it has been reported to be used for over thousands of years (Vonmaydell, H. J. 1986).

Oils are heterogeneous biochemical substances which have in common, the property of being soluble in most organic polar solvents (chloroform, benzene, diethyl ether, etc.) and insoluble in water.

The term lipid is the scientific name for fatty acids and similar chemicals often found in oils produced by living things.

They may contain diethyl-glycerol, free fatty acids, phosphatides, sterols and fat-soluble vitamins like tocopherol, pigments, waxes and fatty alcohol are present but as minor components (Zang, C.U., Jock, A.A., Garba, H. I. and Chindo, Y. I 2018).

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Soaps are compounds that consist of long chain of hydrocarbons attached with a carboxylic acid which is ironically bonded to the metal ion usually sodium or potassium, it is a combination of animal fat or plant oil with caustic soda. Soaps are therefore called the salts of fatty acids which are usually used as surfactants for washing, bathing and cleaning. Soaps are obtained by the treatment of vegetable oils or animal fats with a strong alkaline solution. The three molecules of fatty acids in the triglyceride gets attached to a single molecule of glycerol and results in a chemical reaction termed saponification.

The extracted oil is used for many uses and it is used in Western Sudan remaining cake is used as animal feed. Both fruits and seed were widely used in many countries during the dry season and drought periods including Nigeria (Lockett *et al*., 2000), Ethiopia, (Guinand and Lemessa, 2001) and Sudan (Grosskinsky and Gullick, 2001).

The need for vegetable oil is rising worldwide so it has to be to look for good sources for the production of high-quality oil can be exploited for industrial purposes This study was conducted on the physical and chemical properties of *Balantiesaegyptiaca* (laloub*)*seed oil as a good source for the production of oil.

Species Balanites aegyptiacus (L.) Delile – desert date (*Saed A. Al-Thobaiti and Isam M. Abu Zeid, 2018).*

MATERIAL

Two kilograms of *Balanitesaegyptiaca* fruit were purchased from local market in Omdurman, Sudan. Fruits were then crushed using a steel hammer and seeds were then obtained. One kilogram of seeds was collected and was then ground using grinding machine ground seeds was then eventually ready for further analysis.

RESULTS AND DISCUSSION

Chemical composition of *B. aegyptiaca* seed

Table (1) shows the chemical composition of *Balanites aegyptiaca* seed. Moisture, fat, protein, fiber, ash and total carbohydrate contents were found to be 3.27, 41.9, 30.9, 11.34, 3.55, and 8.9% respectively moisture content was found to be 3.27% which is similar with that reported by Mohammed S (2005). Fat content was noticed to be 3.10%.but it was higher than reported Mohammed S.

Protein content was found to be 30.9% which is lower than the 31.09% reported by Mohammed S. (2005). Fiber content was 11.34% which is lower than the 12.64% reported by Mohammed S. (2005). Ash content was noticed to be 3.55% which is higher than the 3.19% reported by Mohammed S (2005). Total carbohydrate content was recorded to be 8.9 % which is higher than the 3.05% reported by Mohammed S (2005).

Table 1: Chemical composition of *B. eagyptiaca* seed

Experiment	First	Second	Three	Mean
Moisture	3.18	3.27	3.36	3.27
Fat	41.57	42.30	41.97	41.9
Protein	30.67	31.08	31.18	30.9
Fiber	10.67	11.38	11.97	11.34
Ash	3.67	3.56	3.42	3.55
Total carbohydrate	10.41	8.41	8.1	8.88

Physical properties of *B.aegyptiaca* oil

Table (2) shows that the physical properties of *Balanites aegyptiaca* oil. The viscosity, density, refractive index and color were found to be 42.71, 0.90913, 1.4734 and (red 5.1, yellow 35.5, blue 0.00) respectively.

Viscosity was recorded to be 42.71 which were higher than the 19.63 and 34cpreported by Mohammed S. (2005), Babagana *et al.*, (2010), respectively. Density was noticed to be 0.9091 which its similar to 0.9109 reported by Mohammed S (2005). Refractive index was found to be 1.473 which is similar to 1.483 that reported by Mohammed S (2005).

Table 2: Physical properties of *B.eagyptiaca* oil:

Experiment	First	Second	Third	Mean
Viscosity	42.67	42.82	42.67	42.71
Density	0.9016	0.9131	0.9127	0.9091
Refractive Index	1.4786	1.4751	1.4667	1.4734
Color Red	5.2	5.1	5.1	5.1
Color Yellow	35.8	35.6	35.3	35.5
Color Blue	0.0	0.0	0.0	0.0

Chemical properties of *B.aegyptiaca* oil

Table (3) shows that the chemical properties of *Balanitesaegyptiaca*oil the free fatty acid , peroxide value, saponification , iodine value, un-saponification and acid value were found to be 0.26, 3.08, 194.33, 98.09, 3.08, and 0.53 respectively.

Free fatty acid was found to be 0.26% which was lower than the 2.8 and 1.84% reported by both Babagana *et al.*, (2011) and Manj (2013) respectively. Peroxidevalue was noticed to be 3.08(mgKO) which lower than the 6.0 and 8.0 reported by Manji (2013) and Babeker (2013) respectively.Saponification was reported to be194.33 (mgKOH/g) which was higher than the168.80, 174.5, 168.3 and 182.80 (mgKOH/g) reported by Manji (2013), Babaganagutti (2011), Babeker (2013) and Okia (2013) respectively. Iodine was found to be 98.09 mg I2/g which higher than the 76.8, 56.4 and lower than 98.28 mg I2/g reported by Manji (2013), Babaganagutti (2011) and Okia (2013) respectively. Acid value was noticed to be 0.53(mgKOH/g) which is similar to reported by Okia (2013) but its lower than the 2.08 (mgKOH/g) reported by Babeker. Un-saponification was found to be 3.08.

Table 3: Chemical properties of *B. eagyptiaca*oil

Experiment	Mean	First	Second	Third
FFA	**0.26**	**0.29**	**0.24**	**0.27**
Acid value	**0.53**	**0.58**	**0.48**	**0.55**
Peroxide value	**3.08**	**3.11**	**2.88**	**3.26**
Saponification value	**194.33**	**193.51**	**195.81**	**193.67**
Un-saponification value	**3.08**	**3.11**	**2.86**	**3.27**
Iodine value	**98.09**	**97.51**	**98.36**	**98.41**

CONCLUSION

The results obtained from the preliminary investigation carried out in this work revealed that B.eagyptiaca seed oil is an economically viable oil source because its oil content was found to be high. Also, the oil parameters showed that the oil was composed of moderately long chain fatty acids with a degree of unsaturation, making it a good feedstock for domestic and industrial purposes.

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