SHORT COMMUNICATION

Fatty Acid Composition of Oleaster Pulp and Pit Oils

ABSTRACT

Fatty acid compositions of oleaster pulp and pit oils were determined by gas chromatography in 4 samples of different varieties. Pit oils were highly unsaturated, containing > 90% linoleic, oleic, and linolenic acids, as well as traces of palmitoleic acid. Saturated fatty acids consisted of palmitic and stearic acids with traces of arachidic acid. Pulp oils showed fatty acid compositions entirely different from that of pit oils. They contained 9 saturated fatty acids, C_{12} to C_{24}, some of them with high quantities, up to 34.9%, of the total fatty acids. Unsaturated fatty acids, mainly oleic and linoleic, with low quantities of palmitoleic and linolenic acids composed about one-third of the total fatty acids.

INTRODUCTION

Different varieties of oleaster, *Elaeagnus angustifolia* L. sometimes called Russian olive or Trebizond date, are grown in many parts of the world as well as in various areas of Iran. In this country fruit pulp is used in human nutrition, and its pit is sometimes fed to sheep.

The oil characteristics of the pulp of this fruit have not been studied to our knowledge. The oil content of the seed and the fatty acid composition have been reported previously by F.R. Earle, et al., (1) and A.S. Barclay and F.R. Earle (2).

MATERIALS AND METHODS

Four samples of oleaster fruits were collected from trees of different varieties. For determination of oil content, fruit skin was removed, and dried fruit pulp was separated from the pit by scratching with a knife. Pulp and pit were separately ground in a mortar and extracted with petroleum ether in a Soxhlet apparatus for 4 hr. Residues were ground again and extracted once more overnight, and solvent was removed from extracts by vacuum distillation at low temperatures. The residues were dried at 103 ± 2 C for 20 min and weighed, and oil contents then were calculated as percent in solids.

Fatty acid methyl esters were prepared by the method 26.052a of the AOAC (3). The gas liquid chromatographic (GLC) analysis was carried out on a 4-mm inside diameter (ID) x 2 m copper column packed with 20% diethylene glycol succinate on Chromosorb W (acid washed, 60-80 mesh). Temperatures used were 190 C for the column and 210 C for inlet and detector ovens. Flow rates were 45 ml/min N_2 as carrier gas and 40 ml/min H_2 with 400 ml/min air for flame of ionization detector. Prior to GLC analysis of the samples, standard mixtures of fatty acid methyl esters were analyzed under the above conditions, and the retention time of the constituents was used for identification of fatty acids. The proportion of individual fatty acid methyl esters to the total was calculated by normalizing of the surface areas of the peaks (4).

RESULTS AND DISCUSSION

The results obtained in this investigation are presented in Tables I-III. The oil content (Table I) was very low, 0.25-0.51%, in pulps. Pits contained 3.1-6.9% oil. The oil content in sample number 1 was considerably higher (about twice) than that of the others. The analyses agree with those reported by Barclay and Earle (2), but are much lower than those reported by Earle, et al., (1). However, the latter data probably were obtained by examination of the seed minus the seed coat (F.R. Earle, private communication).

TABLE I

Oil Content of Oleaster Pulp and Pit

Sample number	Local name	Oil/pit (%)	Oil/pulp (%)
1	Has teh ee	6.9	0.25
2	De ra zeh	3.5	0.37
3	Khor ma ee	3.1	0.51
4	She ka ree	3.4	0.42

TABLE II

Fatty Acid Composition of Oleaster Pit Oil[a]

Sample number	$C_{16:0}$	$C_{18:0}$	$C_{20:0}$	$C_{16:1}$	$C_{18:1}$	$C_{18:2}$	$C_{18:3}$
1	4.6	1.5	t	0.1	26.3	54.1	13.4
2	3.5	1.8	0.1	0.1	25.4	55.9	13.3
3	4.5	1.7	0.1	0.1	28.0	54.2	11.4
4	4.6	1.9	t	0.1	29.8	52.3	11.2

[a]% by wt.

TABLE III

Fatty Acid Composition of Oleaster Pulp Oil[a]

Sample number	$C_{12:0}$	$C_{14:0}$	$C_{16:0}$	$C_{17:0}$	$C_{18:0}$	$C_{20:0}$	$C_{22:0}$	$C_{23:0}$	$C_{24:0}$	$C_{16:1}$	$C_{18:1}$	$C_{18:2}$	$C_{18:3}$
1	0.1	0.1	24.2	0.2	1.4	0.7	10.0	1.3	22.4	2.3	22.3	12.6	2.3
2	0.2	0.2	31.4	0.4	2.3	2.1	10.5	0.8	28.4	1.9	14.8	5.9	0.9
3	0.1	0.1	32.3	0.2	0.9	0.9	9.4	0.8	22.9	1.5	20.2	10.6	1.0
4	0.1	0.1	34.9	0.2	1.0	0.3	4.1	0.5	19.5	2.0	21.0	13.5	2.7

[a]% by wt.

Pit oils of various samples did not differ considerably in their fatty acid composition. The saturates consisted of 3.5-4.6% palmitic, 1.5-1.9% stearic, and trace - 0.1% arachidic acids. The unsaturates consisted of 25.4-29.8% oleic, 52.3-55.9% linoleic, and 11.2-13.4% linolenic acids. Also, traces of myristic acid were detectable on 2 chromatograms. Our analyses for saturates and $C_{18:2}$ are higher and for $C_{18:1}$ are lower than those reported by Earle, et al., (1). Our data probably are more accurate because we used gas chromatographic analysis, while they used isomerization procedure.

Thirteen fatty acids could be determined in pulp oils, and traces of other components appeared on few chromatograms. Saturated fatty acids, lauric 0.1-0.2%, myristic 0.1-0.2%, palmitic 24.2-34.9%, margaric 0.2-0.4%, stearic 0.9-2.3%, arachidic 0.3-2.1%, behenic 4.1-10.5%, tricosenoic 0.5-1.3%, and lingnoseric 19.5-28.4% were determined in various samples. The unsaturates consisted of 1.5-2.3% palmitoleic, 14.8-22.3% oleic, 5.9-13.5% linoleic, and 0.9-2.7% linolenic acids. Thus, pulp oils of different samples varied considerably in regard to their fatty acid composition.

F. FARROHI
M. MEHRAN
School of Pharmacy
Tehran University
Tehran, Iran

REFERENCES

1. Earle, F.R., C.A. Glass, I.A. Wolff, and C. Geisinger, JAOCS 37:440 (1960).
2. Barclay, A.S., and F.R. Earle, Econ. Botany 28:178 (1974).
3. "Official Methods of Analysis," Association of Official Analytical Chemists, 10th Edition, Washington, DC, 1965, Method 26.052a.
4. McNair, H.M., and E.J. Bonelli, "Basic Gas Chromatography," 5th Edition, Varian Aerograph, Walnut Creek, CA, 1969, p. 139.

[Received May 19, 1975]

ERRATUM

In the title and abstract of the paper "Occurrence of 7-Methyl-7-Hexadecenoic Acid, the Corresponding Alcohol, 7-Methyl-6-Hexadecenoic Acid, and 5-Methyl-4-Hexadecenoic Acid in Sperm Whale Oils" by Pascal, J.C. and Ackman, R.G., Lipids 10(8):478 (1975), "5-methyl-4-hexadecenoic acid" should read "5-methyl-4-tetradecenoic."