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Phytochemical Study of Leaves of Common Peach (Persica Vulgaris Mill.) Growing In Karakalpakstan

Abdurasulieva Gulshad Makhsetbayevna
Karakalpakstan Medical Institute, Uzbekistan

Farmanova Nodira Takhirovna
Tashkent Pharmaceutical Institute, Uzbekistan

Berdimbetova Gulsara Esenovna
Karakalpakstan Branch of the Academy of Sciences of the Republic of Uzbekistan Karakalpak Scientific Research Institute of Natural Sciences, Uzbekistan

Khojambergenova Piryuza
Karakalpakstan Medical Institute, Uzbekistan

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Abstract: This work presents the results of the determination of bioactive substances in the dry extract of common peach leaves growing in the Kungirat district of the Republic of Karakalpakstan and their bioactivity (anti-inflammatory and antitumor, immunomodulatory). In carrying out the research work, traditional and modern physicochemical research methods were used: thin-layer chromatography, high-performance liquid chromatography, inductively coupled plasma mass spectrometry, liquid chromatography-mass spectrometry with processing using the

PubChem substance database using the MestReNova program. As a result of the analysis, the chemical nature and amount of biologically active substances (flavonoids, amino acids, vitamins, organic acids, amygdalin, furocoumarin) in the dry extract of common peach leaves were determined.

Keywords: Common peach, dry extract, flavonoids, amino acids, vitamins, organic acids, amygdalin, furocoumarin.

Introduction: Today, much attention is paid to research on medicinal plants, which contain biologically active substances that are necessary for human health and are used to prevent and treat various diseases. Preparations of biologically active compounds obtained from plant sources are distinguished by their safe and long-term use, and the combined effect of natural compounds makes them more effective than synthetic drugs. It is known that the effectiveness of natural drugs is explained by the specific biological activity of flavonoids, essential oils, polysaccharides, vitamins and other compounds contained in them. Chemical research of plants containing biologically active compounds and the creation of drugs for medical practice on their basis are of particular importance.

It is believed that ordinary peach leaves contain these biologically active substances, and an analysis of scientific literature data showed that Abu Ali ibn Sina used peach leaves as an anti-inflammatory, to treat difficult-to-heal wounds, and to

treat cancer.

Research objective: To analyze the bioactive compounds in the dry extract of common peach leaves.

Materials and methods. Common peach leaves were collected in September 2023 in Kungirat district of the Republic of Karakalpakstan and brought to standard

conditions. Dry extract (70% ethanol) was obtained in laboratory conditions. The obtained dry extract was a dark green-brown hygroscopic powder with a characteristic odor.

When the biologically active substances in the tested object were analyzed using thin layer chromatography and high-performance liquid chromatography/mass spectrometry (LC/MS), it was found that it contained flavonoids, coumarins, terpenoids. Amino acids, organic acids, amygdalin and vitamins were determined by high-performance liquid chromatography, and elemental analysis was determined by inductively coupled plasma mass spectrometry.

Results of the research and their discussion. The results of the analysis of chemical compounds in the dry extract of common peach leaves are presented in Figure 1.

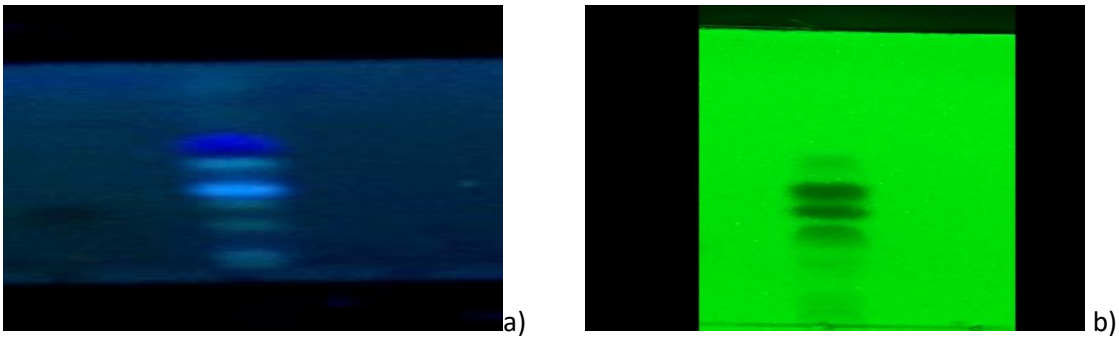

Figure 1. The process of separation of substances in the dry extract of leaves of common peach (Persica vulgaris Mill.) by thin layer chromatography (TLC). a) 366 nm; b) 254 nm.

