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FATTY ACID COMPOSITION OF TWO *Athamanta turbith* SUBSPECIES

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The fruit oils of Athamanta turbith *ssp.* hungarica *and* Athamanta turbith *ssp.* haynaldii *were obtained by Soxhlet extraction using petroleum ether. The fatty acid composition of oils was determined by GC in the methyl ester form. Considering the composition and content of fatty acids, the examined oils were very similar. Petroselinic acid was the principal one (45.6 and 46.2%, respectively), followed by a significant amount of linoleic acid (26.9 and 29.1%, respectively). In both oils, myristic, pentadecanoic, palmitic, palmitoleic, stearic, petroselinic, oleic, linoleic, α-linolenic, arachidic, and behenic acid were identified. Lignoceric acid was detected only in* A. turbith *ssp.* hungarica *oil.*

Key words: *Athamanta turbith* ssp. *hungarica*, *Athamanta turbith* ssp. *haynaldii*, fatty acid composition, GC, petroselinic acid.

The genus *Athamanta* L. (Umbelliferae) consists of about nine species, which are distributed mainly in southeastern Europe. *A. turbith* ssp. *hungarica* (Borbas) Tutin is distributed in the gorges of south Carpathians and northeastern Serbia, while *A. turbith* ssp. *haynaldii* (Borbas & Uechtr.) Tutin is an endemic Dinaric plant [1]. This taxon is registered as species *A. haynaldii* Borbas & Uechtr. in Flora of FR Serbia [2].

Some of the *Athamanta* species are used in traditional medicine as antiseptics, diuretics, in the therapy of sclerosis, and to expel renal calculi [3, 4].

Species from the genus *Athamanta* have been investigated with respect to coumarins [5–8], flavonoids [9], and essential oil composition [10–15]. Lipids from fruits and leaves of *A. macrophylla* Korov. (syn. *Mediasia macrophylla* Regel et Schmalh.) have also been examined [16–18].

In this study, fatty acids of the oils isolated from mature fruits of *A. turbith* ssp. *hungarica* and *A. turbith* ssp. *haynaldii* were analyzed. No data on fatty acid composition of these plants could be found in the scientific literature.

The oils were isolated from powdered fruits by Soxhlet extraction using petroleum ether. Using this procedure, essential oils, present in high amounts in the fruits (7.1 and 7.7%, respectively) [15], were extracted as well. The obtained oil mixtures (19.6 and 17.1%, respectively), were clear, dark-yellow liquids, with on aromatic odor.

The total fatty acid composition of the oils was determined by GC in the methyl ester form. Results are presented in Table 1. Considering the composition and content of fatty acids, the examined oils were very similar. Twelve fatty acids were identified in the oil of *A. turbith* ssp. *hungarica* (93.7% of total fatty acids) and eleven fatty acids (95.7% of total fatty acids) in the oil of *A. turbith* ssp. *haynaldii*. In both oils, myristic, pentadecanoic, palmitic, palmitoleic, stearic, petroselinic, oleic, linoleic, α-linolenic, arachidic and behenic acid were detected. Lignoceric acid was identified only in *A. turbith* ssp. *hungarica* oil. In both oils, the percentage of unsaturated fatty acids was significantly higher (87.8 and 87.3%, respectively) than the

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TABLE 1. Fatty Acid Composition of *A. turbith* ssp. *hungarica* and *A. turbith* ssp. *haynaldii* Oils, %

Fatty acid	*A. turbith* ssp.	
	hungarica	*haynaldii*
Myristic (14:0)	0.2	0.2
Pentadecanoic (15:0)	0.1	0.1
Palmitic (16:0)	3.8	5.6
Palmitoleic (16:1)	0.2	0.2
Stearic (18:0)	0.6	0.6
Petroselinic (18:1)	45.6	46.2
Oleic (18:1)	14.7	11.5
Linoleic (18:2)	26.9	29.1
α-Linolenic (18:3)	0.3	0.3
Arachidic (20:0)	0.6	1.5
Behenic (22:0)	0.4	0.4
Lignoceric (24:0)	0.3	-
$\Sigma_{Sat.}$	5.9	8.4
$\Sigma_{Unsat.}$	87.8	87.3
$\Sigma_{Fatty\ acids}$	93.7	95.7

saturated ones (5.9 and 8.4%, respectively). The principal acid was petroselinic acid (45.6 and 46.2%, respectively), followed by a significant amount of linoleic acid (26.9 and 29.1%, respectively).

Myristic, pentadecanoic, palmitic, stearic, petroselinic, oleic and linoleic acid were also identified in oil from the leaves of *A. macrophylla*. This oil was also characterized by the presence of laurinic, tridecanoic and heptadecanoic acid [17, 18].

Petroselinic acid, the Δ^{6cis} isomer of octadecenoic acid (18:1), is the major component of the seed oil of most Umbelliferae, Araliaceae, and Garryaceae species, where it may comprise up to 85% of total fatty acids. Because of its limited natural occurrence, petroselinic acid is considered to be un unusual fatty acid [19]. Petroselinic acid represents an important oleochemical material for the food, cosmetics, chemistry, and pharmaceutical industries [20].

EXPERIMENTAL

Plant Material. The mature fruits of *A. turbith* ssp. *hungarica* and *A. turbith* ssp. *haynaldii* were collected in July 2004 from two localities in Serbia: Djerdap gorge (*A. turbith* ssp. *hungarica*) and Ovcar Kablar gorge (*A. turbith* ssp. *haynaldii*). Voucher specimens (ko2004071 and ko2004072, respectively) were deposited at the Herbarium of the Natural History Museum, Belgrade (BEO).

Extraction. Fruit oils were obtained in petroleum ether by Soxhlet extraction until exhausted. Organic solvent was removed under reduced pressure at 40°C and the residue dissolved in a mixture of abs. EtOH–toluene (1:1) and dried in a vacuum desiccator.

Preparation of Fatty Acid Methyl Esters. Fatty acids were isolated after saponification of fruit oils with potassium hydroxide. Fatty acid methyl esters were prepared using 14% BF_3–MeOH solution and extracted with hexane [21]. The total fatty acid composition of the oils was determined by GC.

Gas Chromatography (GC). GC analysis was performed on a Hewlett Packard chromatograph, Model 5890, equipped with a flame ionization detector and Supelco Fused silica capillary column 100 m × 0.25 mm × 0.2 μm, Cat. No. SP-2560. Helium 6.0 was used as a carrier gas (flow rate 1 mL/min). The initial column temperature was 140°C, programmed to 2°C/min until 240°C and kept for 15 min. The detector and injector temperature were set at 280°C and 250°C respectively. Fatty acids were identified by comparison with retention times (Rt) of standards (Supelco^{TM} 37 Component FAME Mix Cat. No. 47885-U). The relative content of each fatty acid, in %, was calculated from the ratio of the relevant peak area to the total peak area for fatty acids.

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