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ASSESSMENT OF THE MEDICINAL PROPERTIES OF QARIQIZ PLANT THROUGH CHEMICAL COMPOSITION

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Abstract

The article analyzes the chemical composition of elderberry plant, its importance for human health, and the amount of water-soluble vitamins and flavonoids in the plant extract using HPLC. The amount of vitamins increases in the order $B_6<B_1<B_3$, and the amount of rutin and apigenin is higher than the rest of the flavonoids.

How to Cite

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INTRODUCTION

Many medicinal preparations used in folk medicine and medicine are extracted from plants or prepared from them. All medicinal plants contain various amounts of alkaloids, glycosides, flavonoids, essential oils, vitamins and other substances necessary for human health. One of the plants with similar properties is the sedum plant. Elderberry is a natural medicinal plant that is traditionally widely used in the treatment of diseases. information on it is cited in the literature[1,2].

Qariqiz belongs to the marigold family and is a wild 2-year herb with a height of 60-180 cm. The root is an arrow root, few branches, the stem is erect, the flowers are shield-shaped, bisexual. The fruit is elongated and smooth-edged. It blooms in July-August, the fruits ripen in September. This plant grows well in shady and shady areas, near residential areas, in gardens and fields on roadsides with sufficient moisture. It reproduces with the help of seeds [3].

Qariqiz is a medicinal plant widely used in folk medicine, and we can draw a conclusion about its healing properties by analyzing its chemical composition. According to the literature, this plant is rich in vitamins and minerals, it contains vitamins C, B1, B3, B6, as well as minerals such as iron, potassium, calcium, and magnesium, as well as various flavonoids. These substances reduce the risk of cardiovascular diseases, cancer and other inflammatory diseases. Especially the amount of vitamin

B6 is very high, which strengthens the body's immune system and increases the ability to fight against infections such as colds and flu.

Polyphenols and flavonoids in elderberry plant are useful in alleviating the negative symptoms of arthritis, rheumatism and other inflammatory diseases in the body[4,5].

The aqueous extract of the plant contains 14,7 mg of rutin flavanoid per 100 g, and this substance is important for human health. Rutin is a bioflavanoid found in many plants, and in medicine, it acts as an antioxidant, anti-inflammatory and anti-viral blood vessel protection.

In folk medicine, the roots and leaves of the plant are used to treat many diseases. It has been studied by researchers that boiling the elderberry plant and then drinking it has a very effective effect in the treatment of fibroids [6,7].

Based on the above information, we determined the amount of water-soluble vitamins and flavonoids contained in the extract of the sorghum plant in the "Folk Medicine and Product Chemistry" laboratory of the Andijan State University using the "High Performance Liquid Chromatography" method.

EXPERIMENTAL PART

Determining the amount of vitamins in the old extract by the HELX method

Reagents and equipment. Vitamin B_{12} was obtained from "Rhydburg Pharmaceuticals" (Germany), vitamin C from "Carl Roth GmbH" (Germany), B9 from "DSM Nutritional Products GmbH" (Germany), vitamins B_1, B_2, B_3, B_6, PP from "BLDPharm" (China). HPLC grade water, acetonitrile, chemically pure grade acetic acid and sodium hydroxide reagents were used.

The amount of water-soluble vitamins in the plant was determined using a LC-40 Nexera Lite high-performance liquid chromatograph manufactured by Shimadzu, Japan.

Preparation of standard solutions. C (CAS 50-81-7), B_1 (CAS 59-43-8), B_6 (CAS 58-56-0), B_3 (CAS 59-67-6), B_{12} (CAS 68–19–9) and Solutions of PP (CAS 98-92-0) vitamins (100 mg/l) are prepared by dissolving 5 mg of each vitamin in 50 ml of 0.1 N HCl solution. Standard solutions of vitamins B_2 (CAS 83-88-5) and B_9 (CAS 59-30-3) were prepared by dissolving 5 mg of these vitamins in 50 ml of 0,025% sodium hydroxide solution. Then, 200 µl of the initial B_1, B_6, B_3, B_{12}, PP vitamins were mixed and a solution with a concentration of each vitamin of 14,286 mg/l was prepared. In this way, standard solutions of 7,143, 3,571, 1,786 mg/l were prepared. Standard solutions of vitamin C with concentrations of 286, 143, 71,5, 57,2 mg/l were also prepared. Pure water for a concentration of 0 mg/l was used to make a calibration graph.

