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GC-MS Analysis of *n*-Hexane Extract of *Saponaria prostrata* WILLD. subsp. *anatolica* HEDGE

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Abstract

The chemical constituents of *n*-hexane extract of *S. prostrata* WILLD. subsp. *anatolica* HEDGE which is an endemic species to Turkey was determined using GC-MS analysis. Twenty six components were identified with alpha-linolenic acid methyl ester and palmitic acid methyl ester as the most abundant components.
Keywords — endemic, GC-MS, methyl ester, *n*-hexane extract, *Saponaria prostrata*

1 Introduction

Saponaria species, which are belonging to Caryophyllaceae family, are annual or perennial herbaceous plants. There are twenty one *Saponaria* species grow in Turkey and eleven of them are endemic. *Saponaria* species are generally known as "sabun otu" in Turkish. As a result of high saponin content of the plant, it has foaming and cleaning properties and used as a natural cleaning agent [1, 2]. In addition, *Saponaria* species are commonly used to treat many illnesses [3]. Biological activity studies of some *Saponaria* species have shown that they are active against prostate, breast and colon cancer cell lines [4]. They also show antiproliferative, immune supporting and hemolytic activities [5, 6].

The main chemical components isolated from *Saponaria* species until today are mainly saponins [3, 6], phenolic glycosides [8, 9], biologically important proteins [10] and oligosaccharides [11].

Saponaria prostrata WILLD. subsp. *anatolica* HEDGE is an endemic plant to Turkey (Figure 1) and to the best of our knowledge there is no phytochemical study reported on this species.

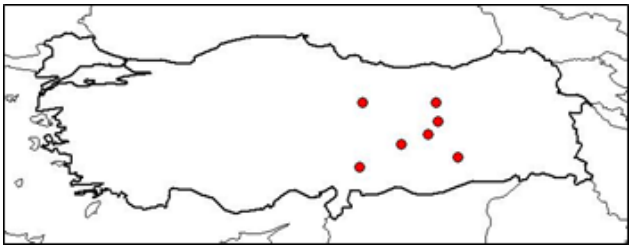

Figure 1. *Saponaria prostrata* WILLD. subsp. *anatolica* HEDGE and its dissemination in Turkey flora [1, 2, 12]

2 Material and Methods

2.1 Plant Material

S. prostrata WILLD. subsp. *anatolica* HEDGE was collected from the slopes between the villages of Yenicami and Karaali, ~1230 m, Elazığ, Turkey in June 2011

2.2 Sample Preperation

The air-dried and powdered whole plant material (264g) was exhaustively macerated with MeOH (3x5 L) at room temperature. The crude extract was yielded after evaporation of the solvent in vacuo and then extracted successively with *n*-hexane (12x150 mL). After removing *n*-hexane using rotary evaporator, the oily mixtures were converted to their methyl esters using the trans-esterification process of International Olive Oil Council (IOOC) and International Union of Pure and Applied Chemistry (IUPAC) [13, 14]. According to this process, dried *n*-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.

2.3 GC-MS Analysis

Methyl esters of fatty acids were analyzed using 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 hold there for 5 min. The sample (in heptane) of 1 µL was injected in the split mode with a split ratio of 20:1. The compounds were identified by NIST–Wiley library data search.

3 Results and Discussion

The identified chemical compounds in *n*-hexane extract of *S. prostrata* WILLD. subsp. *anatolica* HEDGE are shown in Table 1. Those peaks matching similarity index (SI) greater than 70% in NIST library were assigned. The major chemical compounds in *n*-hexane extract were found as alpha-linolenic acid methyl ester (ala-ω-3) (28.10%), palmitic acid methyl ester (22.90%), linoleic acid methyl ester (la-ω-6) (18.60%), phytol (8.27%), palmitic acid (5.23%), and stearic acid methyl ester (3.49%).

Tablo 1. Chemical composition of *n*-hexane extract of *S. prostrata* WILLD. subsp. *anatolica* HEDGE

RT	Compound Name	%
12.655	Benzoic Acid Methyl Ester	0.10
24.672	Lauric Acid Methyl Ester	0.27
28.558	1-Methyl-Cyclododecene	0.20
28.677	Cyclodecanol	0.34
29.243	Myristic Acid Methyl Ester	0.75
31.028	7-Hexadecenoic Acid Methyl Ester	0.12
31.360	Pentadecanoic Acid Methyl Ester	0.30
31.770	6,10,14-Trimethyl-2-Pentadecanone	0.84
32.968	Palmitoleic Acid Methyl Ester	0.47
33.435	Palmitic Acid Methyl Ester	22.90
34.172	Palmitic Acid	5,23
34.862	Cis-10-Heptadecenoic Acid Methyl Ester	0.42
35.308	Margaric Acid Methyl Ester	0.71
36.014	9-Octadecenoic Acid Methyl Ester	0.13
36.294	.Gamma.-Linolenic Acid Methyl Ester	0.25
36.393	Cyclohexadecane	0.12
36.631	Linoleic Acid Methyl Ester	18.60
36.777	Alpha-Linolenic Acid Methyl Ester	28.10
36.953	Phytol	8.27
37.171	Stearic Acid Methyl Ester	3.49
37.425	Cis,Cis-Linoleic Acid	2.50
39.963	9-Octadecenoic Acid (Z)-(.Delta.(Sup9)-Cis-Oleic Acid)	0.55
40.440	13-Tetradece-11-yn-1-ol	0.44
40.969	Cis-11,14-Eicosadienoic Acid Methyl Ester	0.93
41.089	Cis-11-Eicosenoic Acid Methyl Ester	1.76
41.825	Eicosanoic Acid Methyl Ester	2.08

4 Conclusions

This is the first GC-MS study of *n*-hexane extract of *S. prostrata* WILLD. subsp. *anatolica* HEDGE which is an endemic species to Turkey. Twenty six components were identified with alpha-linolenic acid methyl ester (28.10%) and palmitic acid methyl ester (22.90%) as the most abundant components. Our results show that unsaturated fatty acid content (~55%) of the *n*-hexane extract was higher than the saturated one which is almost 35%. The phytochemical analysis and activity studies of different extracts of this plant are still in progress in our laboratories.

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