Analysis by thin-layer chromatography revealed that common peach leaves contain terpenoids (black) and their glycosides, coumarins (blue) and their glycosides, and flavonoids (yellow) and their glycosides.

The compounds in common peach leaves, as analyzed by high-performance liquid chromatography mass spectrometry (LC/MS), include flavonoids (hyperoside, rutin, kaempferol, isorhamnetin, apigenin), epigallocatechin, organic acids (oxalic, citric, gallic), and furocoumarin (psoralen) as shown in Figure 2.

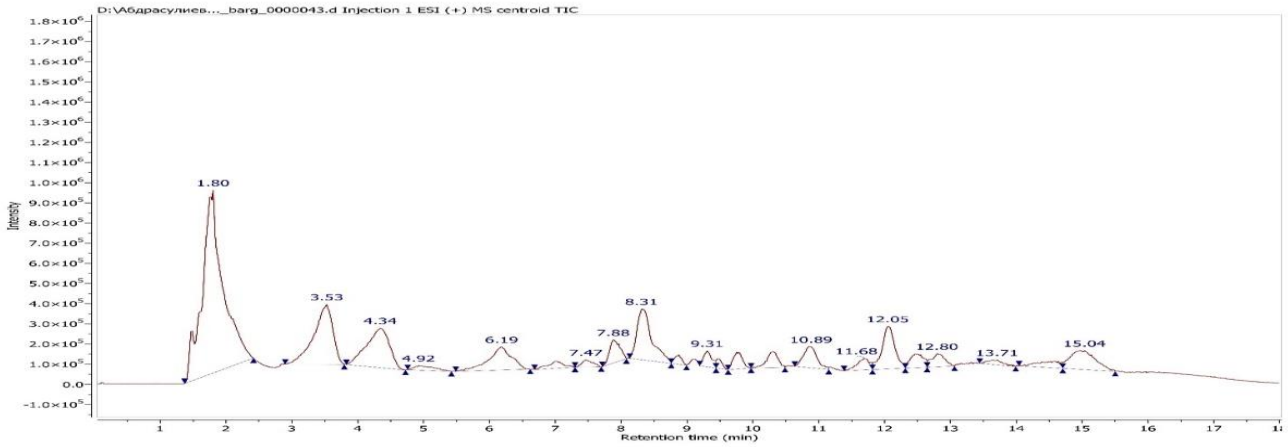

Figure 2. Chromatogram of dry extract of common peach (Persica vulgaris Mill.) leaves

High-performance liquid chromatography analysis revealed that common peach (Persica vulgaris Mill.) leaves contain flavonoids and their glycosides (Figure 3) [1,5].

