

GC-MS Analysis of N-Hexane Extracts of Turkish *Ankyropetalum* Species

Türkiye’de Yetişen *Ankyropetalum* Türlerinin N-Hegzan Özütlerinin GC-MS Analizi

Research Article

Gamze Koz and Ömer Koz*

Department of Chemistry, Faculty of Natural Sciences, Architecture and Engineering, Bursa Technical University, Bursa, Turkey.

ABSTRACT

The chemical constituents of crude n-hexane extracts of three *Ankyropetalum* species, *Ankyropetalum gypsophiloides* Fenzl, *Ankyropetalum arsusianum* Kotschy Ex Boiss. and *Ankyropetalum reuteri* Boiss. Et Hausskn. from Turkey was determined using GC-MS analysis. Thirty three components were identified with Palmitic Acid Methyl Ester and Oleic Acid Methyl Ester as the most abundant components.

Key Words

Ankyropetalum gypsophiloides Fenzl, *Ankyropetalum arsusianum* Kotschy Ex Boiss., *Ankyropetalum reuteri* Boiss. Et Hausskn., GC-MS analysis.

ÖZ

Türkiye’de yetişen üç *Ankyropetalum* türü olan *Ankyropetalum gypsophiloides* Fenzl, *Ankyropetalum arsusianum* Kotschy Ex Boiss. ve *Ankyropetalum reuteri* Boiss. Et Hausskn. bitkilerinin ham n-hekzan özütlerinin içerdiği kimyasal bileşenler GC-MS (Gaz kromatografisi-Kütle spektrometresi) ile belirlendi. Tanımlanan otuz iki bileşen arasında palmitik asit metil esteri ve oleik asit metil esterinin en yüksek orana sahip olduğu saptandı.

Anahtar Kelimeler

Ankyropetalum gypsophiloides Fenzl, *Ankyropetalum arsusianum*, Kotschy Ex Boiss., *Ankyropetalum reuteri* Boiss. Et Hausskn., GC-MS analizi.

Article History: Received: Mar 19, 2017; Revised: Jul 11, 2017; Accepted: Oct 9, 2017; Available Online: Dec 25, 2017.

DOI: 10.15671/HJBC.2018.177

Correspondence to: Ö. Koz, Dep. of Chem., Architecture and Engineering, Bursa Technical University, Bursa, Turkey.

Tel: +90 224 300 3598

Fax: +90 224 300 3419

E-Mail: omer.koz@btu.edu.tr

INTRODUCTION

A *nkyropetalum* Fenzl genus has 4 species in the world and 3 of them are grown in Turkey. One of them is endemic and the others are rare. The genus is essentially pervasive in south-west Asia including Turkey. Regarding the phytogeography the genus grows in the south-east part of Turkey; that is in Irano-Turanian and Mediterranean regions [1,2]. The species belonging to the *Ankyropetalum* genus in Turkey are *Ankyropetalum gypsophiloides* Fenzl, *Ankyropetalum arsusianum* Kotschy Ex Boiss. and *Ankyropetalum reuteri* Boiss. Et Hausskn. (endemic). The roots of *Ankyropetalum* species are economically important and used as food additive as a result of their rich saponin content [3]. Furthermore, saponins obtained from *Ankyropetalum* species are used as adjuvant in some vaccines and fire extinguishers [4,5]. Despite the economic importance and wide area of application, there are no phytochemical studies reported on these species.

As a part of our ongoing project on the analysis of chemical constituents of *Ankyropetalum* species, we investigated the content of n-hexane extracts of *A. gypsophiloides*, *A. arsusianum* and *A. reuteri* by GC-MS.

MATERIALS and METHODS

Plant Material

Plant materials were collected from different locations as *A. gypsophiloides* from Bozova, Işınlı, Şanlıurfa, *A. arsusianum* from Osmaniye-Ceyhan and *A. reuteri* from Nurdağı, Gaziantep in June 2014.

Sample Preparation

Air-dried aerial parts of the plant materials were extracted with n-hexane using Soxhlet extractor. The oily mixtures were derived to their methyl esters using trans-esterification process of the International Union of Pure and Applied Chemistry [6]. According to this process, dried hexane extracts were dissolved in heptane and then extracted with 2 M methanolic KOH at room temperature for 30 s. The upper phases were analyzed by GC-MS systems.

Gas Chromatography/Mass Spectrometry (GC-MS) Analysis

The methyl esters of fatty acids were analyzed by Agilent 7890A and Agilent 5975C inert XL MSD (mass selective detector) combined system with HP-5MS column (30 m × 0.25 mm × 0.25 μm). Pure helium gas (99.999%) was used as a carrier gas at a constant flow rate of 1 mL/min. The oven temperature was programmed as 60°C for 5 min. then 5°C/min to 220°C and kept constant for 5 min. The sample (in heptane) of 1 μL was injected in the split mode with a split ratio 20:1. The component identification was carried out using spectrometric electronic libraries (WILEY and NIST).