Preparation of sample extract. For the extraction of water-soluble vitamins, 1 g of the tested sample was measured, placed in a 50 ml conical flask, and 25 ml of 0,1 N HCl solution was added. The mixture was extracted in an ultrasonic bath of GT SONIC-D3 (China) at a temperature of 60ºC for 20 minutes. Then the mixture was cooled, filtered and made up to 25 ml with water in a volumetric flask. 1,5 ml of the extract was filtered through a 0,22 µm syringe filter and placed in a vial and used for analysis.

Chromatographic conditions

Identification of vitamins. Standard solutions and sample extracts LC-40 Nexera Lite high performance liquid chromatograph consisting of LC-40D pump, SIL-40 autosampler, SPD-M40 photo-diode array detector (PDA) and LabSolutions ver. 6,92 software was analyzed. Shim pack GIST C18 (150 × 4,6 mm; 5 µm, Shimadzu, Japan) reversed-phase column and a gradient mobile phase consisting of acetonitrile (A) and a 0,25% solution of acetic acid in water (B) (Table 1) was used. The injection volume was set at 10 µL, the flow rate at 0,6 mL/min, and the column thermostat temperature at 40°C. Analytical signal (peak area) of each vitamin was recorded at three wavelengths 265, 291, 550 nm (Figures 1-3). A 15-minute gradient was used to determine vitamin C (Table 2) and the analytical signal was measured at a wavelength of 265 nm.

Table 1

A mobile phase gradient program in the determination of vitamins.

time, minute	Acetonitrile (A), %	0.5% acetic acid (B), %
0	0	100
3	0	100
14	20	80
17	50	50
18	0	100
25	Finish	

Table 2

A mobile phase gradient program for the determination of vitamin C

Time, minute	Acetonitrile (A), %	0.5% acetic acid (B), %
0	0	100
2	0	100
6	50	50
6,01	0	100
15	Finish	

