

## Profile Comparison of Fatty Acids of Seeds of *Albizia Lebbeck* Trees, Native of Bushehr Province, with Some Common Oils

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### ABSTRACT

*Albizia Lebbeck* tree, as a native tree of Asia, is also found in Iran and particularly grows in Bushehr Province. In this research, oil from this tree was compared to some other edible common oils. Seeds from this tree were collected from different regions of Bushehr Province, and oil extracted from seeds was analyzed by An-hexan solvent and fatty acids profile. Identification of these fatty acids was done by gas chromatography instrument. An important point found in extracted fatty acids was the presence of nonaic acid (C9) and hencosanoic acid (C21) which are found less often in common edible oils. Furthermore, presence of a large amount of linoleic acid, which is among rare fatty acids makes this tree a source for this fatty acid. Ratio of oleic acid to linoleic acid in this species completely corresponds to oil health standards and was 1 to 3 which is similar to kanola and banana oils. Also, the ratio of unsaturated fatty acids to saturated fatty acids was 2.58 and for saturated fatty acids was 27.95 which is similar to cotton seed oil. This oil just like cotton seed oil, because of containing high linoleic acid, can be considered a source for this fatty acid and because of these especial ratios, in research, it is used as a proper substitute for cotton seed oil in people's food diets. Since cotton seed oil does not contain cholesterol and its fatty acid trans is very low, similarity of those two factors in *Albizia Lebbeck* oil are possible, which requires further studies.

**KEYWORDS:** oil of *Albizia Lebbeck* seeds, profile of fatty acids, linoleic acid, cotton seed oil

### 1-INTRODUCTION

*Albizia Lebbeck* tree with a height of 12 to 21 meters is characterized by pale color bark and young branches without fuzz. This tree grows in many parts of Asia, in planting fields, beside roads, in irrigated fields and along rivers and sometimes it is grown as an ornamental plant in homes and gardens and in some areas as wind breakers.

Considering food nutrients in seeds and its medicinal value of its different parts, in recent years, it has attracted attention. Of course, studies on this field is not complete yet. This plant has alexiopharmic properties (anti poison medicine) and some of its parts are used for treatment of poisonous bites. Different parts of this plant have lots of useful properties, its leaves are good for curing eye diseases, nyctalopia, and syphilis (Hussain et al., 2008; Pathak et al., 2009), and also this part of the plant is good for treatment of cold, coughs and breathing disorders (Pratibha et al., 2004; Saha & Ahmed, 2009) and because of containing high nitrogen, it is used as a fertilizer (Benthal, 1933). The bark of this tree is bitter and is used for cooling insect diseases, hemorrhoid, over perspiration, inflammation, bronchitis, tooth ache, strengthening gums and teeth and even treatment of leprosy, it has also been reported useful for treatment of deafness, pimples, itching, syphilis, paralysis, and body weakness (Verma & Srivastav, 2011). Leaves, after being dried, are used as soap substitute. Useful parts include roots which have anti-cancer properties and are also used for reducing spasm and stimulating the cardio vascular system (Kumar et al., 2007). Natives eat the seeds which are in brown covers, after boiling. Seeds are also used as aphrodisiac and have constipating properties and strengthen the brain and are used for treating gonorrhea, Natives use the seeds for treating leucoderma - a skin disease - that causes the skin color to fade away because of burning or injection of steroid (Kirtikar & Basu, 2000). Seeds are also used for treating hemorrhoid and diarrhea and it is believed that the extract of seed covers have anti protozoal properties (treatment for single cell infection) and can treat diabetes and have anti-cancer properties (Saha & Ahmed, 2009; Uma et al., 2009). In addition, to use the wood of this tree for fuel, leaves, seeds and their covers are used for feeding goats, sheep and cows in Asian countries like Iran.

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Although different parts of this plant are useful, there is not enough information available about seeds, their covers and other parts, so we decided to study the profile of fatty acids of seeds which are native of Bushehr Province and compared them with common oils used .

## 2- MATERIALS AND METHODS

### 2-1 sample preparation

20 samples of *Albizia Lebbeck* seeds (one fourth of kilogram ) according to G- Power 3,0,10 software with 0.05 alpha factor and 0.71 effect size was collected randomly from different parts of Bushehr Province in the south of Iran and was sent to toxicology lab in food and medicine control unit .Then seeds were separated from their covers and were separately turned into a soft powder for oil extraction ,by Moulinax grinding machine. Oil extraction from seeds was done by soxhlet machine, and n-hexon solvent was used for this purpose . In this process ,for extraction ,each time 10 grams of powder was weighed separately and extraction was done according to bas method ,and results were repeated 5 times in accordance with formal chemical and oil association method of America AOCS Ba 3-38 (AOCS, 1998; Souhail *et al.*, 2004). After oil extraction- hexon solvent was separated and evaporated.

### 2-3 Fatty acids content

To determine components of fatty acids of the previous stage, a gas chromatography machine equipped with FID and the 20 meters pillar

(model -Varian cp-3800)and programmed with the following conditions was used to evaluate **fatty acids** :

Helium gas was used as the carrier gas and the flow of nitrogen gas (as the Makeup). Hydrogen and air, 30, 30,300mili liter /min, respectively were adjusted. The required standards and chemicals were purchased from Merk Company in Germany. The program for the pillar temperature was as follows: At first the pillar's temperature after 60 seconds reached from 150 c to 220 degrees with speed of 10 degrees / minute and stayed at this

temperature for 2 minutes and then with speed of 7 degrees per minute reached temperature of 235 degrees centigrade and stayed at that temperature for 2 minutes and after that reached 255 degrees with the same speed and after staying for 1 minute at this temperature finally with speed of 10 degrees per minute reached 268 degrees centigrade and was kept at that for 30 seconds. The apparent temperature was kept at 270degees centigrade and the injection temperature was 255.

