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Study of Physical and Chemical Properties of Extracted Oil of Seeds of Jojoba H *F.* Simmondisa *chinensis*

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Abstract

The aim of present study was to extract oil from jojoba and study the physical and chemical properties of extracted oil. The samples were collected for two seasons 2011 to 2012 respectively from Arkawiet, south of west of Portosudan city. After prepare of samples and extracted oil from it, we did some physical properties as (refracting coefficient, relativity of density, viscosity-ratio of ash, color, moisture and the grays), The chemical properties include determination of (free fatty acid, Ph, saponification value, peroxide number, iodine number, unsap materials and ester characteristics). The study showed that the percentage of extracted oil for two samples A and B were 53 and 55 % respectively. Viscosity for two seasons varied from 34.31 and 36.499 mm^2/s for 2011 and 2012, respectively. Both values are within the standard limits of the oil which is 35- 37 mm^2/s. Acidification value for the two seasons was 1.82 and 1.68 for 2011 and 2012 respectively compared to the standard which is less than 2.00. Among the most important recommendations concern the cultivation of jojoba plant and try to increase production in environments suitable to invest in it extraction locally.

Key Words: jojoba**,** physical properties, chemical properties.

Introduction:

Jojoba tree produces a rare type of plant oil [1]. That could be mixed with fuel and gives great power this oil is known as unpolluted oil [2].

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It helps to fight desertification as it grows in deserted, dry spaces and does not need a lot of water. It is called the Green Gold tree because it can contribute to increasing national income of poor countries [3]. Jojoba tree is grown in medium heat areas like deserts of Egypt, India, Mexico, United States and most of the countries that lie on the same line with similar climate [1, 3].

Jojoba tree was discovered by American botanists called H F link in Santa California in 1882 m [4], and he named it after T.W.C.Mondz who is one of his English teachers. So, the first scientific name of it is *Simmondsia* Jojoba [5].

Researchers began searching for an alternative of whale oil after the United States issued a resolution prohibiting the use of whale oil in the cosmetic industry to preserve the whales from extinction by over fishing. The most appropriate alternative was jojoba oil as the most important properties available in this oil is that the bud contains waxy fluid equivalent to about 50% by weight, and enters into many everyday industries uses [5] and it has become a substitute for whale oil in important industries as it has similar properties [6]. In addition to the ability of this plant to withstand high degrees of heat and moisture stress as well as the possibility of cultivation in areas with high salinity, low fertility soil and it is possible to grow in arid and semi-arid areas with high population density allowing wide employment opportunities in those areas and opportunities for many industries [7]. Moreover, there is possibility of making use of jojoba bushes in finding natural pastures, parks and resist desertification through using it as a roadside shrub that protect public roads from the advancing sand and breaking wind [8].

Our research Problem is using natural plant oils to reduce the side effects of chemicals and save the cost of high-priced animal oils that are used in industries such as shampoos and cosmetics industry and others.

Extract oil from jojoba seeds that are locally produced and study of physical and chemical properties of obtained oil, in addition to economic benefits from jojoba plant seeds that are produced locally, are our research objectives.

The importance of research is to use of medicinal plants and benefit from local agricultural products and benefits from Jojoba plant, distinguished unique characteristics and high economic value, as Jojoba oil reduces side effects resulting from the use of chemicals in cosmetics and shampoos, also, it reduces the cost of using animal oils and it has many medical benefits. It has many benefits for your scalp, hair follicles and production of inexpensive oil. Jojoba bushes don´t need much water for

irrigation as sprout in desert feed land, dry and high temperature environment, so the benefits from these plants are in combating desertification.

Hypotheses of the Research:

1. The possibility of extracting oil from the seeds of Jojoba plant.
2. The possibility of using the oil in many industries.

Research methodology:

This study uses an experimental method of laboratory and theoretical work in order to access reliable results.

Sample collection and preparation:

The sample was collected from an area farm in southwest of Port Sudan, (Eastern Sudan) in the period of 2012 to 2013. The dry seeds were collected in plastic bags and placed in a sealed plastic pot. After that the sample is cleaned of impurities, and then the sample mashed. 25 g were taken as sample of which oil will be extracted.

Oil extraction:

A Weight of 25 grams of mashed jojoba sample in powder form which is not smooth was taken. Then it was put in alsksolit device with a piece of cotton or cloth to prevent the sample raised higher than the discharge tube. A piece of cloth is also used to covering the top of the sample. Then 300 ml of hexane was added gradually in order to solve out some of the components of the sample.