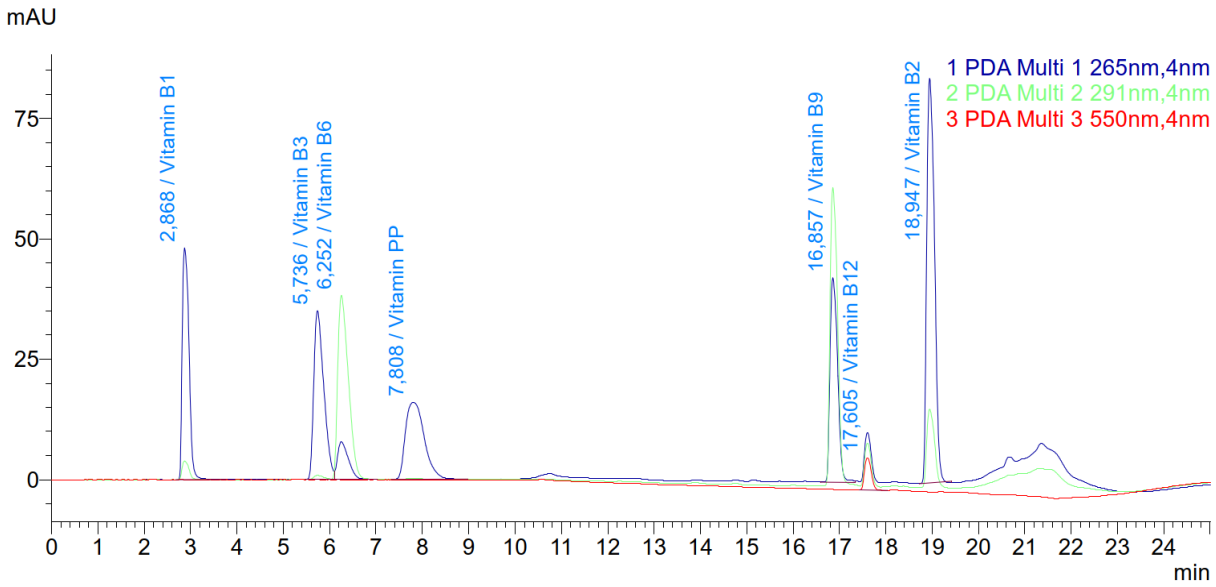


Figure 1. Chromatogram of standard solution of vitamins

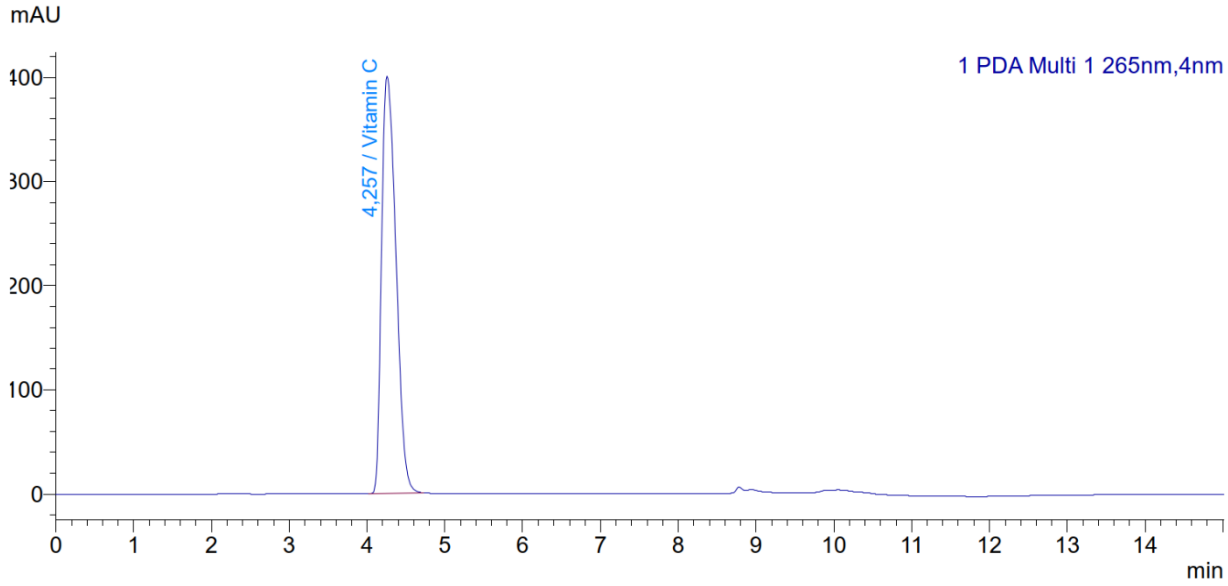


Figure 2. Chromatogram of Vitamin C standard solution

The amount of phenolic compounds in the extract of the Qariqiz
Determination by the HELX method

Reagents and equipment. Gallic acid from "Macklin" (China), salicylic acid from "Rhydburg Pharmaceuticals" (Germany), quercetin, apigenin, kaempferols from "Regal" (China), rutin from natural sources were isolated by extraction and column chromatography methods. HPLC grade water, acetonitrile, chemically pure grade acetic acid and sodium hydroxide reagents were used.

The amount of polyphenols in the plant was determined using a LC-40 Nexera Lite high-performance liquid chromatograph manufactured by Shimadzu, Japan.

Preparation of standard solutions. Gallic acid (5,2 mg), salicylic acid (5,2 mg), rutin (5 mg), quercetin (5 mg), apigenin (5 mg), kaempferol (5 mg) were dissolved in 96% ethanol in an ultrasonic bath for 20 minutes and transferred to a 50 mL flask and made up to the mark with ethanol. 200 µl of each solution was taken and mixed and a total of 4 different solutions were prepared by diluting them. Each solution was poured into a vial and used for analysis.

Preparation of plant extract. For the extraction of phenolic compounds, 1 g of the tested sample was weighed with an accuracy of 0,01 g on a NV222 scale manufactured by the OHAUS company (USA), placed in a 50 ml conical flask, and 25 ml of 96% ethanol was added. The mixture was extracted in an ultrasonic bath of GT SONIC-D3 (China) at a temperature of 60°C for 20 minutes. Then the mixture was cooled, filtered and made up to 25 ml with ethanol in a volumetric flask. 1,5 ml of the extract was centrifuged at 7000 rpm in a Mini-7 centrifuge (BIOBASE, China) and filtered through a 0,45 µm syringe filter and used for analysis.

Chromatographic conditions

Determination of phenolic compounds. Standard solution, sample extract Shim pack GIST C18 (150 × 4,6 mm; 5 µm, Shimadzu, Japan) reverse phase column and a gradient mobile phase consisting of acetonitrile (A) and 0,5% acetic acid in water (B) (Table 1) was used. The injection volume was set at 10 µl, the flow rate at 0,5 ml/min, and the column thermostat at 40°C. The analytical signal (peak area) of phenolic compounds was recorded at 300 nm (Fig. 3).

