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QUALITATIVE AND QUANTITATIVE ANALYSIS OF AMINO ACID COMPOSITION OF MOGOLTAVIA SEWERZOWII

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Abstract. Mogoltavia of the Apiaceae family, based on scientific sources, is analyzed, along with the results of a qualitative and quantitative analysis of the amino acid composition of various organs (root, leaf, flower, and seed) of the Mogoltavia sewerzowii plant, collected in the Fergana Region of the Republic of Uzbekistan in April 2025. The results of a qualitative and quantitative comparison of the amino acid composition of the Mogoltavia sewerzowii plant collected in the Sokh District of the Fergana Region in May 2025 with the amino acid composition of the plant collected in the Uzbek District of the Fergana Region are also presented. The amino acid composition of Mogoltavia sewerzowii is being studied for the first time, highlighting the potential for the future development of a biologically active food supplement based on the chemical composition of this plant.

Keywords: Apiaceae, *Mogoltavia sewerzowii*, amino acids, aspartic acid, serine, proline, cysteine.

Introduction. The world's flora is rich in a wide variety of medicinal, therapeutic, and poisonous plants, including species belonging to the genus *Mogoltavia*. For many years, medicinal products developed from physiologically active compounds isolated from medicinal plants, as well as dietary supplements prepared directly from these plants, have been widely used in the treatment of various diseases in living organisms. Therefore, the study of the biological classification and chemical composition of medicinal plants, the analysis of the pharmacological properties of their biologically active compounds, and the development of dietary supplements for traditional medicine based on the obtained results remain among the most important tasks of modern scientific research. Investigations of *Mogoltavia sewerzowii*, a plant species belonging to the Apiaceae family, represent a continuation of these scientific efforts.

There are two species belonging to the genus *Mogoltavia* in the world flora, one of which is *Mogoltavia sewerzowii*. This species is widely distributed in the Republics of Tajikistan and Uzbekistan. The second species, *Mogoltavia narynensis*, is mainly found in the mountainous regions of the Kyrgyz Republic [1]. Therefore, it was planned to investigate the chemical composition of *Mogoltavia sewerzowii*, which was originally identified in the Republic of Uzbekistan.

This plant is widely distributed in the mountainous regions of Uzbekistan, particularly in the Fergana Valley, including the Sokh District of the Fergana Region and the Pap District of the Namangan Region, i.e., in the foothill areas.

The results of our studies on the water-soluble vitamins, flavonoids, macroelements, and microelements in four organs (roots, leaves, flowers, and seeds) of *Mogoltavia sewerzowii* collected from the mountain slopes of the Fergana and Sokh districts of Uzbekistan were presented in our previous publications [2–5].

To comprehensively investigate and analyze the chemical composition of *Mogoltavia sewerzowii* and to draw appropriate conclusions, the amino acid composition of the roots, rhizomes, leaves, and flowers of this plant growing in the Fergana Region of Uzbekistan was analyzed at the Institute of Bioorganic Chemistry of the Academy of Sciences of the Republic of Uzbekistan (Table 1). The obtained results were compared with the amino acid composition of the roots and leaves of the same species growing in the Sokh District of the Fergana Region.

Materials and Methods – Isolation of Free Amino Acids. Proteins and peptides were precipitated from the aqueous extracts of the samples in centrifuge tubes. For this purpose, 1 ml of the test sample was mixed with 1 ml of 20% trichloroacetic acid (TCA). After 10 minutes, the precipitate was separated by centrifugation at 8,000 rpm for 15 minutes. Subsequently, 0.1 ml of the supernatant was collected and lyophilized.The hydrolysate was evaporated to dryness, and the dry residue was dissolved in a mixture of triethylamine, acetonitrile, and water (1:7:1) and then dried. This procedure was repeated twice to ensure complete neutralization of the acid. Phenylthiocarbamyl (PTC) derivatives of amino acids

were prepared by reaction with phenylisothiocyanate according to the method of Steven A. and Cohen Daviel [6]. The amino acid derivatives were analyzed using HPLC. HPLC Conditions: An Agilent Technologies 1200 chromatograph equipped with a diode-array detector (DAD) and a 75 4.6 mm Discovery HS C18 column was used. Mobile phase A consisted of 0.14 M sodium acetate (CH_3COONa) containing 0.05% triethylamine (TEA), adjusted to pH 6.4, while mobile phase B was acetonitrile (CH_3CN). The flow rate was maintained at 1.2 ml/min, and detection was performed at 269 nm. The gradient elution program for mobile phase B was as follows: 1–6% B from 0 to 2.5 min; 6–30% B from 2.51 to 40 min; 30–60% B from 40.1 to 45 min; 60% B from 45.1 to 50 min; 60–0% B from 50.1 to 55 min.

