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EXTRACT OF *Elaeagnus angustifolia* FLOWERS

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A hexane extract of Elaeagnus angustifolia *flowers has been investigated, and the class and fatty acid compositions of its lipoids have been determined.*

Various organs of Russian olive, *Elaeagnus angustifolia* L. (fam. Elaeagnaceae), have long been used in folk medicine. The stimulating action of a tincture of fresh flowers of the plant on the working of the cardiac muscle is known, and it is used as an agent against insomnia [1]. The essential oil of the flowers is also used to improve the working of the heart [2]. According to the literature [3], the essential oil, amounting to 0.1% of the weight of the fresh flowers, contains 85 components (from GC-MS), and 47 of them (96.5%) have been identified. The main component — ethyl *trans*-cinnamate — makes up 78.88% of the oil.

We have investigated *E. angustifolia* flowers gathered in the valley of the R. Chirchik (Tashkent oblast, Uzbekistan). The initial raw material was dried, comminuted, and exhaustively extracted with *n*-hexane. The yield of hexane extract was 3%. The total lipids were separated by CC. Individual classes of compounds were identified by analytical TLC in comparison with authentic specimens, by qualitative reactions, by GLC, and by various spectroscopic methods. The composition of the hexane extract is shown in Table 1.

The total fraction of hydrocarbon (HC) compounds was investigated by TLC in the heptane–benzene (9:1) system, and five saturated and carotenoid HCs were detected. Of the 4% total weight of the HCs, saturated compounds made up 2.9%: their homologous series is given in Table 2.

As can be seen from Table 2, the main paraffin of the flowers was the C_{29} species. The MS of this fraction also confirmed the presence of nonacosane (M^+ 408) as the main compound. In addition, we detected high intensities of the peaks of ions with *m/z* 71 and 85, corresponding to the splitting of bonds at the third C atom. This permits the assumption of the presence of branched HCs. An examination of the whole HC fraction in the cyclohexane–toluene (40:1) system revealed five aromatic HCs.

The main lipid class of the hexane extract of the flowers consisted of sterol and triterpenol esters, and there was also a considerable amount of triacylglycerols (TAGs) and of triterpenols in admixture with fatty alcohols, present in an approximately equal amounts.

TABLE 1. Composition of a Hexane Extract of *E. angustifolia* Flowers

Lipid class	Content, % by weight
Hydrocarbons: aliphatic, branched, carotenoid, aromatic	4.0
Esters of fatty acids with higher fatty alcohols, triterpenols, and sterols	33.1
Fatty acid methyl and ethyl esters	1.8
Triacylglycerols	15.4
Tocopherols	0.4
Free fatty acids	5.8
Higher fatty alcohols + triterpenols	15.2
Diacylglycerols	2.0
Sterols	9.9
Triterpene acids	7.5
Monoacylglycerols	0.9
Unidentified	4.0

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TABLE 2. Composition of the Saturated Hydrocarbons of *E. angustifolia* Flowers

HC	Amount, % GLC	HC	Amount, % GLC
C_{18}	1.5	C_{24}	0.3
C_{19}	2.7	C_{25}	1.0
C_{20}	1.6	C_{27}	2.1
C_{21}	3.9	C_{28}	0.9
C_{22}	0.8	C_{29}	51.3
C_{23}	5.0	C_{30}	2.5
		C_{31}	26.4

TABLE 3. Fatty Acid Composition of Some Acyl-Containing Classes of Lipids of *E. angustifolia* Flowers

Class of lipids	Acid, % GLC										
	12:0	14:0	16:0	16:1	16:2	18:0	18:1	18:2	18:3	Σ_{sat}	Σ_{unsat}
Esters	2.0	1.8	30.2	5.8	–	3.9	29.6	18.2	8.5	37.9	62.1
TAGs	0.1	0.1	11.5	7.8	1.1	1.9	22.2	8.7	46.6	13.6	86.4
FFAs	–	–	60.0	4.2	–	4.3	25.8	1.6	4.1	64.3	35.7

We determined the fatty acid (FA) composition of some acyl-containing classes of lipids (Table 3).

The most unsaturated class was formed by the TAGs, the main acid quantitatively here being the 18:3 species. The most highly saturated class proved to be the FFAs, in which the amount of the 16:0 acid reached 60%. In the triterpenol and sterol esters, the amounts of the 16:0 and 18:1 acids were approximately equal.

In their FA composition, the *E. angustifolia* flowers differed from the seeds. As is known [4], the seed oil contains linoleic acid.

EXPERIMENTAL

For the conditions of separating the total hexane extract into classes of compounds and identifying individual components, see [5].

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