RESULTS and DISCUSSION

The compositions of the chemical compounds isolated from three species of *Ankyropetalum* are shown in Table 1.

The major chemical compounds in n-hexane crude extracts of *A. gypsophiloides*, *A. arsusianum* and *A. reuteri* were found as Palmitic Acid Methyl Ester (24.88%), Oleic Acid Methyl Ester (21.62% and 20.75%) respectively. Linoleic Acid Methyl Ester (LA-ω-6) was also determined as 9.30% in *A. arsusianum* and 12.81% in *A. reuteri*.

ACKNOWLEDGEMENTS

Harran University, Department of Chemistry and Biology were gratefully acknowledged for providing the plant material. Undergraduate students Onur Çakır, Sedat Kale and Zafer Bulut are also gratefully acknowledged for their support in the laboratory.

Table 1. The identified chemical compounds in n-hexane crude extracts of *Ankyropetalum* species.

RI	Compound	Composition (%)		
		<i>A. gypsophilides</i>	<i>A. arsusianum</i>	<i>A. reuteri</i>
8.89	Tetradecane	0.33	-	-
11.87	2, 6-Di-tert-butyl-4-cresol	0.89	1.43	0.73
12.05	Lauric acid methyl ester	2.23	1.79	1.40
12.37	5,6,7,7a-Tetrahydro-4,4,7-trimethyl-2(4H)-Benzofuranone	-	0.24	-
16.21	Heptadecane	0.27	-	-
16.79	Myristic acid methyl ester	5.55	3.10	3.16
18.40	Octadecane	0.26	-	-
18.95	Pentadecanoic acid methyl ester	0.47	0.46	0.40
19.36	Hexahydrofarnesyl acetone	3.19	1.50	1.65
20.06	1-Nonadecanol	1.33	0.27	0.40
20.47	Nonadecane	0.33	-	-
20.53	7-Hexadecenoic acid methyl ester	-	-	0.26
20.89	Farnesyl acetate 3	0.42	-	-
21.01	Palmitic acid methyl ester	24.88	19.61	17.24
22.44	Eicosane (icosane)	0.26	0.22	-
22.95	14-Methyl-hexadecanoic acid methyl ester	0.44	0.28	0.46
23.55	2-Cis-9-octadecenylxyethanol	-	0.36	0.29
23.55	Oleyl alcohol, methyl ether	1.36	-	-
24.00	1-Octadecene	1.45	0.33	-
24.23	Linoleic acid methyl ester	4.33	9.30	12.81
24.35	Oleic acid methyl ester	17.65	21.62	20.75
24.45	Elaidic acid methyl ester	1.18	1.19	1.08
24.56	Phytol	6.44	8.58	5.11
24.82	Stearic acid methyl ester	3.31	3.60	3.83
25.38	Lignoceryl alcohol	-	0.92	0.96
25.93	Octadecane	4.43	-	-
25.94	Pentacosane	-	-	1.04
27.46	Behenic acid methyl ester	2.42	3.38	3.68
28.14	1-Octadecanol	-	0.47	0.60
28.49	Octadecane	-	-	0.32
28.92	1-Heptacosanol	-	-	3.32
29.28	Arachidic acid methyl ester	4.10	4.15	9.29

References

1. F.U. Afifi, B. Abu-Irmaileh, Herbal medicine in Jordan with special emphasis on less commonly used medicinal herbs, *J. Ethnopharm.*, 72 (2000) 101-110.
2. H. Özçelik, F. Özgökçe, Taxonomic contributions to Genus *Gypsophila* L. (Caryophyllaceae) from East Anatolia (Turkey), *IVth Plant Life in Southwest and Central Asia* (Ed. M. Öztürk, Ö. Seçmen and G. Görk), Ege University Press, İzmir, Turkey, (1995) 195-209.
3. T. Baytop, *Türkiye'de Bitkiler ile Tedavi* (Therapy with medicinal plants in Turkey), Nobel Tıp press, İstanbul, (1984) 190-191.
4. M. Öztürk, H. Özçelik, *Useful Plants of East Anatolia*, SISKAV Publications, Semih Ofset and Press, Ankara, (1991).
5. M. Korkmaz, H. Özçelik, Economic importance of *Gypsophila* L., *Ankyropetalum* Fenzl and *Saponaria* L. (Caryophyllaceae) taxa of Turkey, *Afr. J. Biotechnol.*, 10 (2011) 9533-9541.
6. C. Paquat, A. Hautfenne, *International Union of Pure and Applied Chemistry*, Blackwell Scientific Publications, London, (1992).

