The bulk of the acids throughout the whole vegetation period of May to September consists of the $C_{16:0}$, $C_{18:1}$, $C_{18:2}$, $C_{18:3}$, $C_{22:0}$, $C_{24:0}$, and $C_{30:0}$ species, which make up more than 80% of the total acids. The end of the vegetation period (August–September) is characterized by the accumulation of the long-chain acids $C_{22:0}$, $C_{24:0}$, and $C_{30:0}$ in the waxy substances.

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# FLAVONOIDS OF Lathyrus sativus


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The epigeal part of Lathyrus sativus L. (grass pea) gathered in the flowering period in Khar'kov province was exhaustively extracted with 70% ethanol. The alcoholic extract was concentrated in vacuum to an aqueous residue, and the flavonoids were extracted with ethyl acetate. Paper chromatography (two-dimensional ascending PC in the butanol–acetic acid–water, 4:1:2, and 15% acetic acid systems) revealed no less than 20 substances of flavonoid nature. To isolate individual compounds, the ethyl acetate fraction from 3 kg of raw material was deposited on a column of polyamide sorbent and was eluted successively with chloroform and mixtures of ethanol and chloroform. As a result, flavonoid substances (I-VI) were isolated and identified.

Substance (I) – $C_{16}H_{12}O_4$, mp 256-258°, $\lambda_{max}$ 249, 302 nm (ethanol), identified as formononetin.

Substance (II) – $C_{15}H_{10}O_6$, mp 330-331°, $\lambda_{max}$ 256, 268, 350 nm (ethanol), identified as luteolin.

Substance (III) – $C_{15}H_{10}O_6$, mp 274-276°, $\lambda_{max}$ 266, 367 nm (ethanol), identified as kaempferol.

Substance (IV) – $C_{15}H_{10}O_7$, mp 310-312°, $\lambda_{max}$ 256, 370 nm (ethanol), identified as quercetin [2].

Substance (V) – $C_{21}H_{19}O_{10}$, mp 233-235°, $\lambda_{max}$ 255, 367 nm (ethanol), and Substance (VI) – $C_{21}H_{20}O_{11}$, mp 283-285°, $\lambda_{max}$ 260, 375 nm (ethanol). In the products of acid and enzymatic hydrolysis we detected kaempferol (V), quercetin (VI), and L-rhamnose. UV spectroscopy with ionizing and complex-forming reagents showed the presence of free hydroxy groups in the C-3, C-5, and C-4' positions, and in (VI) also at C-3'. In the PMR spectra (DMSO), in addition to the protons of the aromatic moieties H-2' (d, 7.72 ppm, J = 1.95 Hz), H-6' (d, 7.58 ppm, J = 8.8 Hz), H-5' (d, 6.88 ppm, J = 8.8 Hz), H-8 (d, 6.74 ppm, J = 1.95 Hz), H-6 (d, 6.41 ppm, J = 1.95 Hz, and, in (V) H-3' (d, 6.92 ppm, J = 8.8 Hz), the protons of the carbohydrate moieties were observed (3.60-5.14 ppm). The anomeric proton of rhamnose was strongly shifted into the weak-field region (d, 5.54 ppm) and appeared in the form of a well-defined doublet with a splitting constant J = 1.5 Hz; the signal of the methyl group of rhamnose was found at 1.12 ppm with J = 5.87 Hz, which confirmed the α configuration of the glycosidic bond. The results obtained enabled substance (V) to be characterized as kaempferol 7-O-α-L-rhamnofuranoside and substance (VI) as quercetin 7-O-α-L-rhamnofuranoside [1-4].


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The structures of the substances isolated were confirmed by UV, IR, and PMR spectroscopies and the results of a study of the products of acid and enzymatic hydrolysis, and also by comparison with authentic substances. This is the first time that substances (I), (V), and (VI) have been isolated from plants of the genus Lathyrus, while (II) is new for this species.

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# CHEMICAL COMPOSITION OF THE ROOTS OF Gentiana asclepiadea


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The herbage and roots of milkweed gentian Gentiana asclepiadea L., family Gentianaceae, are widely used in folk medicine for improving digestion [1]. Eleven flavone C-glycosides derived from apigenin and luteolin and three xanthone C-glycosides have been isolated from the epigeal part of this plant previously [2-5]. The pyridine alkaloid gentianine and the secoiridoid gentiopicrin and its 6'-O-glucoside have been found in its roots [6-8], and 13 phenolcarboxyolic acids have also been detected [9].

We have studied the roots gathered in Vitosha in October, 1987. A herbarium specimen (No. 147197) is being kept in the herbarium of the Botanical Institute in Sofia. The comminuted freshly gathered roots (10 kg) were exhaustively extracted with alcohol. The concentrated extract was diluted with water and was reextracted with ethyl acetate, and the ethyl acetate was driven off in vacuum. The dry powder so obtained (40 g) was suspended in water and treated with diethyl ether.

The aqueous residue was separated on columns of polyamide (with the eluents water–ethanol (9:1) and (7:3)) and by preparative paper chromatography in the $CHCl_3$–$CH_3COOH$–$H_2O$ (20:15:5) system, and substances (I-III) were obtained.

The ethereal solution was extracted with a 10% aqueous solution of caustic potash. The alkaline solution was neutralized with hydrochloric acid and extracted with ethyl acetate. Both fractions (neutral and phenolic) were separated by preparative chromatography on columns of Kieselgel Merck silica gel, with elution by benzene–ethyl acetate ((3:1) and (3:2)). As a result, substances (IV-VI) were obtained.

Substances I and II were identified on the basis of data from chromatographic analysis, acid hydrolysis UV, and PMR spectroscopy [10], and at the same time compared with set pure samples.

Substance (I) (281 mg) was isovitexin (apigenin 6-C-β-glucoside). mp 245-247°C; $R_f$ 0.51 (15% acetic acid, Filtrak 1 paper); $R_f$ of its isomer 0.28 (acid hydrolysis with 10% HCl, 90 min); $\lambda_{max}^{MeOH}$ 271, 335 nm. PMR spectrum (ppm, DMSO, 100 MHz): 13.58 (s, 1H, 5-OH); 10.40 (2H, 7, 4'-OH); 7.88 (d, J = 8 Hz, 2H, H-2', 6'); 6.90 (d, J = 8 Hz, 2H, H-3', 5'); 6.74 (s, 1H, H-3); 6.48 (s, 1H, H-8); 4.62 (d, J = 10 Hz, 1H, H-1"); 3.00–4.20 (m, sugar protons).

Substance (II) (50 mg) was isoorientin (luteolin 6-C-β-glucoside). mp 230-232°C; $R_f$ 0.35 (15% acetic acid, paper); $R_f$ of its isomer 0.14 (acid hydrolysis with 10% HCl, 90 min); $\lambda_{max}^{MeOH}$ 272, 340 nm. PMR spectrum (ppm, DMSO, 100 MHz): 13.52 (s, 1H, 5-OH); 7.36 (m, 2H,


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