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CHARACTERISTICS AND CHEMICAL COMPOSITION OF THE FIXED OIL OF *ACHRAS ZAPOTA* SEEDS

L.M. KHATRI, M.K.A. NASIR, ROBINA SALEEM AND FATIMA NOOR*

PCSIR Laboratories Complex, Off University Road, Karachi-75280, Pakistan

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The fixed oil from the seeds of *Achras zapota* (*N.O. Sapotaceae*) was extracted to the extent of 8.1% and studied for its physico-chemical properties and fatty acid composition. The oil contained palmitic acid (20.5%), stearic acid (12.0%), oleic acid (58.5%) and linoleic acid (3.9%) as the major fatty acids.

Key words: Fixed oil, *Achras zapota*, Fatty acids, *Sapotaceae, Sapodilla.*

Introduction

Achras zapota L., syn. *Manilkara zapota* (L.) *P. van Royen* (*N.O. Sapotaceae*), commonly knowns as "Sapodilla" and vernacular name "Chiku", a native of S. America, is widely cultivated in Pakistan for its fruit. It is a large ever green tree having dark green leaves. The fruit (epicarp) is brown and sweet to taste when ripe. It contains 2-3 black shining seeds which are known to be aperient and diuretic. The bark is reported to be a good tonic and its decoction is given in diarrhoea and paludism. It is used as a febrifugal and antipyretic [1,2].

The present work describes the physico-chemical characteristics and fatty acid composition of *A. zapota* seed oil which has not been studied so far except by Vidyarthi and Mallya [3], using old methods. The results of the present studies are quite different to those reported earlier.

Material and Methods

The seeds (fresh) of *A. zapota* were collected from the trees grown in the vicinity of PCSIR Laboratories Complex Karachi.

Extraction of oil. The seeds (250 gms) of *A. zapota* were ground and extracted with hexane in a Soxhlet apparatus on a water bath for four hrs. The extract was dried over anhydrous sodium sulphate and the solvent removed under reduced pressure. The physico-chemical properties were determined by AOCS methods [4] and are recorded in Table 1.

Saponification of the oil and methylation of fatty acids. It was carried out as usual according to the standard procedure [5].

Unsaponifiable portion. The unsaponifiable matter was taken in warm methanol and filtered. The methanol soluble fraction, on concentrating yielded white leaflets m.p. 140-141°C. It gave positive Liebermann - Burchard test. Its acetate (m.p. 127-128°C), IR spectrum and the mixed m.p. with an authentic sample confirmed it to be β-sitosterol.

Gas chromatography of methyl esters. GLC of the methyl esters was carried out using a Shimadzu GC-9A gas chromatograph fitted with a flame ionisation detector under the following conditions.

Column length 2100 mm and i.d. 3 mm, column material GP 3% SP 2310/2% SP 2300 on chromosorb WAW 100-120 mesh, carrier gas nitrogen, flow rate 30 ml/min, initial column temp. 150°C, final column temp. 250°C at the rate of 5°C/min., injector and detector temp. 300°C.

Various components were identified by running standard mixture of methyl esters under identical conditions and their retention time. Confirmation was made by coinjection. The percentage composition was determined by peak area. The results are given in Table 2.

Results and Discussion

The oil content of *A. zapota* seeds has been found to be 8.1% (18.3% on kernel basis). The physico-chemical properties and fatty acid composition of the oil are completely different from those reported by Vidyarthi and Mallya [3]. In

TABLE 1. PHYSICO-CHEMICAL CHARATERISTICS OF *ACHRAS ZAPOTA* SEED OIL.

		Present studies	Vidyarthi and Mallya [3]
i)	Yield %	8.1 (18.3) (kernel basis)	10.0
ii)	Acid value	3.5	8.94
iii)	Saponification value	192.6	205.4
iv)	Iodine value	75.2	59.8
v)	Refractive index	$1.467^{32°}$	$1.463^{31°}$
vi)	Unsap. matter %	0.92	1.8
vii)	Colour in 1" lovibond cell	9R+10Y	–
viii)	Specific gravity	$0.8984^{32°}$	$0.8725^{31°}$

*Department of Chemistry, University of Karachi, Karachi-39.

TABLE 2. FATTY ACID COMPOSITION OF *ACHRAS ZAPOTA* OIL.

Fatty acid	Present studies	Vidyarthi and Mallya [3]
Lauric acid	–	1.6
Myristic acid	0.2	6.2
Palmitic acid	20.5	12.6
Palmitoleic acid	0.2	–
Stearic acid	12.0	12.0
Oleic acid	58.5	66.2
Linoleic acid	3.9	1.4
Linolenic acid	0.8	–
Arachidic acid	0.6	–
Behenic acid	0.2	–
Lignoceric acid	0.1	–

the present study, a higher iodine value (75.2) and lower acid (3.5) and saponification (192.6) values have been found compared to 59.8, 8.94 and 205.4 as the I.V. A.V. and S.V. respectively.

The GLC analysis revealed that the oil is rich in oleic acid (58.5%). Other major component acids are palmitic (20.5%), stearic (12.0%) and linoleic (3.9%) acids. Vidyarthi and Mallya [3] have reported palmitic acid (12.6%), oleic acid (66.2%), linoleic acid (1.4%), stearic acid (12.0%) myristic acid (6.2%) and lauric acid (1.6%). Thus a striking difference has been found in the percentage of palmitic, linoleic, myristic and oleic acids. Besides, we have also detected small amounts of linolenic (0.8%), arachidic (0.6%), palmitoleic (0.2%), behenic (0.2%) and lignoceric (0.1%) acids which had not been earlier reported. The difference in the percentage of some fatty acids has been found quite alarming e.g. myristic and palmitic acids have been found to be 0.2% and 20.5% respectively as compared to 6.2% and 12.6%. Minor differences are also visible in the case of other fatty acids except stearic acid. Lauric acid could not be detected in the present work.

The unsaponifiable protion of the oil contains β-sitosterol as confirmed by its I.R, mixed m.p. with an authentic sample of β-sitosterol and the acetyl derivative.

The variations in the fatty acid composition and physicochemical characteristics might be due to the different soil and climatic conditions and the use of old methodology by previous workers.

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