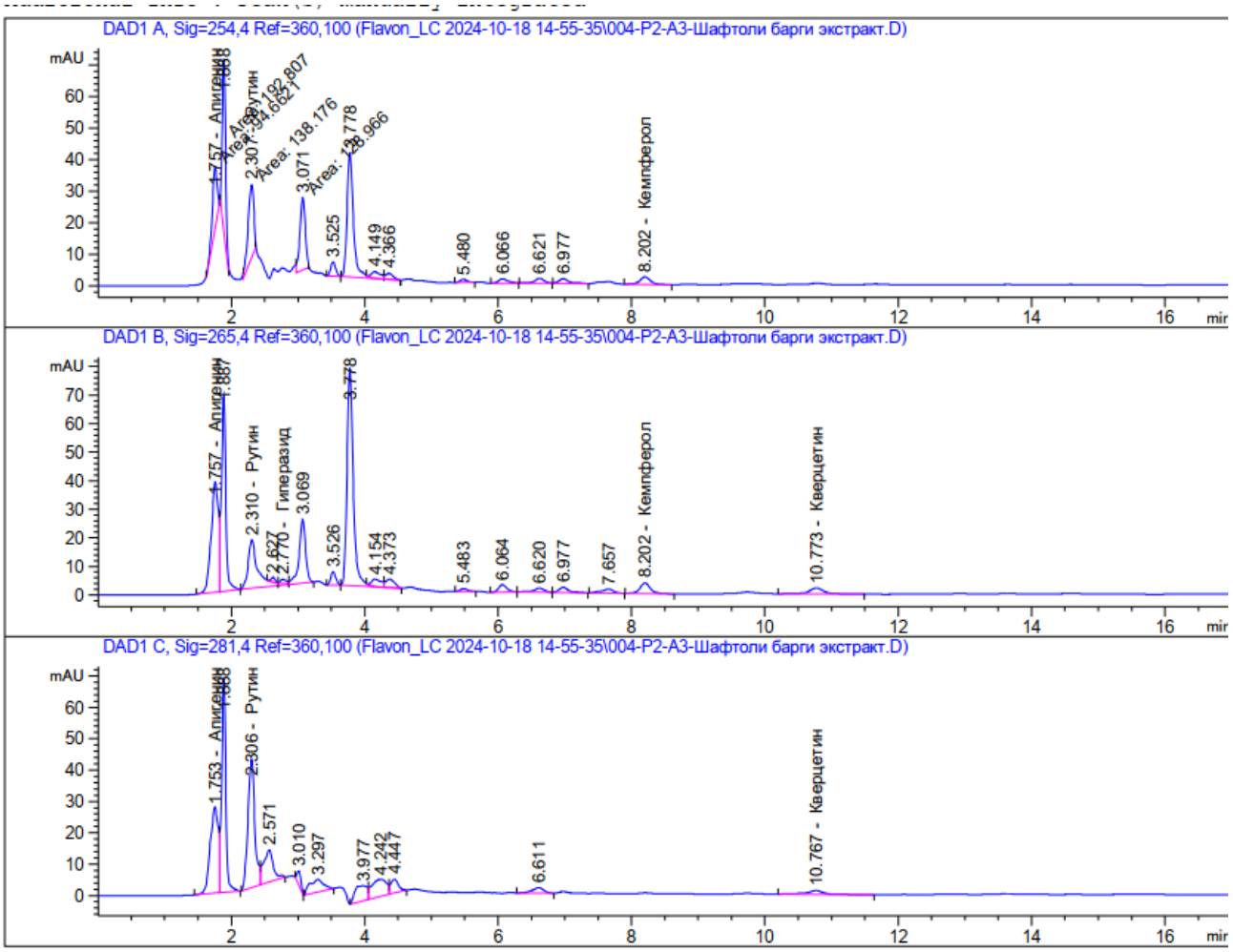

Figure 3. YuSSX chromatogram of flavonoids in the dry extract of common peach (Persica vulgaris Mill.) leaves

For the first time, as a result of the conducted research, it was found that the dry extract of common peach (Persica vulgaris Mill.) leaves contains rutin (164.448 mg/g), quercetin (37.521 mg/g), hyperoside (0.835 mg/g), apigenin (11.604 mg/g) and kaempferol (5.654 mg/g). It was found that the quantitatively dominant flavonoid in the dry extract under study was rutin (164.448 mg/g). Considering that rutin exhibits effective effects in a number of diseases (including antitumor, antioxidant) and has no side effects, this compound and medicinal plant raw materials containing it can be recommended as a promising source [2].

The leaves of common peach (Persica vulgaris Mill.) were found to contain 20 free amino acids, of which eight were essential (valine, methionine, phenylalanine, threonine, leucine, isoleucine, lysine, tryptophan), two were partially essential (histidine and arginine), and 10 were exchangeable amino acids (alanine, asparagine, glutamine, asparagine and glutamic acids, proline, glycine, cysteine, tyrosine, serine). The total amount of amino acids was 29.05 mg/g (2.9 %), of which 6.8861 mg/g (0.69%) were essential amino acids, taking into account the share of histidine. Exchangeable amino acids, taking into account the share of arginine, were 22.16 mg/g (2.22%) [3].

The chromatogram of amino acids in the leaves of common peach (Persica vulgaris Mill.) is presented in Figure 4.

