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Fatty Acids from *Verbascum songaricum* Herb.

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ABSTRACT

The fatty acid content of lipophylic fractions from *Verbascum songaricum* herb was determined using gas chromatography. The presence of 18 fatty acids was established in the *V. songaricum* herb. Among the identified fatty acids, the unsaturated fatty acids dominated in the studied type of plant material.
Keywords: *Verbascum songaricum*, Scrophulariaceae, fatty acids, gas chromatography

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INTRODUCTION

Verbascum L. (Scrophulariaceae), common name Mulleins, is a genus of 360 species of flowering plants, predominantly distributed in Asia, Europe, and North America, historically used as folk medicinal plant for the treatment of various ailments, which where demonstrated to be an important and well-traditional herbal [1]. Mulleins are biennial or perennial, rarely annual plants, with a deep tap root. Verbascum plants have been used medicinally since ancient times in folk medicine as a remedy for respiratory problems such as bronchitis, dry coughs, whooping cough, tuberculosis, and asthma. Different Verbascum species exhibit an anti-inflammatory activity [2-4].

Verbascum songaricum Schrenk which is the subject of the current study is endemic to Kazakhstan and one of the growth areas of the species is the foothills of Dzhungar and Tien Shan mountains. Although V. songaricum extracts are used among the local people for the purpose of remedy, the information on V. songaricum is relatively limited. It has been studied in details regarding its saponin content in aerial parts and flavonoids in the roots, while the presence of iridoids has been proven only by TLC [5, 6, 7]. Fatty acids are a class of biologically active substances, which cause inflammatory properties of raw materials. Unsaturated fatty acids are of great interest due to their antagonistic properties against arachidonic acid, thromboxanes and leukotrienes [8, 9]. The goal of our work was to determine the fatty-acid composition of *Verbascum songaricum* herb.

EXPERIMENTAL

Herb of *Verbascum songaricum* was collected in gorge Kaskasu (South Kazakhstan region, June 2014). Lipophilic fraction received by exhaustive extraction with hexane was investigated.

Method for determining the fatty acid content is based on the conversion of fatty acids and its triglycerides to methyl esters of fatty acids and gas chromatographic analysis of them [10].

The fatty-acid composition of total lipids was determined after methylation of total lipids fraction by gas chromatography "Selmihrom-1" with a flame ionization detector using a gas chromatography column stainless steel length of 2.5 meters and an inner diameter of 4 mm, packed with a stationary phase - innerton treated with 10% diethylene glycol succinate (DEGS).

Chromatograph on operating parameters set as follows: column oven temperature - 180 °C evaporator temperature - 230 °C. Detector temperature - 220 °C, flow rate of carrier gas (nitrogen) 30 cm^3 / min, sample volume 2 µl acid methyl ester solution in hexane.

The identification of methyl esters of fatty acids was performed by retention time of the peaks compared to the standard formula. Calculation of methyl esters was conducted by internal normalization. The standards of saturated and unsaturated fatty acid methyl esters of firm "Sigma" were used as standards.

Fatty acid methyl esters prepared by a modified method of Peysker, which ensures complete methylation of fatty acids. For methylation a mixture of chloroform, methanol and sulfuric acid in a ratio of 100: 100: 1 used. 30-50 mcl of lipophilic extract measured into a glass vial, 2.5 ml of methylated mixture poured and sealed ampoules. Then they placed in an oven at a temperature of 105 ° C for 3 hours. After closure of methylation ampoules opened, the contents transferred to a test tube, powdered zinc sulfate on the tip of a scalpel, 2 ml of distilled water and 2 ml of hexane for extraction of methyl esters added. After thorough stirring and settling, the hexane extracts filtered and used for chromatographic analysis.

RESULTS AND DISCUSSION

In the study of fatty acid composition presence of 18 fatty acids in of *Verbascum songaricum* herb was established. The results of fatty acid analysis given in the table 1.

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Table 1: Fatty-acid composition of the lipophilic fraction of *V. songaricum* herb

#	Fatty acids	Retention time, s	The amount of total,%
1	$C_{12:0}$ Lauric acid	187,58	0,32
2	Unidentified acid	220,85	0,26
3	$C_{14:0}$ Myristic acid	306,11	0,50
4	$C_{14:1}$ Myristoleic acid	388,95	1,15
7	$C_{16:0}$ Palmitic acid	507,24	23,47
8	$C_{16:1}$ Palmitoleic acid	650,32	2,38
9	Unidentified acid	700,90	0,84
10	$C_{18:0}$ Stearic acid	954,32	1,85
11	$C_{18:1}$ Oleic acid	1125,38	30,63
12	Unidentified acid	1284,09	0,76
13	$C_{18:2}$ Linoleic acid	1451,56	9,42
14	Unidentified acid	1714,01	0,78
15	$C_{18:3}$ Linolenic acid	1984,45	14,64
16	$C_{20:1}$ Gondoinic acid	2421,96	6,31
17	$C_{22:0}$ Behenic acid	3052,87	1,39
18	$C_{22:1}$ Erucic acid	3420,25	0,05
19	Unidentified acid	4599,58	3,42
20	$C_{24:0}$ Lignoceric	5520,29	1,83
The content of the identified fatty acids - The content of saturated fatty acids - The content of unsaturated fatty acids			 29,36 64,58
Content of unidentified fatty acids			6,06

In the lipophilic fraction of the object among the saturated acids palmitic acid predominated, the content of the amount was 23.47%. Among the unsaturated fatty acids oleic acid predominated, the content of which amounts to 30.63%. Among the identified fatty acids, unsaturated acids were predominant.

CONCLUSIONS

- Fatty-acid composition of *Verbascum songaricum* herb investigated using method of gas chromatography. Among the identified fatty acids, unsaturated acids were predominant.
- Experimental data might be explaination of *V. songaricum* herb using to treat inflammatory processes.

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