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LIPIDS FROM LEAVES OF *Olea europaea* GROWN IN UZBEKISTAN

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The evergreen olive tree (Oleaceae) is distributed along the shores of the Mediterranean Sea and in Mexico, California, and South Africa. Olive has been cultivated in southern Europe in the last few decades [1].

Olive oil is obtained from fruit pulp and pit cores. It is well studied. A characteristic feature of it is the presence of >80% oleic-containing triglycerols. The principal saturated acid is palmitic [2, 3]. The oil is widely used in food and for frying and preserving. It contains up to 30 mg% tocopherols and ~0.3% sterols [2]. However, the chemical composition of lipids from the leaves has not been reported.

We studied the chemical composition of lipids from olive leaves cultivated by us in the foothills of southern Uzbekistan at altitude 500–600 m according to a cultivation method developed by us.

Leaves were collected in November 2010, dried in the shade, and stored in paper bags at room temperature.

Total lipids were isolated from leaves that were ground in a mortar and soaked several times with solvent consisting of $CHCl_3$:MeOH (2:1, v/v) [4]. Column chromatography over silica gel separated the extract into neutral (NL), glyco- (GL), and phospholipids (PL). NL were eluted by $CHCl_3$; GL, acetone; PL, MeOH. The yield of NL was 13.3%; PL, 12.4%; and GL together with pigments, 74.3%.

NL, GL, and PL were hydrolyzed by methanolic KOH (10%). The resulting soaps were decomposed by aqueous H_2SO_4 (10%). The released fatty acids were extracted with Et_2O and identified as methyl esters by GC on a Chrom-5 instrument with a flame-ionization detector using a steel column (2.5 m × 4 mm) packed with Chromaton N-AW with 15% Reoplex 400, column temperature 192°C, and N_2 and H_2 carrier gas flow rate 30 mL/min.

Model acids that were isolated from cotton oil were used to identify fatty-acid methyl esters by comparing their retention times with the studied acids. Table 1 presents the analytical results.

Table 1 shows that the studied lipid classes contained the same set of seven acids that differed in quantitative content. The principal acids in NL and GL were palmitic (saturated) and linoleic and linolenic (unsaturated). A rather large amount of oleic acid was also present in PL. Furthermore, the total saturated fatty acids in PL was greater than in NL and GL. However, all these classes were enriched mainly in unsaturated fatty acids. Thus, NL contained 72.6% essential fatty acids; GL, 73.9%; PL, 55.2%.

Furthermore, the content of lipophilic substances in the leaves was determined. For this, leaves were extracted first with $CHCl_3$ and then EtOH (50%). The yield of the $CHCl_3$ extract was 6.67%; EtOH, 7.6% of the leaf mass. The content of flavonoids in the EtOH extract calculated as rutin was 350 mg% [5]. Chlorophyll "a" (9.76 mg%) and "b" (17.17 mg%) were observed in the $CHCl_3$ extract of the leaves [6]. Then, unsaponified substances (15.7% of the extract mass) were isolated from this extract after hydrolysis. The carotinoid content in them was highly significant, 4266 mg%, which was 44.19 mg% calculated for dry leaves and 661.6 mg%, for the extract [7]. Tocopherols, squalene, sterols, and triterpenols were detected in the unsaponified substances using analytical TLC on silica gel and solvent systems hexane:ether (4:1 and 1:1).

The results indicated that olive leaves contain a significant amount of biologically active substances. Further research on the leaves will allow their practical use to be found.

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TABLE 1. Fatty-Acid Composition of Neutral Lipids (1), Glycolipids (2), and Phospholipids (3) from Olive Leaves, GC, mass%

Acid	**1**	**2**	**3**
14:0	1.7	1.5	0.1
16:0	12.4	15.2	25.0
16:1	1.1	1.2	3.2
18:0	2.8	2.5	4.5
18:1	9.4	5.7	12.0
18:2	22.8	6.2	15.4
18:3	49.8	67.7	39.8
$\Sigma_{sat.}$	16.9	19.2	29.6
$\Sigma_{unsat.}$	83.1	80.8	70.4

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