

## AMINO-ACID COMPOSITION OF FLOWERS, LEAVES, AND EXTRACT OF *Sambucus nigra* FLOWERS

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We previously reported the qualitative and quantitative contents of the principal biologically active substances in leaves and bark of *Sambucus nigra* L. and the macro- and microelement compositions of flowers, leaves, and bark of it [1, 2].

The goal of the present work was to study the amino-acid composition of the vegetative and generative organs of *S. nigra* and the extract of flowers of this medicinal plant.

The qualitative composition of free amino acids in the studied raw material was determined by ascending chromatography. Paper chromatography used Filtrak FN-12 paper and *n*-butanol:acetic acid:water (4:1:2) [3] with reference to a standard set of amino acids (TU 6-09-3147-83, 0.1% concentration). The chromatogram was developed with ninhydrin (0.2%) in acetone.

Six free amino acids (threonine, valine, glutamic acid, isoleucine, arginine, and methionine) were found in flowers, leaves, and extract of *S. nigra* flowers by the analysis.

The composition of bound amino acids was found using an LKB415 (Sweden) amino-acid analyzer. Samples were hydrolyzed in HCl (6 M) for 24 h at 80°C.

TABLE 1. Amino-Acid Composition of Proteins from Flowers, Leaves, and Extract of *S. nigra* Flowers

Amino acid	Amino-acid content, % dry wt.		
	flowers	leaves	extract
Aspartic acid	2.447	2.730	2.633
Threonine	1.071	1.378	1.226
Serine	1.325	1.707	1.410
Glutamic acid	3.594	4.372	3.914
Glycine	1.318	1.794	1.593
Alanine	3.048	4.290	3.794
Proline	1.239	1.993	1.629
Valine	1.102	1.522	1.202
Methionine	0.614	0.803	0.703
Isoleucine	1.188	1.727	1.540
Leucine	1.124	1.294	1.039
Tyrosine	1.028	0.876	0.799
Phenylalanine	1.165	1.254	1.108
Histidine	0.624	0.740	0.694
Lysine	1.082	1.298	1.291
Arginine	0.995	1.476	1.210
Total protein	2.458	3.331	2.874

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Analysis of flowers, leaves, and extract of *S. nigra* flowers showed the presence of 16 amino acids (Table 1), 9 of which were essential (valine, threonine, methionine, isoleucine, leucine, lysine, histidine, phenylalanine, and arginine) and are especially important for humans. The total content of essential amino acids was 8.965% in flowers, 11.492 in leaves, and 10.013 in the extract. Alanine, glutamic acid, and aspartic acid dominated in all studied samples. The protein content in leaves was greater than in flowers and the extract [4].

Samples were collected in 2004 in Khar'kov, Kiev, Zhitomir, and Poltava districts of Ukraine. The extract of *S. nigra* flowers was prepared at the Central Plant Laboratory of OOO FK (Zdorov'e).

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