Table 3

Mobile phase gradient software

Time	Acetonitrile (A), %	0,5 % acetic acid (B), %
0	5	95
5	5	95

17	40	60
22	40	60
22,1	5	95
40	Finish	

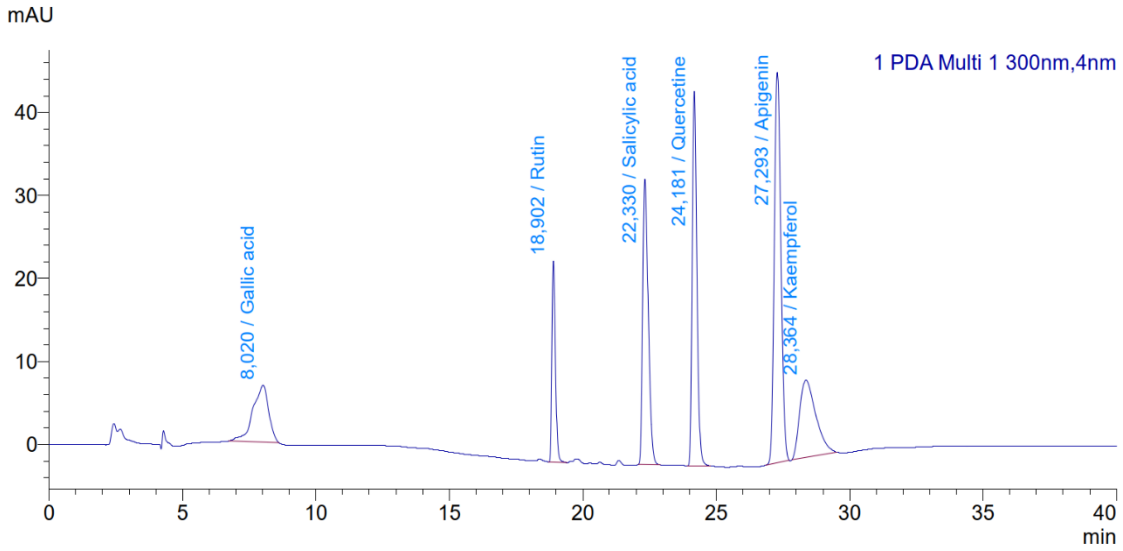


Figure 3. Chromatogram of standards at 300 nm

RESULTS AND THEIR DISCUSSION

A group of Russian scientists led by L.A.Bagdanova developed a methodology for determining water-soluble vitamins in premixes (food additives) and developed conditions for obtaining vitamins, chromatographic separation and determination (relative error 10%) that ensure the necessary accuracy of premix analysis [8,9 ,10,11].

A group of scientists from Moscow State University led by A.V.Pirogov developed a method for the simultaneous determination of 14 different water-soluble vitamins by the HELX method [12].

We managed to determine the amount of water-soluble vitamins contained in the extract of the sorghum plant in the conditions of Andijan region using the HELX method.

Determination of vitamins in Qariqiz

A chromatogram of the sample extract (Figures 4,5) was obtained, and based on the results, the amounts of vitamins in 100 g of the sample were calculated using the following formula and presented in Table 4.

$$X = \frac{C_{vit} \cdot V_{extract}}{m_{sample}} \cdot 100\ g$$

Here, X is the amount of vitamins in 100 grams of the plant, mg;

C_{vit} - the concentration of the vitamin in the extract determined by the HELX method, mg/l;

$V_{extract}$ - sample extract volume sample - extract preparation, l;

sample mass withdrawn for.

