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RESEARCH ARTICLE

Chemical composition of *Artedia squamata* L. essential oil

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Abstract

The genus *Artedia* L. (Apiaceae) is represented in Turkey by 485 species and altogether 511 taxa. The rate of species endemism in Turkey is 37.7%. The plant material was collected from the province of Kahramanmaraş, Turkey. The essential oils from fruits and aerial parts were obtained by hydrodistillation using a Clevenger type apparatus. Chemical compositions of the oils were analysed using the GC-FID and GC-MS techniques. The main components of fruits oil were characterized as 1-octadecanol (16.4%), hexadecanoic acid (16.2%), 1-hexadecanol (6.0%), spathulenol (5.5%), caryophyllene oxide (5.0%), bicyclogermacrene (4.1%) and dillapiol (3.0%). Major compounds of the oil from aerial parts were determined as *α*-pinene (39.0%), sabinene (36.0%) and terpinen-4-ol (3.2%).

Keywords: *Artedia squamata,* essential oil, GC-FID, GC-MS.

Introduction

The family Apiaceae is represented by 101 genera and 485 species (511 taxa) in Turkey. The endemism rate on species basis is 37.3% (Davis, 1972; 1988). Apiaceae family is rich in commercial essential oils and has wide traditional use. Essential oils of many species belonging to Apiaceae family have been investigated (Baser and Kirimer, 2014).

Artedia squamata L. is the only representative species of the genus *Artedia* L. (Apiaceae) (Davis, 1972). *A. squamata* is known and used locally as 'Karabenek'. An infusion of *A. squamata* leaves is internally used as antihypertensive in folk medicine (Bulut et al., 2014). Likewise, an infusion of *A. squamata* seeds is internally used for indigestion (Baydoun et al., 2015; Arnold et al., 2015). Extracts of the aerial parts of *A. squamata* were previously investigated for antioxidant and enzyme (cholinesterase, butyrylcholinesterase, tyrosinase, α-amylase, α-glucosidase) inhibitory activities (Zengin et al., 2015; Orhan et al., 2016).

There is not enough study on essential oil composition of *A. squamata*. In this study, the composition of essential oil of fruits and aerial parts of *Artedia squamata* collected from province of Kahramanmaraş, Turkey was investigated.

Materials and Methods

Plant material

Artedia squamata was collected from Kahramanmaraş in Turkey on 12 June 2015. The voucher specimen has been deposited at the Herbarium in Selçuk University (KNYA), Konya, Turkey (Voucher specimen no: A. Duran 10294).

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The fruits and aerial parts of *A. squamata* were hydrodistillated for 3 hours with the Clevenger apparatus. Essential oils of fruits and aerial parts were obtained trace amounts, trapped in *n*-hexane. Oil yields were less than 0.1%. The essential oil samples were kept at 4°C until chemical composition analysis.

GC-FID and GC-MS analyses

GC-FID and GC-MS analytical conditions were performed according to Öztürk et al. (2020). GC-MS chromatograms of essential oil of aerial parts and fruits of *A. squamata* are given Figure 1 and Figure 2. GC analysis results are reported in Table 1.

Results and Discussion

As a result of GC-FID and GC-MS analyses, the main compounds of the fruits oil were identified as 1-octadecanol (16.4%), hexadecanoic acid (16.2%), 1-hexadecanol (6.0%), spathulenol (5.5%), caryophyllene oxide (5.0%), bicyclogermacrene (4.1%) and dillapiol (3.0%). Forty-three compounds were determined constituting 91.9% of the total oil of the fruits. Diterpenes (30.0%) were the main compounds group of the oil of the fruits, followed by fatty acid (21.9%), oxygenated monoterpenes (12.9%), oxygenated sesquiterpenes (12.3%), sesquiterpene hydrocarbons (10.9%) and monoterpene hydrocarbons (3.2%). Major compounds of the oil from aerial parts were determined as α-pinene (39.0%), sabinene (36.0%) and terpinen-4-ol (3.2%). Thirty-six components were detected comprising 97.3% of the essential oil of the aerial parts. Monoterpene hydrocarbons (87.6%) were the major group of components of the aerial parts oil, followed by oxygenated monoterpenes (7.9%) and others components (1.8%).