Results and Discussion. Table 1 presents the qualitative and quantitative data on the amino acid composition of the roots, leaves, flowers, and seeds of *Mogoltavia sewerzowii* collected in April 2025 from the Fergana District of Uzbekistan. The analyses were carried out at the Physical Research Laboratory of the Institute of Bioorganic Chemistry, Academy of Sciences of the Republic of Uzbekistan.

Table 1.

Amino Acid Composition of *Mogoltavia sewerzowii* Collected from the Fergana Region of Uzbekistan

№	Amino Acid Name	Concentration (mg/g)			
		Root	Leaf	Flower	Seed
1	Glutamic acid	11.117529	4.345478	13.639	8.276
2	Serine	1.006053	3.037112	5.060	3.093
3	Glycine	6.208776	0.881786	11.424	9.933
4	Asparagine	2.441311	4.119647	9.670	6.495
5	Glutamine	2.265476	24.44262	9.649	6.508
6	Cysteine	2.978088	16.55432	4.691	5.102
7	Threonine	12.44574	8.040984	0.559	0.332
8	Arginine	1.66986	1.555917	31.447	23.176
9	Alanine	4.150498	1.663265	1.257	0.726
10	Proline	0.999179	1.237458	16.853	6.758
11	Tyrosine	26.77142	3.345808	74.108	11.695
12	Valine	1.228431	0.781781	4.400	2.451
13	Methionine	2.994849	0.892414	8.050	2.468
14	Histidine	2.785077	0.877277	2.686	4.320
15	Isoleucine	0.880297	2.994002	6.684	5.013
16	Leucine	2.115916	2.960411	5.276	2.208
17	Tryptophan	2.127578	0.451968	9.405	4.370
18	Phenylalanine	1.123985	0.988301	3.350	6.022
19	Lysine	1.014951	0.344943	6.832	5.891

20	Glutamic acid	1.026513	0.766513	0.314	0.304
Total		**77,35152**	**80,28200**	**225.354**	**115.141**

The analysis of the amino acid composition of the roots, leaves, flowers, and fruits of *Mogoltavia sewerzowii* collected in April 2025 from the Fergana District of Uzbekistan revealed that the roots of the plant (Figure 1) contain 20 different amino acids that are important for living organisms. Among these, serine, asparagine, cysteine, arginine, leucine, isoleucine, proline, and valine were found in relatively high concentrations. In particular, proline and cysteine were the most abundant amino acids. A similar pattern was observed in samples collected in May 2025 from the Sokh District of the Fergana Region, with only minor differences in the concentrations of the detected amino acids. Proline is an important amino acid involved in the synthesis of collagen, which is essential for maintaining the health of the skin, joints, and connective tissues. It contributes to the strengthening of connective tissue and supports immune system function. Therefore, the roots of *Mogoltavia sewerzowii* may serve as a potential natural source of amino acids for collagen synthesis.

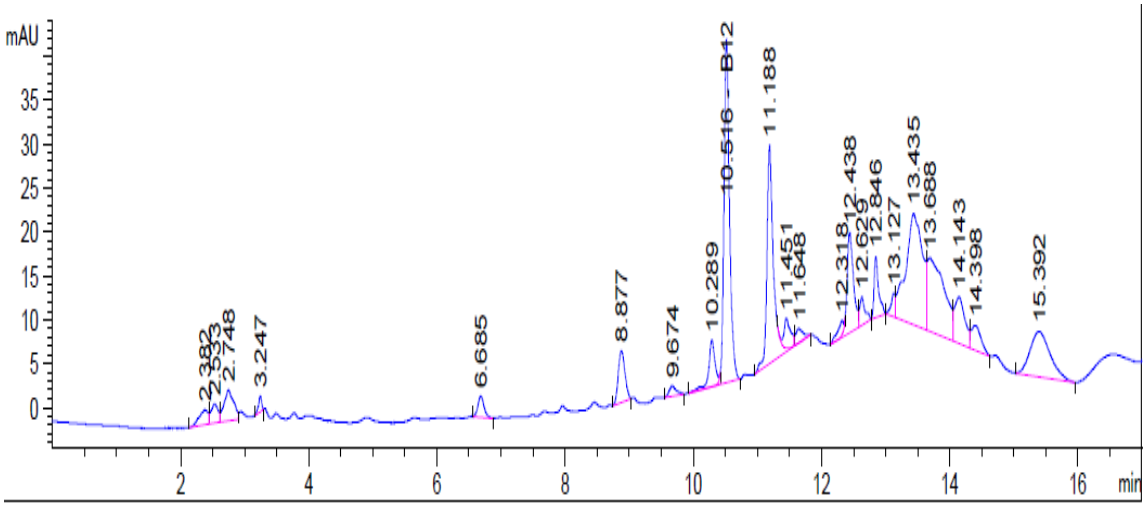


Figure 1. Chromatogram of amino acids detected in the roots of *Mogoltavia sewerzowii*.