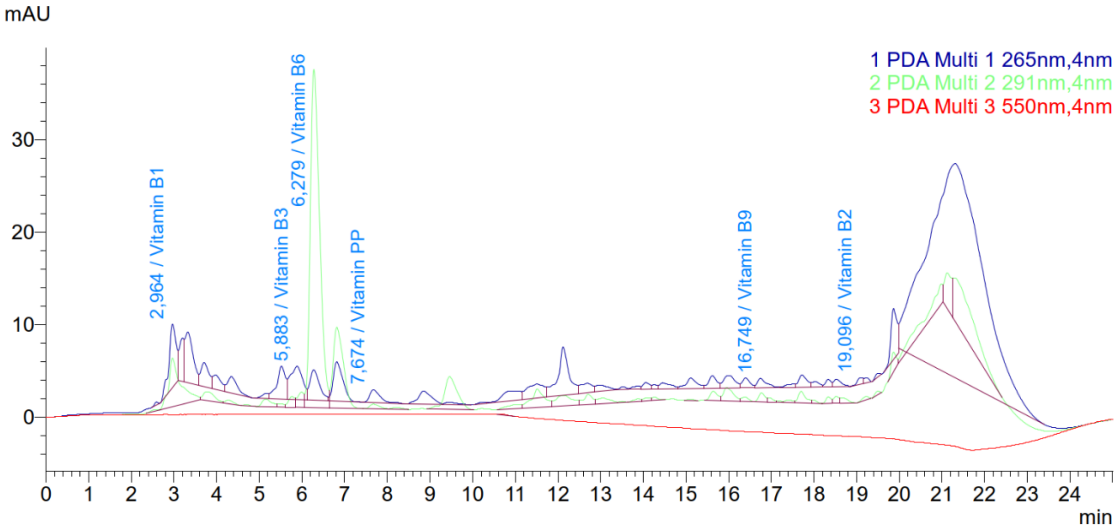


Figure 4. Chromatogram for determination of vitamins in Qariqiz.

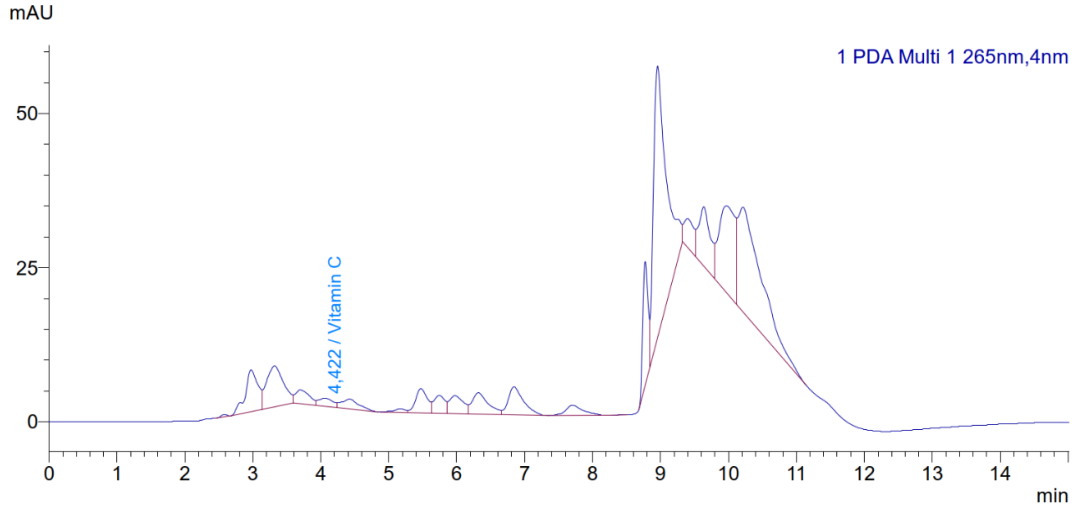


Figure 5. Chromatogram for determining the amount of vitamin C in elderberry extract.

Table 4

Amount and retention times of vitamins in the extract

Vitamin	Retention time, sec	Concentration, mg/l	Amount per 100g sample, mg
Vitamin B_1	2,964	2,481	6,203
Vitamin B_3	5,883	1,94	4,850
Vitamin PP	7,674	0,793	1,983
Vitamin B_9	16,749	0,465	1,163
Vitamin B_2	19,096	0,364	0,910
Vitamin B_6	6,279	13,086	32,715
Vitamin B_{12}	Not found	0	0,000
Vitamin C	4,422	1,202	3,005

If we analyze the chromatogram of vitamins contained in the elderberry plant extract (Figures 4, 5), we can see that the peaks of vitamins B_6, B_1 and B_3 are clearly visible among the 7 different peaks of vitamins identified in the chromatogram of vitamins. The chromatogram determined from the composition of the extract indicates that vitamin B_{12} was not detected[13].

Due to the abundance of vitamins B_6, B_1 and B_3 in the composition of the elderberry plant, vitamin B1 (thiamine) plays an important role in the metabolism of carbohydrates, proteins and fats, and in the processes of excitation of the nervous system. plays Vitamin B_3 protects skin cells from the effects of the sun, helps prevent some types of skin cancer, is considered the main treatment factor for Pellagra, and vitamin B_6 regulates protein and fat metabolism, fights against nerve and skin diseases, and It is emphasized in the books of folk medicine and medicine encyclopedia that it can eliminate nausea[14].

The results of determining the amount of phenolic compounds in the extract of Qariqiz.