Previously, only two studies were reported on the essential oil chemistry, namely; Habibi et al. (2006) found main components as α-pinene (79.9%), camphene (4.7%), δ-3-carene (3.2%), β-pinene (3.0%) and limonene (2.4%) from the aerial parts of *A. squamata* collected from Iran. Twenty-five constituents were identified, comprising 99.6% of the total oil (Habibi et al., 2006). Bagci and Dogan (2015) characterized α-pinene (57.8%), camphene (9.0%), myrcene (5.7%), δ-3-carene (5.3%) and limonene (5.3%) as major components of the oil from aerial parts of *A. squamata* from Elazığ, Turkey. Fifty-three compounds constituting 99.7% of the essential oil of *A. squamata* were determined (Bagci and Dogan, 2015).

In this study, essential oil composition of the fruits and aerial parts of *A. squamata* were analysed. According to literature reviews, this is the first study of the essential oil of *A. squamata* fruits with GC-FID and GC-MS analysis.

Table 1. Essential oil composition of the fruits and the aerial parts of *Artedia squamata* L.

RRI	Constituent	A (%)	B (%)
1014	Tricyclene	0.2	-
1032	α-Pinene	38.6	0.2
1035	α-Thujene	0.8	-
1076	Camphene	3.8	-
1118	β-Pinene	0.3	-
1132	Sabinene	35.5	0.7
1135	Thuja-2,4(10)-diene	0.7	-
1159	δ-3-Carene	0.3	-
1174	Myrcene	0.8	-
1188	α-Terpinene	1.3	0.2
1203	Limonene	0.8	-
1213	β-Phellandrene	0.1	-

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1215	*p*-Mentha-1,3,6-triene	0.1	-
1255	γ-Terpinene	2.6	1.2
1280	*p*-Cymene	1.1	0.5
1290	Terpinolene	0.6	0.4
1499	α-Campholene aldehyde	0.8	1.8
1586	Pinocarvone	0.6	0.2
1590	Bornyl acetate	-	0.4
1611	Terpinen-4-ol	3.2	3.8
1612	β-Caryophyllene	0.1	1.1
1642	Thuj-3-en-10-al	0.2	tr
1648	Myrtenal	0.5	0.9
1667	*cis*-Verbenol	0.1	-
1670	*trans*-Pinocarveol	0.3	-
1690	*trans*-Verbenol	-	2.5
1704	γ-Curcumene	-	0.6
1706	α-Terpineol	0.1	-
1725	Verbenone	0.3	0.3
1726	Germacrene D	-	0.5
1744	Phellandral	1.1	-
1751	Bicyclogermacrene	-	4.1
1772	δ-Cadinene	-	1.0
1786	*ar*-Curcumene	0.1	2.6
1802	Cuminaldehyde	0.2	0.9
1804	Myrtenol	0.1	0.5
1814	*p*-Mentha-1,5-dien-7-ol	0.2	-
1849	Cuparene	-	1.0
2008	Caryophyllene oxide	0.3	4.5
2029	Perilla alcohol	-	1.6
2073	*p*-Mentha-1,4-dien-7-ol	0.2	-
2131	Hexahydro farnesyl acetone	-	0.9
2144	Spathulenol	tr	5.5
2179	1-Tetradecanol	-	0.7
2187	*T*-Cadinol	-	tr
2209	*T*-Muurolol	-	0.3
2247	*trans*-α-Bergamotol	-	0.6
2255	α-Cadinol	-	1.4
2384	Dillapiol	tr	2.6
2384	1-Hexadecanol	-	5.9
2500	Pentacosane	-	0.6
2503	Dodecanoic acid	-	0.6
2607	1-Octadecanol	-	16.4
2622	Phytol	-	1.0
2670	Tetradecanoic acid	-	2.8
2700	Heptacosane	-	2.6
2822	Pentadecanoic acid	-	2.3
2900	Nonacosane	-	tr
2931	Hexadecanoic acid	1.3	16.2
	Total	**97.3**	**91.9**

RRI Relative retention indices calculated against *n*-alkanes; % calculated from FID data; tr Trace (< 0.1%); A: Aerial parts; B: Fruits

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Figure 1. GC-MS total ion chromatogram of essential oil of aerial parts of *Artedia squamata* L.

