

BRIEF COMMUNICATIONS

FATTY ACID COMPOSITION OF THE NEUTRAL LIPIDS OF THE LEAVES
OF TWO VARIETIES OF *Olea europea*

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UDC 547.915

The oil of the fruit of the olive (olive oil) is a valuable food product. A large number of publications have been devoted to its study, but there is no information in the literature on the lipids of the leaves of this crop, Donaire [1] having discussed only their amount.

We have investigated the dynamics of the change in the fatty acids of the neutral lipids of the leaves according to the stage of ripeness of the fruit and variety characteristics. The leaves of two varieties of the olive were analyzed: Tossiiskaya and della Madonna, which are grown in Azerbaidzhan. The leaves were collected as the fruit of the 1984 harvest ripened in the following phases: I) "green fruit," preserving ripeness, gathered in September; II) "brown fruit," before the setting in of complete pigmentation, collected in October; III) "black fruit," the setting in of complete pigmentation, collected in November; and IV) "black fruit," complete ripeness, collected in December.

The neutral lipids were extracted from the air-dry leaves with petroleum ether (40–60°C) in a Soxhlet apparatus [2]. The combined fatty acids were isolated by hot saponification with a 10% methanolic solution of caustic potash as described in [3]. The fatty acid methyl esters were analyzed by gas-liquid chromatography on a Chrom-4 chromatograph (Czechoslovakia) with a 4 mm × 2.5 m column filled with 17% of ethylene glycol succinate on Chromaton N-AW-DMCS at 196°C with a rate of flow of carrier gas (helium) of 62 ml/min. The amounts of the components were calculated as the products of the heights of the peaks and the retention times measured in minutes [4].

The fatty acid composition (FFA), % of the neutral lipids is shown in Table 1. From eight to ten components were detected in the fatty acids of the neutral lipids of the leaves of the varieties studied, of which five have not been identified. The predominating acids proved to be the 16:0, 18:0, 18:2, and 18:3 species. During the ripening process the composition of the fatty acids of the lipids changed, which indicates their existence in a state of metabolic activity. It can be seen from Table 1 that in the lipids of both varieties the amount of the 16:0 acid was relatively high in the "preserving ripeness" and "complete ripeness" phases and was lower in the "before the setting in of complete pigmentation" phase. The level of the 18:1 acid increased monotonically during the phases, and reached its maximum value at the moment of ripeness of the fruit. It must also be mentioned that increase in the amount of the 18:1 acid was accompanied by simultaneous sharp fall in the amount of the 18:3 acid.

TABLE 1

Fatty acid	Time of collection							
	September		October		November		December	
	Tossiiskaya	della Madonna	Tossiiskaya	della Madonna	Tossiiskaya	della Madonna	Tossiiskaya	della Madonna
Unidentified X_1	0,8	0,5	1,1	1,5	0,4	0,7	0,5	0,2
16:0	10,6	10,4	9,5	9,8	10,6	10,2	10,7	10,8
16:1	1,4	1,6	2,0	1,3	1,6	1,3	1,4	1,3
Unidentified X_2	0,8	0,5	2,6	3,0	1,1	1,3	0,9	2,1
Unidentified X_3	—	—	—	Tr.	—	—	1,0	Tr.
18:0	2,1	2,4	3,0	2,9	2,8	2,5	3,1	2,7
18:1	53,8	55,3	66,1	65,5	70,0	70,3	70,8	71,6
18:2	9,0	10,3	9,9	9,8	8,6	7,9	9,7	9,0
18:3	13,5	12,8	5,8	6,2	4,9	5,8	1,9	2,3
Unidentified X_4	6,6	5,3	—	—	Tr.	Tr.	—	—
Unidentified X_5	1,4	0,9	—	—	Tr.	—	—	—

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Thus, depending on the phases of ripeness of the fruit the amount of 18:1 acid in the neutral lipids of both varieties rises, reaching its greatest value at the end of ripening, while, conversely, the amount of the 18:3 acid decreases. Variety differences have practically no effect on the amount and qualitative composition of the fatty acids.

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COUMARINS OF SOME SPECIES OF THE GENUS *Heracleum*

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UDC 547.814

The presence of coumarins in *Heracleum asperum* Bieb., *H. moellendorffii* Hance, *H. ponticum* (Lipsky) Schischk. ex Grossh., *H. sphondylium* L. (hogweed cow parsnip) and *H. woroschilowii* Gorovoi, has been shown previously by paper chromatography [1].

In the present communication we compare the results of a study of the coumarins of the fruit of the above-mentioned species and of the quantitative determination of the total amount of furocoumarins and individual substances in them with the aim of finding promising raw materials sources for obtaining them as pharmacologically active compounds.

The isolation of the furocoumarins and their identification were carried out as described previously [2-5]. Quantitative determinations were carried out as in [6].

We isolated 10 substances from each species of the cow parsnip investigated: phellopterin - $C_{17}H_{16}O_5$, mp 100-102°C; biac-angelicin - $C_{17}H_{18}O_7 \cdot H_2O$, mp 117-118°C, $[\alpha]_D^{18} + 24^\circ$ (s, 0.6; ethanol); isopimpinellin - $C_{13}H_{10}O_5$, mp 148-154°C (decomp.) imperatorin - $C_{16}H_{14}O_4$, mp 102-103°C; xanthotoxin - $C_{12}H_8O_4$, mp 145-146°C; bergapten - $C_{12}H_8O_4$, mp 189-190°C; heraclecol - $C_{17}H_{18}O_7$, mp 117-118°C, $[\alpha]_C^{20} + 30^\circ$ (s 0.5; methanol); pimpinellin - $C_{13}H_{10}O_5$, mp 116-117°C; and isobergapten - $C_{12}H_8O_4$, mp 223-224°C.

Determination of the total amount and the amounts of the individual furocoumarins in the fruit of the species investigated gave the following results (%):

<u>Heracelum</u>	Total	Bergapten	Xanthotoxin	Isopimper-nellin
Woroschilowii	2,85	0,41	0,33	0,57
Asperum	1,33	0,27	0,12	0,41
Moellendorffii	1,68	0,18	0,17	0,18
Sphondylium	0,95	0,32	0,15	0,17
Ponticum	1,51	0,24	0,10	0,35

The species investigated belong to the section *Heracleum* and are close in qualitative coumarin composition. Quantitatively, the richest is *H. woroschilowii*, and this is promising as a source for obtaining furocoumarins. Xanthotoxin was used as a standard.

The authors are grateful to I. F. Satsiperova for providing the samples of cow parsnip seeds for investigation.

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Translated from *Khimiya Prirodnikh Soedinenii*, No. 3, pp. 446-448, May-June, 1987. Original article submitted August 14, 1986; revision submitted December 31, 1986.