

## FATTY-ACID COMPOSITION AND ANTIBACTERIAL ACTIVITY OF CHCl<sub>3</sub> EXTRACTS OF THREE PLANTS OF THE GENUS *Silene*

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UDC 547.553.655:37

A total of 84 species of the plant genus *Silene* (Caryophyllaceae) are indigenous to Central Asia [1].

We studied previously ecdysteroids from the aerial part of three species of *Silene* [2–4]. Lipids extracted by CHCl<sub>3</sub> during isolation of the ecdysteroids were studied in order to utilize more of the raw material.

Ecdysteroids were isolated by soaking the ground air-dried aerial part of the plants in MeOH at room temperature for 1 d. Then, the extract was filtered. The MeOH was distilled in a rotary evaporator. The solid was dissolved in water and treated with CHCl<sub>3</sub>. The ecdysteroids remained in the aqueous layer. The CHCl<sub>3</sub> part of the extract was not used.

We isolated the lipids from it using column chromatography over silica gel and solvent system hexane:Et<sub>2</sub>O (1:1). This isolated neutral lipids (NL). Their composition was determined using TLC and hexane:Et<sub>2</sub>O (4:1 and 1:1). The principal components of the NL were triglycerides, free fatty acids, and free sterols. Fatty acids were isolated from NL after their alkaline hydrolysis and were analyzed by GC as the methyl esters on a Chrom 5 instrument with a flame-ionization detector using a metallic column (2.5 m) packed with Chromaton N-AW with Reoplex-400 (15%). Table 1 presents the fatty-acid composition.

It can be seen that the qualitative fatty-acid compositions of NL from the aerial parts of the aforementioned species of *Silene* were identical and consisted of 15 acids. Their quantitative compositions differed. This was evident in the content of the principal acids, the saturated one of which was palmitic acid (16:0); the unsaturated ones, two essential fatty acids ω-6 (18:2) and ω-3 (18:3). Palmitic acid dominated the NL in plants **2** and **3**; the sum of linoleic and linolenic acids, in *S. viridiflora*.

Next the antibacterial activity of these CHCl<sub>3</sub> extracts was determined by the disk diffusion test [5]. For this, they were dissolved in DMSO. Microorganisms were grown in agar dishes at 30°C overnight in Mueller–Hinton medium (Oxoid). The suspension (100 μL) contained 10<sup>8</sup> CFU/mL. Sterile filter disks (5-mm diameter) were soaked with extract solution (20 μL, 5 mg/mL) and placed on the surface of the inoculated Petri dishes. The dishes were incubated at 37°C for 24 h. The antibacterial activity was estimated by measuring the inhibition zone formed around the disks. We used five disks in each Petri dish. Each test was performed in triplicate.

The test cultures of microorganisms were the following: *Klebsiella pneumoniae* 40602; *Micrococcus luteus* obtained from the Microbiology Faculty, Manchester University, GB; *Pseudomonas aeruginosa* NCTC6749; *Enterococcus faecalis* NCTC775; *Proteus rettgeri* NCIMB9570 obtained from the National Collection of Great Britain (NCTC); bacterial strains *P. agglomerans* T26, *B. cereus* T80, and *Staphylococcus saprophyticus* T415 obtained from the Biology Faculty, National University of Uzbekistan.

Antimicrobial activity was found by testing against several bacterial cultures. The CHCl<sub>3</sub> extract of *S. brachyica* inhibited growth of three Gram-negative (*E. faecalis*, *P. rettgeri*, and *P. aeruginosa*) and one Gram-positive (*M. luteus*) bacterial strain. The CHCl<sub>3</sub> extract of *S. viridiflora* was active against *M. luteus*, *P. rettgeri*, *K. pneumoniae*, and *P. aeruginosa*. The extract of *S. wallichiana* exhibited activity against pathogenic bacteria *M. luteus* and *P. aeruginosa* but was weaker than extracts from the other species of *Silene*. Thus, the microbiological studies indicated that extracts of these species of *Silene* exhibited antimicrobial activity against various species of bacteria.

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TABLE 1. Fatty-Acid Composition of Neutral Lipids in CHCl<sub>3</sub> Extract of the Aerial Part of *S. brachuica* (1), *S. viridiflora* (2), and *S. wallichiana* (3), GC, mass %

Acid	NL			Acid	NL		
	1	2	3		1	2	3
10:0	0.4	0.2	0.1	18:3	25.0	32.8	15.5
12:0	0.8	0.3	0.6	20:0	1.2	1.2	0.8
14:0	1.2	0.4	1.1	21:0	1.4	1.5	1.9
15:0	0.6	0.3	0.5	22:0	8.9	3.8	5.4
16:0	18.5	24.7	26.6	23:0	4.8	3.1	4.5
16:1	2.6	1.8	2.2	24:0	10.6	3.4	7.6
18:0	2.7	2.3	2.4	∑ <sub>sat.</sub>	51.1	41.2	51.5
18:1	10.3	5.4	8.3	∑ <sub>unsat.</sub>	48.9	58.8	48.5
18:2	11.0	18.8	22.5				

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