

STUDIES ON THE FIXED OIL OF THE SEEDS OF *ALBIZIA LEBBEK* BENTH Part II.

Munir Ahmed, F.M. Chaudhary and Abid Hussain Shah

Applied Chemistry Division, PCSIR Laboratories, Lahore-54600

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A fixed oil to the extent of 4.8% has been extracted from the seeds of *Albizia lebbek* Benth, which belongs to the family Leguminosae. Its physical properties, fatty acid composition and vitamin A and D contents have been studied. The oil is found to contain myristic (0.11%), pelmitic (16.17%), stearic (2.71%), arachidic (2.01%), behenic (4.57%), oleic (18.23%), linoleic (54.06%), and linolenic (0.16%) acids. The vitamin A is found to be 24.1.0. while vitamin D 2. I.U.

Key words: Fatty acids, Esterification, Saponification.

INTRODUCTION

Albizia lebbek Benth is commonly known as Siris (Hindi), Kokko (Burmese), Sirish (Bengali), Pilo Sarshio (Gujrati), Dirasana (Telgu), Vagei (Tamil) and Frywood (tropical America and West Indies). It belongs to the sub-family Mimosae of the family Leguminosae. It is a quick growing tree and is generally grown for shade purposes. During fruiting the tree gets profusely rich in pods which bear light brown, smooth and compressed seeds. Our present studies deal with the various physical and chemical aspects of the fixed oil of these seeds. Although some work has already been done in the past [1-3] K. Kafuku [4], D.N. Grindley [5] and M.O. Farooq [6] have specially worked on this seed oil for fatty acids composition. Now during our research work as we have found a noticeable difference in the various results published by the aforesaid workers so it has been considered necessary to publish our findings. We have also dealt with the Vitamin A and D contents which is an important feature in determining the quality of an oil for edible purposes.

MATERIAL AND METHODS

The seeds were collected from the pods and crushed to a powdery material. It was extracted with *n*-hexane which yielded yellow-brown oil (4.8%). The physical constants were determined by the standard procedures [7]. The oil was then separated into free fatty acids (97.2%) and unsaponifiable matter (2.8%).

The fatty acids were converted into methyl esters. The I.R. spectrum showed the absence of carboxyl peak at 2.9μ and shifting of carbonyl peak from 5.9μ to 5.7μ inferred that all the fatty acids have been esterified. They were purified by column chromatography using silica gel 60 and *n*-hexane as an eluent. Purity was checked by TLC. The methyl esters were then identified on a Pye Unicam 104 series gas chromatograph fitted with an F.I. detector using WCOG carbowax 20 meter column. Hydrogen was used as the carrier gas having 14 lbs per sq inch pressure. The sample size was 0.02 ml. The temperature was programmed

as 150° for 5 minutes with 10 minutes increase to 220° while detector and injector temperature were 300° and 250° respectively. The qualitative and quantitative identification of the fatty acids was confirmed by running standard mixture under identical conditions.

Vitamin A and D contents were determined from the unsaponifiable part according to the U.S.P. XX [8].

RESULTS AND DISCUSSION

The physico-chemical characteristics of the seed oil of *Albizia lebbek* are given in Table 1. A comparative study of the fatty acids composition of the saponifiable matter has been presented in Table 2. This study has been carried out to compare the fatty acids position of the seed oil of other species of *Albizia* [9-11] and also with the results published by the previous workers on the species under discussion. It is quite interesting to note that percentage of the total unsaturated fatty acids in *Albizia lebbek* determined by the previous workers is almost the same as found by us but there occurs a noticeable difference in the percentage of individual fatty acids. For instance oleic acid has been found

Table 1. Physico-chemical properties of the seed oil of *Albizia lebbek* Benth.

Fixed oil	4.8%
Colour	Yellow-brown
Specific gravity	0.937
Refractive index at 30°	1.47
Saponification value	200.23
Acid value	4.011
Iodine value	113.456
Ester value	196.218
I.N.S. value	86.774
Peroxide value	28.70
Unsaponifiable matter	2.8%
Saponifiable matter	97.2%
Vitamin A	24 I.U. per gm.
Vitamin D	2 I.U. per gm.

Table 2. Comparative study of the fatty acids in *Albizia*.

Acids	<i>Albizia lebbek</i>				<i>Albizia oderatissima</i>	<i>Albizia amara</i>	<i>Albizia Procera</i>
	Kafuku and Hata [4] (%)	D.N. Grindley [5] (%)	Farooq and Varshnev [6] (%)	Munir and Abid present study (%)	Farooq and Siddiqui, [9] (%)	Chandra et. al. [10] (%)	Farooq and Siddiqui, [11] (%)
(i) Saturated							
myristic	29.0	29.0	27.78	25.58	22.02	17.57	33.70
Small quantities	—	—	—	0.11	—	1.62	—
Palmitic	29.0	The large quantities	7.26	16.17	14.33	8.04	7.23
Small quantities	—	—	—	—	—	—	—
Stearic	—	—	9.63	2.71	6.88	4.55	14.26
arachidic	The large quantities	—	10.89	2.01	0.81	2.30	12.21
Behenic	—	3.19	—	4.57	—	0.61	—
lignoceric	—	—	—	—	—	0.45	—
(ii) Unsaturated							
Oleic	71.0	71.0	72.22	72.46	77.98	82.43	66.30
Linoleic	Present	43.0	39.28	18.23	26.56	33.18	50.89
Linolenic	Present	28.0	32.94	54.06	51.41	49.25	15.41
—	—	—	—	0.16	—	—	—

to be 18.23% and linoleic acid 54.06% of the total fatty acids, while the previous workers have published an alarmingly different percentage. Similar discrepancies have been found in the results of the saturated fatty acids as is apparent from Table 2.

The cause of such a difference in the results could be found either in the methodology or genetic variation within the species. The riddle of genetic variation within the species was solved by collecting twelve samples from the various areas of Pakistan and it was found that all of them gave almost the same results. The difference in climate or soil did bear only a negligible effect on the fatty acids composition of the seed oil. Therefore, difference in methodology could only be attributed for the variation in results. The previous workers have used only the TLC technique which is deficient in many ways to give the correct results. Our findings are, however, based on the high pressure gas-liquid chromatography which is the most modern technique for the authentic results.

Work is in progress to study the unsaponifiable matter of the oil which is 2.8%. It is also intended to study the protein and carbohydrates of the seeds. These studies will bring out the practical utility of these seeds. Presence of vitamin A and D to a reasonable extent is quite encouraging to use this oil for edible purposes.

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