To methyl ester fatty acids (FAME). Ce 2-66 AOCS method was used (AOCS, 1997).For this purpose 0.02 grams of the oils were weighed with lab scales with 3 decimal point accuracy and then 2cc metanol and 1 cc n-hexan solvent was added to it .Then 0.02 cc condensed sulfuric acid was added as catalyst and reflex process performed at 75 degrees for 3-5 hours .After that ,the formed methyl esters were injected to gas chro monography instrument with 10 microliter syringe and their fatty acids profiles were determined .After that spectrum comparison of oil from this tree was made with common oils

### 3-Findings

Figure 1 shows the fatty acids spectrum ,which considering the measured spectrums, rates and content of these fatty acids are shown according to table 1 .

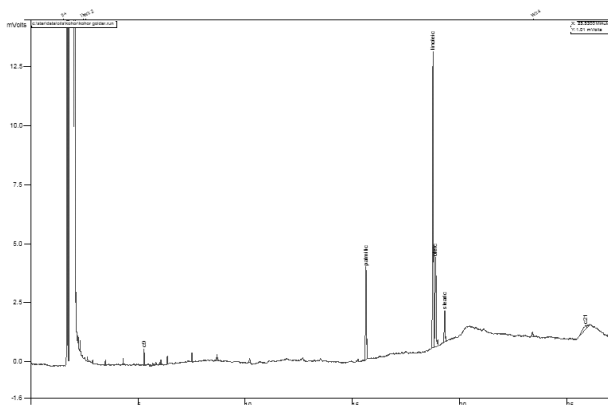


Figure 1:spectrum of fatty acids of the oil of *Albizia Lebbeck* seeds

**Table - 1. Rate and contents of fatty acids of the oil of *Albizia Lebbeck* seeds**

fatty acid compound	fatty acid percentage
(C9) nonanoic acid	1.65
(C16.0) palmetic acid	17.19
(C18,0) estearic acid	5.73
(C18,1) oleic acid	17.68
(C18,2) linoic acid	54.36
(C21) hencosanoic acid	3.38

In Table 2, compound percentage of fatty acids of some common oils are shown. In Table 3, compound percentage of other fatty acids in regard to rate of saturation and rare fatty acids are shown (Agricultural Research Service, 2011). Percentage of fatty acids of an unsaturated (MUFA) and percentage of fatty acids of multi unsaturated (PUFA) are also important which are shown for various comparisons, separately.

**Table - 2. Comparison of different rates of fatty acids of common fatty acids and the *Albizia Lebbeck***

Oil type	SFA	MUFA	PUFA	ω <sub>3</sub>	ω <sub>6</sub>
<i>Albiza</i> flower seed	27.95	17.68	54.36	ND	54.36
Soya oil	15.6	21.2	58.8	ND	51.5
Corn oil	14.5	29.9	51.3	0.9	50.4
Olive oil	14.3	73	8.2	0.7	7.5
palm oil	47.8	37.1	10.4	0.3	10.1
Grape's seed oil	10.9	18.9	56.7	0.29	65.42
Sun flower's seed oil	12	20.5	62.3	0.1	63.2
Peanut oil	20	44.4	31	0.1	31
Coconut oil	86.5	2	1.5	0.1	1.5
Canola oil	7.4	63.3	28.1	9.1	19
Cotton seed oil	25.9	17.8	51.9	0.2	51.5
banana oil	86.5	6	1.5	0.1	1.5

#### 4- DISCUSSION AND CONCLUSION

Essential fatty acids (EFA) are fatty acids that cannot be made in the body ,but plays an important role in human health .Some of them are, linileic acid (W2), linoleic (W6), fatty acids belonging to W6 groups, mostly in seeds of plants such as sunflower, soya and corn. Linileic acid is not stable and reacts to light and oxygen.

Lack of essential fatty acids such as linileic acid in people's diets is obvious ,so finding a new source of an oil with these properties which resemble common oils used by people is essential, therefore, considering lack of proper substitutes for common oils .this study was done to find a new source of essential fatty acids and to compare fatty acids of the oil found with other common oils to find a substitute for commonly used oil in the society ,and on the other hand rate and kind of fatty acids for the health degree of this oil was determined to be able to introduce a new source for a good diet as far as percentage of fatty acids are considered .

After studying table 1 important points were found in fatty acids ,presence of nonaloic acid(C9) and hencosanoic acid (C21) which are found less in common oils .Presence of high percentage of linileic acid which is a rare fatty acid can present this tree native of this province as a source for this fatty acid ,the rate of oleic to linoleic acid in this species corresponds with standard of healthy oils which is similar to Canola, palm ,and banana oil, and also the amount of saturated fatty acids 27.95 and the rate of unsaturated fatty acids to saturated ones was 2.58 which is very similar to cotton seed oil,this native oil of Booshehe Province, just like cotton seed oil because of having a high amount of linoleic acid can be used as a source for this essential fatty acid, and because of such special ratios in future studies can be a good substitute for cotton seed oil in people's diets and since cotton seed oil does not have cholesterol and its trans acid is very low; therefore, similarity of the two factors in *Albizia Lebbeck* is possible and it is suggested that further studies to be done about this oil.

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