The solved components come out through the discharge tube (Round bottom flask) into a beaker. The solution is heated to a temperature between (40-60) °C which is appropriate for boiling the solvent (hexane). The solvent evaporated and mounted to the concentrator via steam pipe where it condensed and returned again to pass through the sample in the extraction device body to come out again with the sample components (Round bottom flap) decanter circular process continues for 6 hours until the solvent that contains all the components. You can melt it after the operation is disposal of residual solvent extraction with oil, and the remaining Oil decanter was transferred to a clean dry Cup known weight and put on an electric heater to vaporize the remaining part of the solvent. After calculating the percentage rule learned the following physical tests conducted relative density, refractive index, viscosity, bug, measuring color, ash, moisture and chemical tests following fatty acids, acid number, saponification number, ref. albiroksidi, iodine number, number of ester and non-saponified.

Results and Discussion:

By the results described in table 1 and figure 1, we find that the proportion of

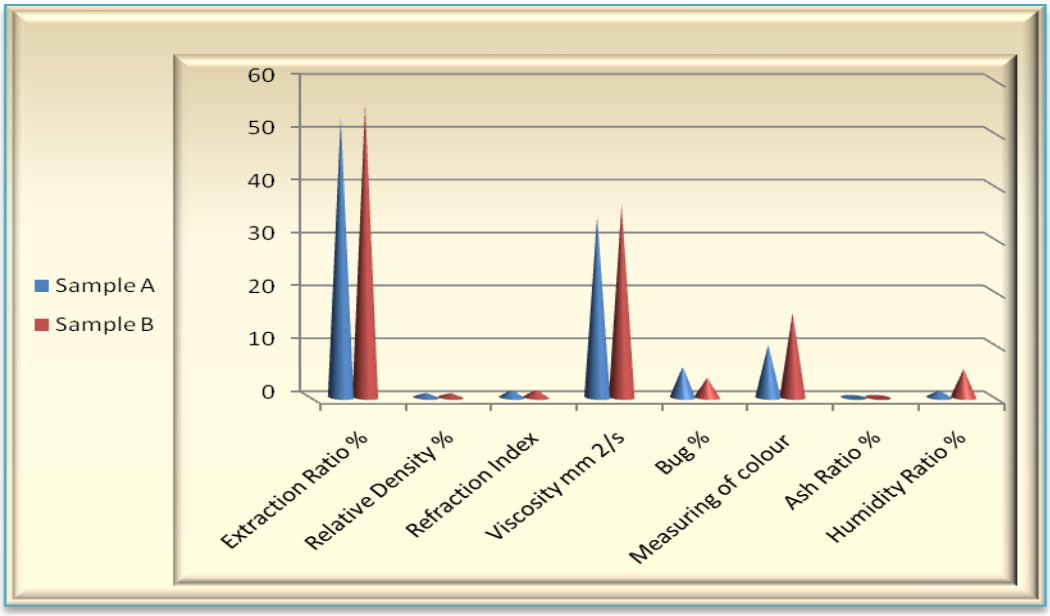
oil extracted for samples A and B are located within the range of the reference sample.

- Relative density of oil A (0.854) and oil B (0.835) this difference is due to the increase in hydrocarbon compounds found in oil [1].
- The difference in refractive index is attributed to the presence of impurities in the oil.
- The viscosity of the samples located compared to the reference sample is within the specified range.
- High proportion of impurities in the samples is due to lack of extracted oil refining.
- The color of the sample A is 10 and the sample B is 16 and reference sample is higher than 9, and this is evidence that it does not need any add-ons to improve the color proportion to the lack of shade of red, where the value in sample A is 1.3 and in sample B is 2.
- Ash content within the limit of the reference sample.
- Humidity increased value in the extracted oil compared to the reference sample is attributed to poor seed storage conditions [9].
- As well as the increased value of the moisture in the oil extracted B more than A because B newly harvested seed, which means they contain a proportion of water more than A sample which was exposed to the air for a long time, this results, agree with other research results [1, 9].

Table 1: The results of physical analytical for samples A and B.

Analysis	Sample A	Sample B	Standard Sample
Extraction Ratio%	53	55.4	45-65
Relative Density%	0.854	0.835	0.863
Refraction Index	1.463	1.468	1.464
Viscosity mm 2/s	34.310	36.499	37-35
Bug%	5.84	3.69	-
Measuring of color	10	16	9 <
Ash Ratio%	0	0	0
Humidity Ratio%	1.37	5.40	0.5

Figure 1: The result of physical analytical.