Qualitative analysis of the amino acid composition of the leaves of *Mogoltavia sewerzowii* collected in April 2025 from the Fergana District of Uzbekistan revealed the presence of 20 different amino acids (Figure 2). Among these, asparagine, glutamine, and cysteine were found in relatively high concentrations in the leaves. Asparagine is a non-essential amino acid that is a constituent of proteins and plays an important role in cellular metabolism. It is involved in protein synthesis, supports the normal functioning of the immune and nervous systems, and contributes to various metabolic processes, including detoxification. Since the leaves of *Mogoltavia sewerzowii* contain a considerable amount of asparagine, they may serve as a potential natural source of this amino acid and could be considered for the development of dietary supplements aimed at supporting normal metabolic functions.

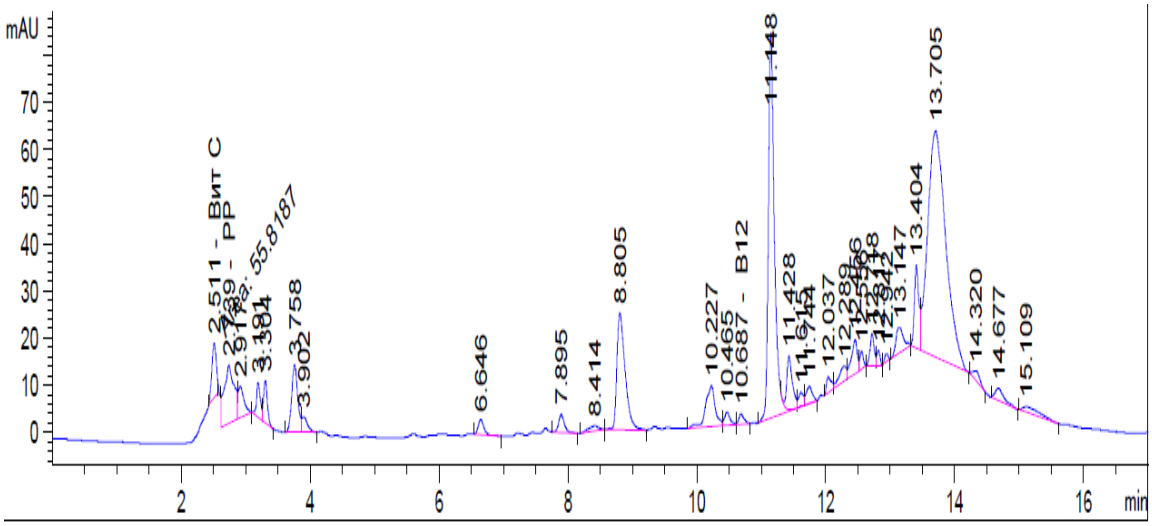


Figure 2. Chromatogram of amino acids detected in the leaves of *Mogoltavia sewerzowii*.

The flowers of *Mogoltavia sewerzowii* were found to be particularly rich in amino acids. A total of 20 amino acids were identified in the flowers, with many of them occurring in relatively high concentrations. These included aspartic acid, serine, glycine, asparagine, threonine, alanine, proline, and leucine. Among the detected amino acids, proline and threonine were present in the highest amounts. Proline was found to be most abundant in the roots of the plant, although it was also detected in considerable quantities in the leaves and fruits. The high concentration of proline in the flowers suggests that this plant organ may serve as a valuable natural source of amino acids involved in collagen synthesis.

The amino acid chromatogram of the flowers of *Mogoltavia sewerzowii* is presented in Figure 3. The chromatogram shows that threonine was the second most abundant amino acid detected in the flowers. Threonine is an essential amino acid that plays an important role in protein synthesis and contributes to the maintenance of normal immune function, as well as the health of the liver, muscles, and mucosal tissues. Therefore, the flowers of *Mogoltavia sewerzowii* may also be considered a potential source of biologically active compounds for the development of products aimed at supporting immune function.

