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STUDIES ON THE FIXED OIL OF THE SEEDS OF *ALBIZIA ODORATISSIMA* , *Part- IV*

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A fixed oil to the extent of 5% extracted from the seeds of *Albizia odoratissima* has been studied with respect to its physico-chemical properties, lipid fractions and fatty acid composition. The oil is found to contain capric (1.09%), Lauric (1.07%),myristic (2.63%), palmitic (22.55%), stearic (6.85%) arachidic (3.86%), benhenic (7.17%), lignoceric (1.07%), oleic (24.01%) and linoleic acid (29.70%). Vitamin A is found to be 24 I. U. while Vitamin D 2 I.U.

Key words: Fixed oil, Physico-chemical properties, Lipid fractions, Fatty acid composition.

Introduction

The studies on fixed oil of the seeds of various varieties of *Albizia* are being carried out as noticeable differences had been found between our results and the previous ones (1,2,8-11). Modern techniques used by us have been concluded to be the exclusive reasons for such variation in the results. It is intended that the correct and detailed information may be recorded by the present manuscript.

Materials and Methods

The course of studies was the same as followed previously [1,2]. The seeds collected from the fully ripe pods were dried under shade. These were then mechanically crushed to a powdry material. The oil was extracted using distilled n-hexane in a soxhlet type liquid/solid extractor. A yellow brown oil was obtained, 5% yield. The physical constants were determined by the standard procedure [3,4] and reported in Table 1. Vitamin A and D contents were determined according to the USP XX [5]. Fractionation into the lipid classes was carried out following the previous methods [6,7]. The results are given in Table 2 and compared with those of the *A. procera*.

Fatty acid composition was determined in the previous manner [1-4]. Methyl esters were analysed by GC on Pye-Unicam 104 gas chromatograph equipped with a flame ionization detector W. COT fused quartz column 25 m x 0.22 mm (internal dia) coated with free fatty acids phase (FFAP) was used. Hydrogen was used as a carrier with a flow velocity of 36 cm/ sec. and split ratio 1:60. The column temperature programmed at 100° for 0 min. with 5/min. increase to 210° while detector and injection temperature of 300° and 250° respectively were used. Various components were identified by the retention times and peak enhancement with standard esters. Percentage composition of individual components was calculated on the basis of peak area using SP-4100 (spectra physics) computing integrator.

Results and Discussion

A comparative study of the physico-chemical properties of the seed oil of *A. procera* and *A.odoratissima* in Table 1 shows quite a smilarity in general characteristics. The visible difference in the iodine and INS values can, however, be attributed to the difference in total saturated and unsaturated fatty acids fractions in the two cases. Both these values depend on the unsaturation present in the fatty acids. The lipid fractionation of *A. procera* and *A. odoratissima* has also been comparatively studied in Table 2. Neutral lipids are the main constituents while the polar lipids are in minor amounts. Amongst the neutral lipids the triglycerides are present in

TABLE 1. COMPARATIVE STUDY OF THE PHYSICO-CHEMICAL PROPERTIES OF THE SEED OIL OF *A. PROCERA* AND *A. ODORATISSIMA*.

Studies	*A. procera*	*A. ordoratissima*
Fixed oil	4.9%	5.0%
Colour	Yellow brown	Yellow brown
Specific gravity	1.091	1.092
Refractive index at 30	1.465	1.472
Saponification value	172.302	174.421
Acid value	3.284	3.181
Iodine value	108.104	102.102
Ester value	169.018	170.240
INS value	64.198	72.311
Peroxide value	27.87	28.345
Unsaponifiable matter	2.14	2.08
Vitamin A	24 I.V per gm	24 I.U. per gm
Vitamin D	2 I.U per gm	2 I.U. per gm

TABLE 2. COMPARATIVE STUDY OF THE NEUTRAL LIPID FRACTIONS OF *A. PROCERA* AND *A. ODORATISSIMA*.

Fractions	*A. procera* (% of fraction)	*A. odoratissima* (% of fraction)
Hydrocarbons	0.8	0.7
Wax ester	2.9	3.1
Triglyceride	74.5	76.8
Diglyceride	10.6	9.9
Monoglyceride	5.5	4.2
Free fatty acids	1.8	1.6
Sterols	3.9	3.7

Note. Wt. % of the neutral lipid and polar lipid in *A. procera* being 99.1% and 0.9% while in *A. odoratissima*, it is 98.8% and 1.2%.

TABLE 3. FATTY ACID COMPOSITION OF THE VARIOUS SAMPLES OF *ALBIZIA ODORATISSIMA*.

Fatty acid	Sample-A (%)	Sample-B (%)	Sample-C (%)	Average (%)
Capric	1.04	1.09	1.14	1.09
Lauric	1.09	1.02	1.10	1.07
Myristic	2.62	2.60	2.67	2.63
Palmitic	22.60	22.50	22.55	22.55
Stearic	6.79	6.91	6.85	6.85
Arachidic	3.88	3.86	3.84	3.86
Behenic	7.14	7.18	7.19	7.17
Lignoceric	1.09	1.08	1.04	1.07
Oleic	24.00	24.03	24.00	24.01
Linoleic	29.65	29.71	29.74	29.70

abundance in both the cases. The fatty acid composition of the three samples from the various areas of Pakistan, i.e. Lahore (Sample A), Sialkot (Sample B) and Rawalpindi (Sample C) was determined and the results are shown in Table 3. On the basis of these results the total saturated fatty acids have been calculated as 46.29% while the unsaturated ones as 53.71%. Farooq and Siddiqui [12] have reported the fatty acid composition as palmitic (14.33%), stearic (6.88%), arachidic (0.81%) oleic (26.56%) and linoleic (51.14%). The total saturated fatty acids comes to be 22.02% while the unsaturated ones as 77.98%. Thus a striking difference has been observed in the percentage of the total saturated and unsaturated fatty acid. Besides, we have also found the presence of capric, lauric, myristic, behenic and lignoceric acids which had not been reported by Farooq and Siddiqui. The difference in percentage of some of the fatty acids has been found to be quite alarming, e.g., linoleic acid has been found to be 29.7% as compared to 51.41%. Minor differences are also visible in the case of other fatty acids. The results of Kafuka and Hata [8], D. N. Grindley [9], Farooq and Varshney [10] regarding *A. lebbek* and Farooq and Siddiqui [11], regarding *A. procera* have also been revised [1, 2].

The cause of discrepancies in the previous results and the present results could be found either in the methodology or genetic variation within the species as was discussed previously [1,2]. The riddle of genetic variation within the species was similarly solved by collecting samples from the various areas of Pakistan. We 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 acid composition of the oil. It is worth mentioning that mature seeds were taken in all the cases as had been taken by the previous workers. Thus maturity of the seeds has also been ruled out for the result differences. Hence methodology seems to be the only cause for the variation in results. The previous workers have used the TLC technique for fatty acid composition which could not yield authentic results as compared to high pressure gas liquid chromatography technique used by us.

Work is in progress for the identification and structure elucidation of the sterols and wax esters present in the oil.

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