We managed to determine the amount of polyphenols contained in the extract of the plant of the plant grown in the conditions of Andijan region using the HELX method. For this purpose, a chromatogram of the extract in ethyl alcohol prepared from a sample of 1 g of the plant was obtained (Fig.6), and the results were processed and presented in Table 5.

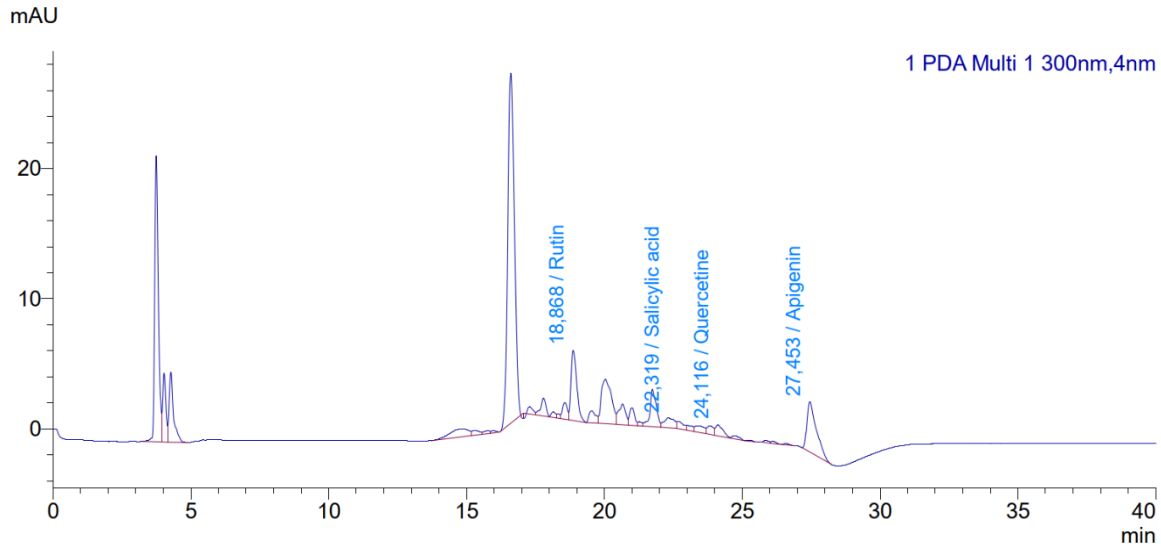


Figure 6. Chromatogram for the determination of polyphenols in the sample extract.

Table 5

Amount and retention times of polyphenols in the extract

Phenol compound name	Retention time, sec	Concentration, mg/l	Amount per 100g sample, mg
Gallic acid	Not found	0	0,000
Routine	18,868	5,878	14,695
Salicylic acid	22,319	0,701	1,753
Quercetin	24,116	0,485	1,213
Apigenin	27,453	1,925	4,813
Kaempferol	Not found	0	0,000

If we analyze the chromatogram of polyphenols determined from the content of the 96% ethanol extract of the elderberry plant (Fig.6), we can see that among the peaks of the 6 different flavonoids analyzed in the chromatogram of polyphenols, the peaks of flavonoids Rutin and Apigenin

are clearly visible. possible In the chromatogram determined from the composition of the extract, we can see that there is no peak of gallic acid and kaempferol among flavonoids.

The experimental analysis of the chemical composition of the elderberry plant (Table 5) showed that 14,695 mg of rutin, 4,813 mg of apigenin, among the 6 different polyphenols analyzed in ethanol extracts prepared from 100 g of samples, were higher than the identified flavonoids. .

CONCLUSION

The amount of vitamins and polyphenols in the aqueous extract of the elderberry plant was determined by the HELX method. According to the results of the analysis of vitamins contained in the extract, the high content of vitamin B_6 can help to strengthen the immune system of the body and increase the ability to fight against infections such as colds and flu when using tinctures made from sorghum.

Among the water-soluble flavonoids contained in the alcohol extract of the elderberry plant, the amount of Rutin flavonoid was found to be the highest. As we know, polyphenols and flavonoids are useful in relieving the negative symptoms of arthritis, rheumatism and other inflammatory diseases in the human body. Among these polyphenols and flavonoids, especially the flavonoid Rutin is important in human health. Rutin is a bioflavanoid found in many plants and can be used in medicine as an antioxidant that protects blood vessels against inflammation and viruses.

It is recommended to use medicinal food additives and tinctures prepared from it in folk medicine, if the chemical composition of the plant is used.

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