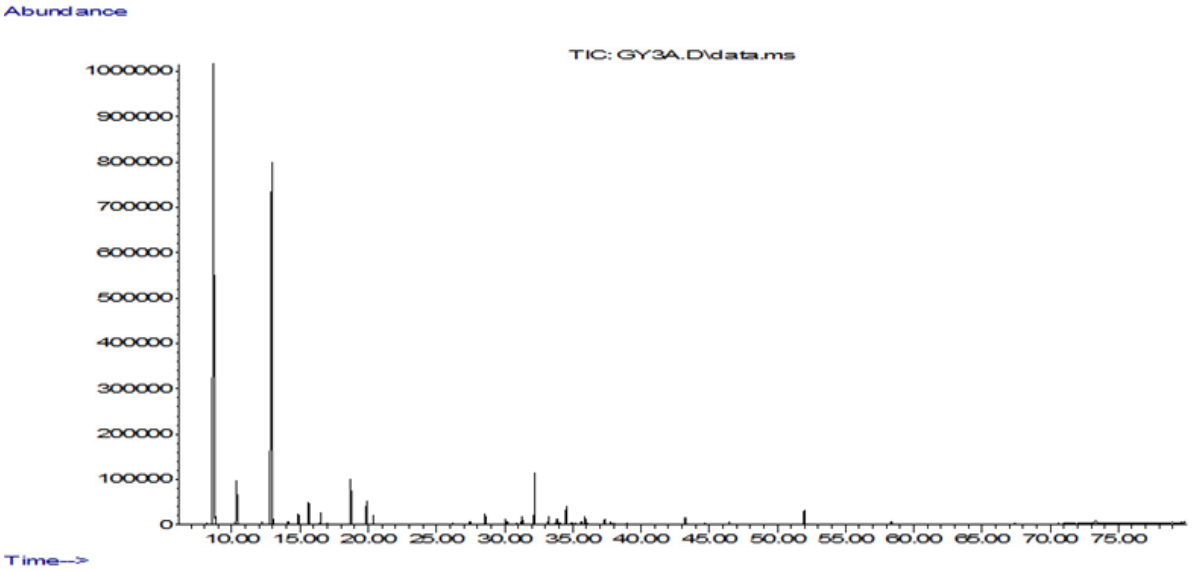
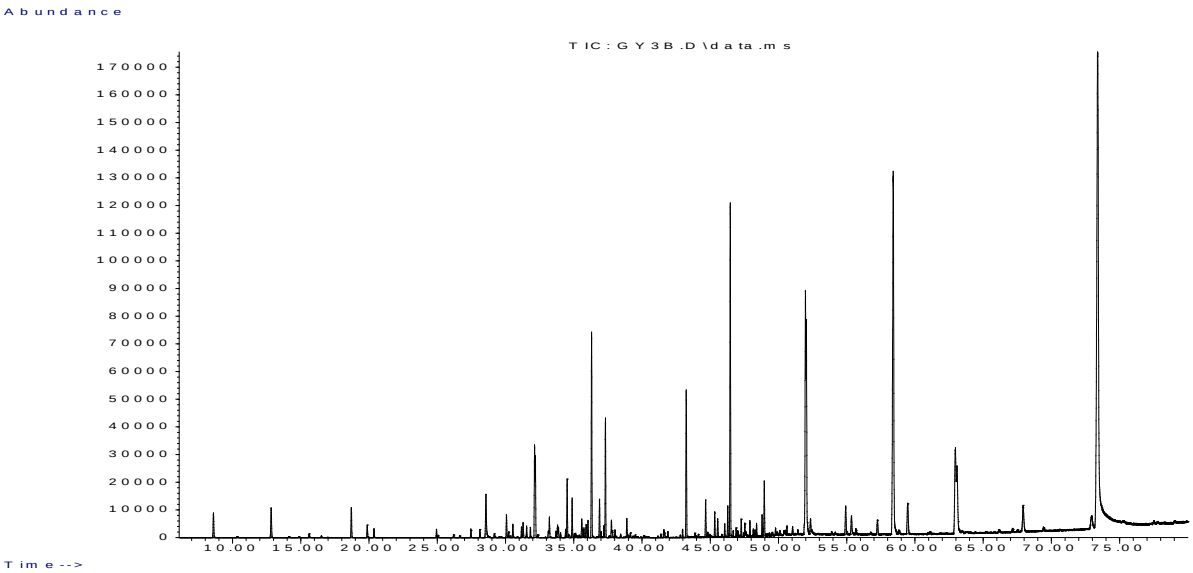