From the results described in table 2 and figure 2, we find that the free fatty acids within the permitted limit, compared with the reference sample, and generally, the free fatty acids in newly extracted oils fall between 4% - 0.2 and it is more extracted to reach 0.5%. –

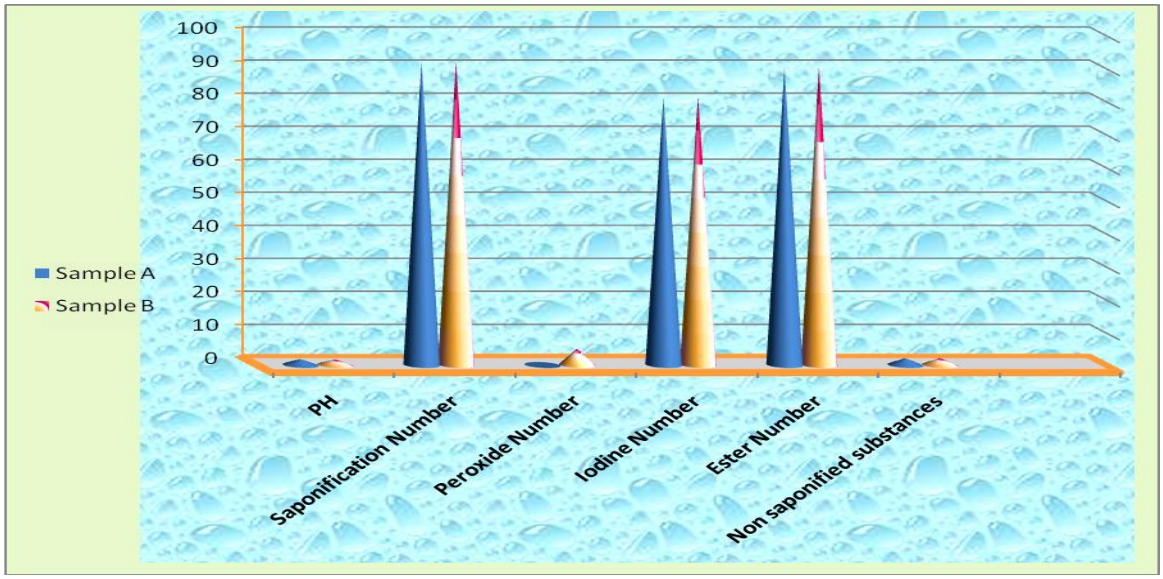
We found that cid number and saponification and the value of oil extracted when compared with the reference sample are within the specified range.

- Peroxide number of extracted oil A is within the permissible limit when compared to the reference sample which indicates absence of materials which may cause the oil to be rotten, while for sample B the raise is attributed to either lack of accurate measurement, such as the absorption of iodine marital ties accuracy as well as the liberation of iodine from potassium iodide by oxygen found in the sample solution, which causes high values of peroxide value appreciation as the size or weight of the tested sample and environmental conditions of humidity and poor storage affected [9, 10].
- The iodine number (table 3) is in the permitted limit compared to the reference sample

Table 1: The results of chemical analytical for samples A and B:

Analysis	Sample A	Sample B	Standard Sample
Free Fatty Acid	.987	.846	< 1
PH	1.82	1.68	2>
Saponification Number	92.004	92.004	92 – 94
Peroxide Number	2.5	5	< 5
Iodine Number	81.15	81.27	81 -82
Ester Number	90.184	90.324	___
Non saponified substances	2.1	2.1	___

Figure 2: The result of chemical analytical.



Recommendation:

Jojoba tree is a neglected treasure that granted us by God with valuable benefits. After the study, which was conducted on jojoba seed oil, we can recommend the following:

- More interest in the cultivation of the jojoba plant and increasing production in environments suitable to invest in it.
- Development and expansion of the study of jojoba plant to take advantage of the compounds it contains, which helps in the treatment of many diseases.
- Finding more efficient ways to extract jojoba´s oil.

- An economic feasibility study to extract the seeds of Jojoba oil and its use in industry [10].
- Continuation of research or study to extract the seeds of jojoba oil and conducting tests on the types of bacteria and fungi to identify the extent of the oil effective in the fight against these harmful organisms.

Table 3: Physical and chemical properties of Jojoba oil.

Characteristic	The value
color	Golden yellow
Hierarchy of color	< 9
Smelling	smell of fat
Stabilization	Stable towards processes of oxidation and Altazrnk
Specific weight(25˚c)	0.863 -0.866
Relative density	0.863
Melting point	7-12 ˚C
Zero ash content	zero
Viscosity coefficient	233
Refractive index (25˚c)	1.464-1.465
Iodine number	82-89
Saponification number	92-94
Combustion point	338 ˚c
Freezing	7-10.6 ˚c
Smoking	195 ˚c
Boiling	420 ˚c
Flash	295 ˚c
Molecular weight	77
No. of acetylcholine	2
Viscosity	35-37

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