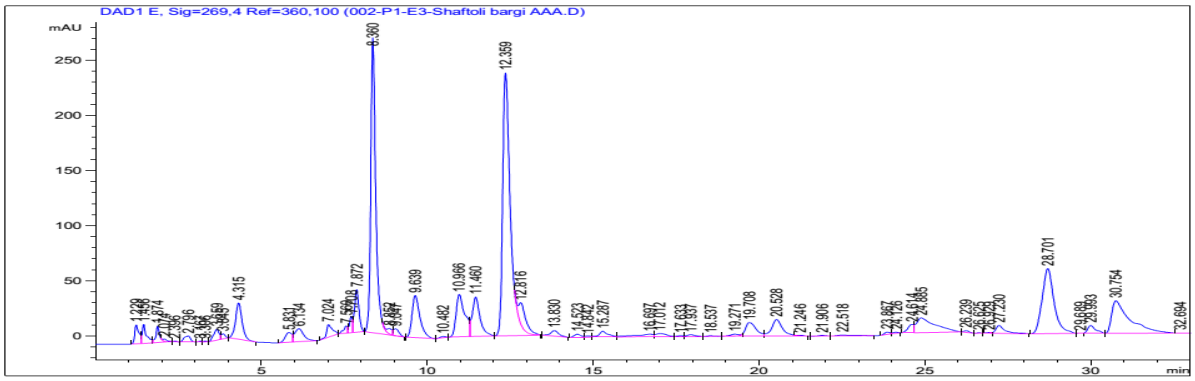

Figure 4. YUSSX chromatogram of amino acids in the leaves of common peach (Persica vulgaris Mill.)

The analysis revealed that the dry extract of common peach (Persica vulgaris Mill.) leaves contained 0.04 mg/g of amygdalin (15.976 ppm) (Figure 5).

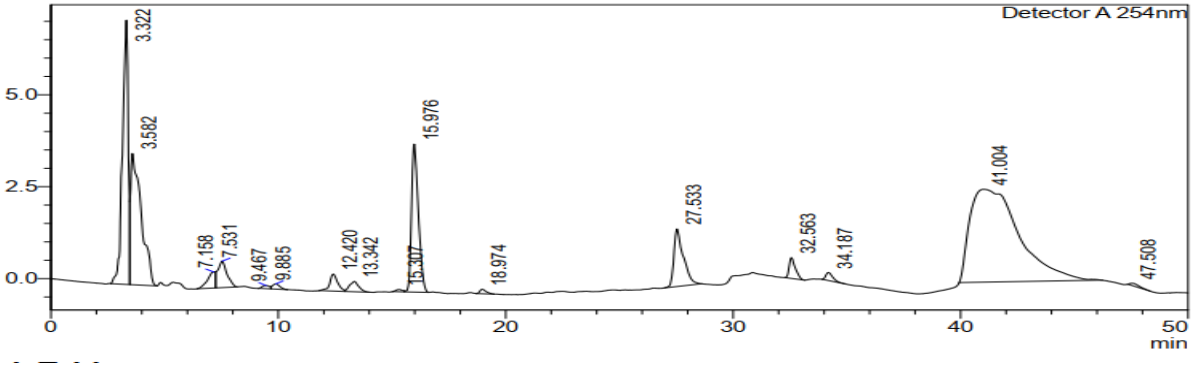

Figure 5. HPLC chromatogram of amygdalin in the dry extract of common peach (Persica vulgaris Mill.) leaves

The results of a study conducted on the qualitative and quantitative analysis of vitamins in the leaves of common peach (Persica vulgaris Mill.) using the YuSSX method are presented in Figure 6.

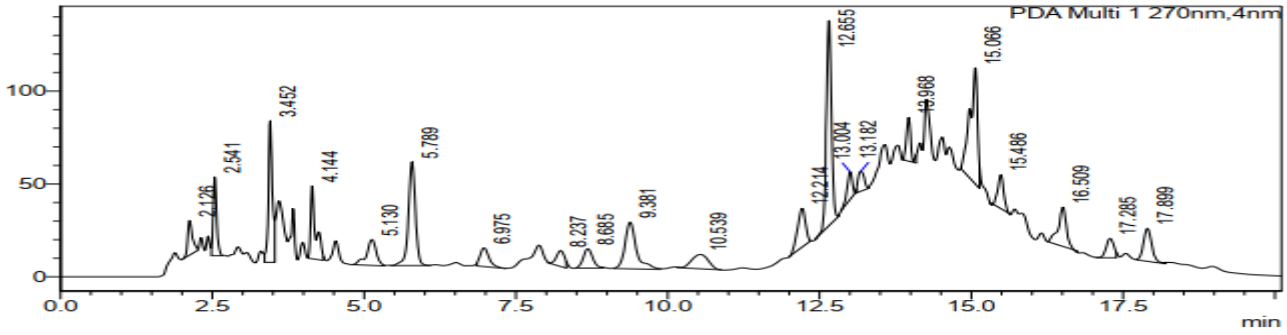

Figure 6. Chromatogram of vitamins in dry extract of common peach (Persica vulgaris Mill.) leaves

The analysis revealed that six water-soluble vitamins, namely C, PP and B vitamins (B1, B2, B6, B12), were present in the samples tested. The content of vitamins in the dry extract (4.57 mg/g) was three times higher than the content of vitamins in the leaves (1.57 mg/g) [4].