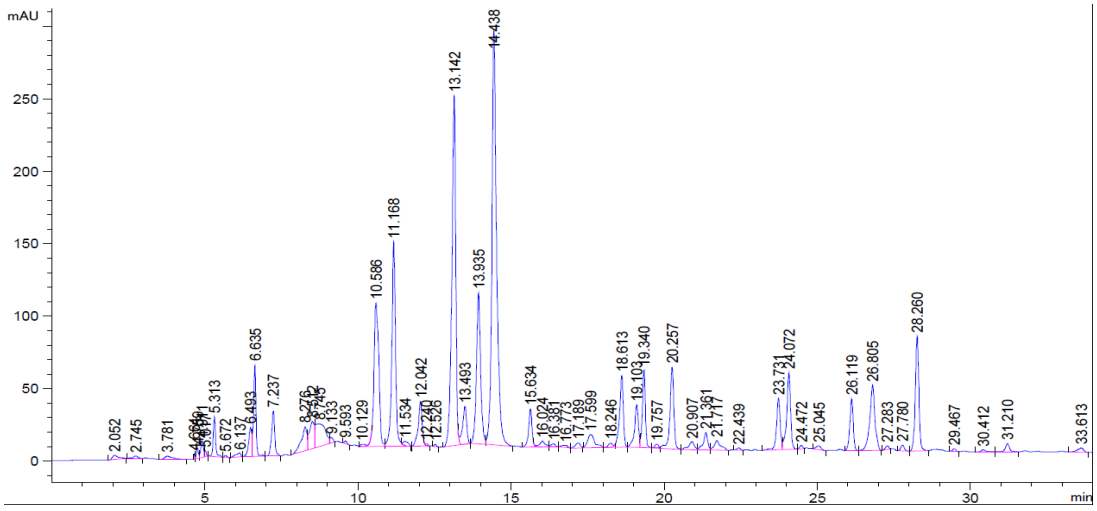


Figure 3. Chromatogram of amino acids detected in the flowers of *Mogoltavia sewerzowii*.

The qualitative amino acid composition of the seeds of *Mogoltavia sewerzowii* is similar to that of other plant organs, with only minor differences in the quantitative content. The seeds, like the flowers, contain appreciable amounts of amino acids such as aspartic acid, serine, threonine, and proline.

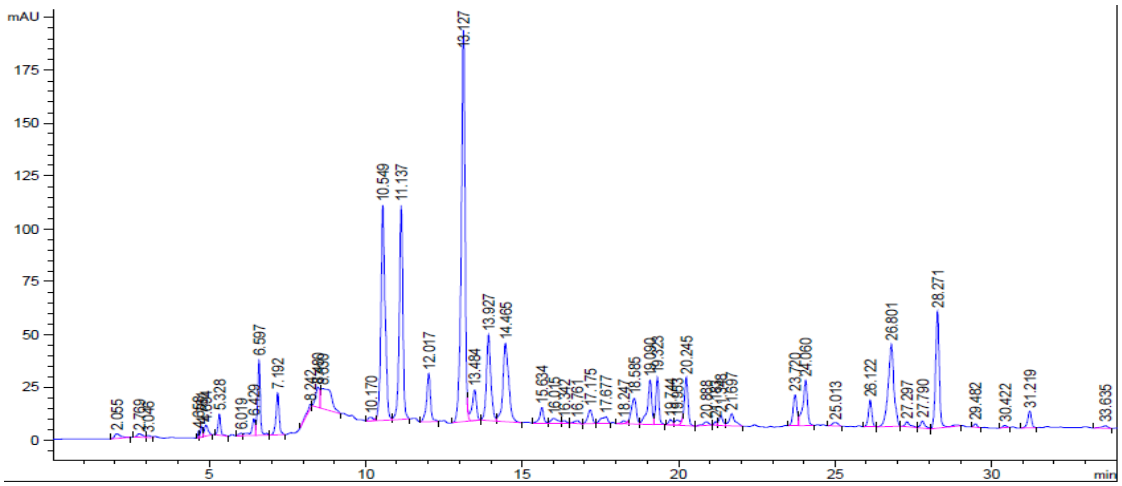


Figure 3. Chromatogram of amino acids detected in the seeds of *Mogoltavia sewerzowii*.

Conclusion. *Mogoltavia sewerzowii* is an endemic species of the flora of Uzbekistan, and its chemical composition has not been previously investigated. The present authors have also, for the first time, studied its flavonoids, water-soluble vitamins, and elemental composition.

The first investigation of the amino acid composition of different organs of *Mogoltavia sewerzowii* collected from the mountainous regions of two districts in the Fergana Region indicates that this plant is a rich source of amino acids. In particular, amino acids such as proline, threonine, and asparagine are present in considerable amounts, suggesting the presence of important physiologically active compounds. The qualitative amino acid composition of samples obtained from both locations was found to be similar, differing only in quantitative content. In other words, certain amino acids were present in higher amounts in the plants collected from the Uzbek district compared to those from the Sokh District. Amino acids were found to be more concentrated in the seeds, and especially in the flowers, than in the roots and leaves of the plant. Therefore, in the future, it may be possible to develop biologically active dietary supplements from the flowers and seeds of this plant. In this regard, further pharmacological studies based on the biologically active compounds of *Mogoltavia sewerzowii* are planned. The results of these pharmacological investigations, as well as information on the dietary supplement “XON-KORON” prepared from *Mogoltavia sewerzowii*, will be presented in future publications.

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