290 nm) and sinapic acid (λ_{max} 320 nm) were identified as minor components, and the total amount of the main phenolic carboxylic acids was 42 μg/g of dry matter with a predominance of p-coumaric acid (24 μg/g) and ferulic acid (6 μg/g).

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PHENOLIC COMPOUNDS OF Euphorbia ferganensis

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UDC 547.99

In Uzbekestan grow 33 species of Euphorbia. They are all resin-bearing and some of them are used in folk medicine [1]. Abroad 44 species of Euphorbia have been investigated, and a number of compounds have been isolated from them. The species of plants of the genus Euphorbia growing in Uzbekestan have been studied to only a small extent.

The comminuted roots of Euphorbia ferganensis B. Fedtsch (2 kg) collected on the slopes of the foothills of the Kurgantepa region, Andizhan province, in 1981 were exhaustively extracted with ethanol. The extract was concentrated in vacuum and the residue was diluted with water and extracted successively with chloroform, ethyl acetate, and butanol.

The ethyl acetate fraction was chromatographed on a column of silica gel. Elution with benzene–ethanol yielded the crystalline substances (I) and (II).

Substance (I), 158-160°C, M^+ 198, composition $C_9H_{10}O_8$ had two absorption maxima in the UV spectrum: $\lambda^{C_2H_5O}_{max}$ 219, 277 (log ε 3.95, 3.53). Its IR spectrum had the abosrption bands of hydroxy group (3465, 3318 cm^{-1}), of an ester carbonyl (1701 cm^{-1}), and of an aromatic nucleus (1622, 1540, 1261, 1205 cm^{-1}).

The PMR spectrum had signals in the form of a three-proton triplet at 1.03 ppm (J = 7 Hz, $-CH_2-CH_3$, of a two proton quartet at 4.10 ppm (J = 7 Hz, $-O-CH_2-CH_3$), and of a two-proton singlet at 7.66 ppm.

The PMR spectrum, and also the presence in the mass spectrum of ions with m/z 170 ($M - CH_2=CH_2$) and 153 ($M - OCH_2-CH_3$) showed that the compound was the ehtyl ester of an aromatic acid. The mild alkaline hydrolysis of (I) yielded gallic acid. On the basis of the facts given above, substance (I) was identified as ethyl gallate, which is considered an antibiltic of higher plants [3].

Substance (II), M^+ 192, composition $C_{10}H_8O_4$. Its IR spectrum contained absorption bands at 3348 cm^{-1} (OH group), 1705 cm^{-1} (C=O of an α-pyrone), 1650, 1611, 1570 cm^{-1} (aromatic C=C bonds). By a study of its UV, IR, and PMR spectra, and also by a direct comparison with an authentic sample, compound (II) was identified as the coumarin scopoletin [4].

The study of the components of E. ferganensis is continuing.

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THE ESSENTIAL OILS OF THE FRUITS OF EARLY-RIPENING VARIETIES OF *Citrus unshiu*

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The most common among the variety of citrus fruits of Georgia have become the mandarins from the Unshiu group (*Citrus unshiu* Marc.) – the common type Owari and the dwarf type Wasi. Varieties of the Wasi-Kovano-Wasi and Miagawa-Wasi types are early-ripening large-fruited plants [1].

There is no information in the literature on the compositions of the essential oils of the skins of the Kovano-Wasi and Miagawa-Wasi fruits growing in Georgia. We give the results of a comparative study of the essential oil of the skins of ripe Kovano-Wasi and Miagawa-Wasi fruits and of the broad-leaved seedless Unshiu of the Owari type growing in the Sukhumi region.

The essential oils were isolated by steam distillation. The oils were extracted from the distillate with methylene chloride.

The essential oils were distilled in vacuum into low-boiling and high-boiling fractions. The high-boiling fraction, after saponification, was chromatographed on Al_2O_3 (activity grade II-III), and by successive elution with petroleum ether and with ethanol the sesquiterpene hydrocarbons and the terpene alcohols were separated. Substances were isolated in the individual state with the aid of preparative GLC from the fractions obtained on fractional distillation and chromatography on Al_2O_3.

The essential oils were separated on the analytical column described in [2]. The components were identified by the procedure described previously [2, 3].

Information on the amounts of the components in the essential oils of the skins of the fruits is given below (% on the total oil):

Component	Kovano-Wasi	Miagawa-Wasi	Broad-leaved Unshiu
α-Pinene	0,4	0,1	0,7
Sabinene	0,1	Tr.	0,1
β-Pinene	0,3	0,1	0,4
Myrcene	1,2	1,3	1,5
Limonene	77,9	81,8	82,3
γ-Terpinene	5,3	3,9	5,3
p-Cymene	0,2	0,3	0,2
Terpinolene	0,1	0,1	0,1
Linalool	3,3	2,7	1,3
Decanal	0,1	0,1	0,1
α-Copaene	0,1	0,1	0,2
β-Elemene	3,4	2,2	0,9
α-Terpineol	0,2	0,1	0,1
β-Caryophyllene	1,2	0,8	0,4
Citronellol	0,1	0,1	0,2
γ-Cadinene	0,1	0,1	0,2

Camphene, octanol, terpinen-4-ol, meryl acetate, geranyl acetate, dodecanol, merol, geraniol, thymol, and methyl methylanthranilate were detected in the oils in trace amounts.

The essential oils of the skins of the fruits of the early ripening varieties, as compared with the broad-leaved Unshiu, are characterized by a high level of sesquiterpene hydrocarbons and terpene alcohols.

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