The results of the analysis of organic acids in the dry extract of common peach (Persica vulgaris Mill.) leaves using the YuSSX method for determining the presence of organic acids (oxalate, citric, succinic) are presented in Figure 7.

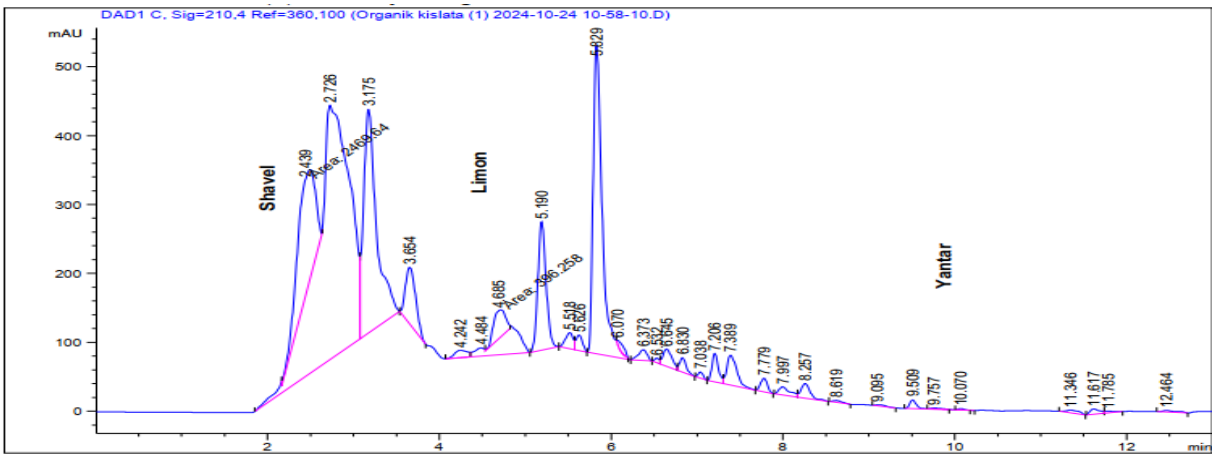

Figure 7. Chromatogram of organic acids in the dry extract of common peach (Persica vulgaris Mill.) leaves.

The analysis revealed the presence of oxalate (96.54 mg/g), citric (29.12 mg/g), and amber (8.41 mg/g) organic acids in the dry extract samples of common peach (Persica vulgaris Mill.) leaves.

Conclusions

1. For the first time, the chemical composition of the leaves of common peach (Persica vulgaris Mill.) grown in the climatic conditions of soil salinity of the Republic of Karakalpakstan was studied. As a result of studying the composition of flavonoids, the main active compounds in the composition of the leaves of the plant using the YuSSX and YuSSX-MS methods, it was shown that it contains rutin, quercetin, apigenin, kaempferol, hyperoside, epigallocatechin, isorhamnetin, and it was proven that rutin is the compound that prevails over the sum of flavonoids.

2. It was found that the leaves of common peach (Persica vulgaris Mill.) contain 20 free amino acids, of which 8 are essential, 2 are partially essential, and 10 are essential amino acids. 44 macro- and microelements were detected in the leaves of the plant using the inductively coupled plasma mass spectrometry (ISP-MS) method, and it was proved that K and Ca predominate among them, and the amount of K is almost 2 times higher than Ca and 21 times higher than Na. It was substantiated that the amount of toxic elements in the composition does not exceed the permissible standards for a living organism.

3. Water-soluble vitamins C, PP and B group vitamins (B1, B2, B6, B12) were found in the leaves of common peach (Persica vulgaris Mill.). The amount of vitamins in the dry extract was three times higher than the amount of vitamins in the leaves. The leaves of the plant were found to contain organic acids - oxalic, citric, and succinic.

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