Figure 2. GC-MS total ion chromatogram of essential oil of fruits of *Artedia squamata* L.



REFERENCES

Arnold, N., Baydoun, S., Chalak, L. & Raus, T. (2015). A contribution to the flora and ethnobotanical knowledge of Mount Hermon. *Lebanon. Flora Mediterranea*, *25*, 13-55.

Bagci, E. & Dogan, G. (2015). Composition of the essential oils of two Umbelliferae herbs (*Artedia squamata* and *Malabaila secacul*) growing wild in Turkey. *Journal of Essential Oil Bearing Plants*, *18*(1), 44-51.

Baser, K. H. C. & Kirimer, N. (2014). Essential oils of Anatolian Apiaceae-A profile. *Natural Volatile Essential Oils*, *1*(1), 1-50.

Baydoun, S., Chalak, L., Dalleh, H. & Arnold, N. (2015). Ethnopharmacological survey of medicinal plants used in traditional medicine by the communities of Mount Hermon, Lebanon. *Journal of Ehnopharmacology*, *173*, 139-156.

Bulut, G., Tuzlaci, E., Dogan, A. & Senkardes, I. (2014). An ethnopharmacological review on the Turkish Apiaceae species. *Journal of Faculty Pharmacy of Istanbul University*, *44*(2), 163-179.

Davis P. H. (Eds.) (1972). Flora of Turkey and the East Aegean Islands, Vol. 4, Edinburgh University Press, Edinburgh.

Davis, P. H., Mill R. R. & Kit Tan (Eds.) (1988). Flora of Turkey and the East Aegean Islands, Vol. 10, Edinburgh University Press, Edinburgh.

Habibi, Z., Aghaie, H. R., Ghahremanzadeh, R., Masoudi, S. & Rustaiyan, A. (2006). Composition of the essential oils of *Ferula szowitsiana* DC., *Artedia squamata* L. and *Rhabdosciadium petiolare* Boiss. & Hausskn. ex Boiss. three Umbelliferae herbs growing wild in Iran. *Journal of Essential Oil Research*, *18*(5), 503-505.

Orhan, I. E., Tosun, F., & Skalicka-Woźniak, K. (2016). Cholinesterase, tyrosinase inhibitory and antioxidant potential of randomly selected Umbelliferous plant species and chromatographic profile of *Heracleum platytaenium* Boiss. and *Angelica sylvestris* L. var*. sylvestris*. *Journal of the Serbian Chemical society*, *81*(4), 357-368.

Ozturk, G., Demirci, B., Celik, M., Başer, K .H. C. (2020). Chemical composition of *Bunium elegans* (Fenzl) Freyn var. *elegans*. *Essential Oil . Natural Volatiles and Essential Oils*, *7*(1), 26-29.

Zengin, G., Ceylan, R., Uysal, S., & Aktumsek, A. (2015). Biological activities of three extracts from *Artedia squamata*: A study on antioxidant and enzyme inhibitory potential. *Current Bioactive Compounds*, *11*(3), 152-155.