POLYISOPRENOIDS FROM LEAVES OF *Althaea armeniaca*

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UDC 547.315.2+582.796

The genus *Althaea* (Malvaceae) is represented by three species distributed in the northern Caucasus, the Volga region, eastern and western Siberia, Ukraine, southern regions of Belarus, and Central Asia. Root of *Althaea* is widely used in medicine as an expectorant and a coating, mitigant, and anti-inflammatory agent for diseases of the respiratory tract [1].

Polyisoprenoids in roots and the aerial part of the plant have not been reported although interest in plant polyisoprenoids has recently increased greatly. This is due to the fact that they are membrane-active compounds and have high biological activity and low toxicity [2, 3]. Therefore, plant polyprenols are promising for developing drugs with anti-ulcer, immunotropic, antiviral, and other activities.

Herein we report results from an investigation of polyprenols from leaves of the annual plant *Althaea armeniaca* grown in the experimental plot of the ICPS in Tashkent in ontogenesis (May-November 2006). Leaves were dried at room temperature, ground (0.1-0.2 cm), and extracted with ethanol (96%, 3×, 10:1 EtOH:leaves) and benzene. The resulting extracts were separated over a silica-gel column (KSK, 160/250 mesh, 1:40) with elution by hexane:$CHCl_3$ of gradually increasing polarity to afford fractions of pure polyprenols and polyprenols containing other biologically active compounds such as tocopherols, sterols, and carotinoids. Table 1 gives the yields of extracted compounds and polyprenols.

Table 1 shows that the content of polyprenols increased as the plant developed. The amount of polyprenols reached a maximum during fruiting and slightly decreased during seed ripening and leaf shedding. The polyprenol contents in leaves of *A. armeniaca* varied from 0.7 to 2.35% depending on the plant development phase.

Polyprenols were identified chemically by comparing physical chemical properties (IR and PMR spectra) with those in the literature [4, 5] and TLC mobilities (AL SIL G/UV plates, Germany) using benzene:ethylacetate (24:1, R_f 0.53) with those of standard samples of polyprenols isolated from cotton line L-4 leaves. Iodine vapor and vanillin—H_2SO_4 were used as developers.

We found that polyprenols of *A. armeniaca* contained 10-13 isoprene units in their molecules, where the dominant one was undecaprenol. Thus, polyprenols in leaves of this plant were isolated and identified for the first time.

TABLE 1. Change of Polyprenol Contents with *Althaea armeniaca* Vegetative Phase (% of Air-Dried Mass, a.d.w.)

Vegetative phase	Moisture, %	Yield of extracted compounds		Yield of polyprenols, %	
		g	%	of a.d.w.	of total extracted compounds
Phase 4-5 of actual leaves	7.00	1.41	14.10	0.70	17.44
Budding	7.60	2.45	24.50	1.15	22.45
Flowering	8.00	1.24	12.40	1.44	25.32
Fruiting	7.10	1.49	14.90	2.35	43.6
Seed ripening	7.90	1.68	16.80	1.70	30.52
Leaf shedding	8.00	2.18	21.80	1.62	26.16

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 0009-3130/07/4304-0470

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