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SOME QUALITY INDICATORS OF THE ARTICHOKE (CYNARA SCOLYMUS L.) PLANT AND THE AMOUNT OF WATER-SOLUBLE VITAMINS

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Abstract

In the article, the relative humidity level, ash content and water-soluble vitamins content of the leaves of the thorny artichoke (Cynara scolymus L.) plant were studied. During the research, the amount of B1, B2, B6, B9, B12 and C vitamins in the plant leaf extract was determined by the HPLC method.

How to Cite

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Introduction. Today in our country much attention is paid to the study of the pharmacological activity of various medicinal plants, their extracts and individual substances. In particular, when using drugs obtained from plant raw materials, drugs obtained from the prickly artichoke plant *(Cynara scolymus L.)* are widely used in practice, including for the treatment of liver diseases [1].

Literary analysis. The pharmacological effect of medicinal preparations prepared from the leaves of Jerusalem artichoke barberry is due to the presence of phenolbricom - cynarin - in their composition, as well as the combination of this substance with phenoxy acids, flavonoids and other substances. A number of active substances, such as cynarin, caffeine, chlorogen, neochlorogen, that are part of the plant have anti-inflammatory and hepatoprotective activity and activate the release of urea and toxins from the body, including nitro compounds, alkaloids, and heavy metal salts [2].

In addition, these active substances have a positive effect on lipid metabolism in the body. As a result, the amount of cholesterol and urea in the blood decreases [3].

Vitamin C, carotenoids and other groups of vitamins, including B vitamins, nicotinic acid and vitamin E, inulin from carbohydrates, contained in prickly artichoke extracts, actively participate in metabolic processes in the body and prevent the accumulation of excess fat. in the body, which leads to death, which, in turn, has a positive effect on preventing excess weight gain [4].

Preparations based on Jerusalem artichoke raw materials are used in folk medicine and medicine mainly as an expectorant, antioxidant, hepatoprotective, diuretic, and stimulant of intestinal motility.

All artichoke-based drugs cause an increase in the secretory function of the liver; this condition increases the secretion of fluid from the gallbladder and stimulates the synthesis of fatty acids. The reflector increases the motility of the digestive system [5]. Continuous use of the drug increases the detoxification ability of the liver. For this reason, medicines derived from plants have a laxative effect and normalize metabolism [6].

In modern folk medicine, the leaves, flowers, roots and seeds of the artichoke plant are used in the form of decoctions, and their infusions are used for heart disease, as an antihypertensive, choleretic agent, and also for liver diseases. Artichoke seeds filled with alcohol extract are used for gastrointestinal diseases. A water infusion of artichoke roots is an effective means of lowering blood sugar levels. In modern scientific medicine, artichoke is recommended for nutrition of weakened patients with liver diseases.

Sinaropicrin, the main component of artichoke, has antioxidant properties. Thanks to this, synaropicrin prevents the development of oxidation, stress and aging of the skin under the influence of UV radiation. Artichoke prevents DNA damage caused by genotoxic chemicals. It inhibits the enzyme xanthine oxidase through luteolin found in artichoke bar extract. In addition, it has been established that this substance has an antiuremic effect, and its leaves exhibit antiproliferative properties. It has been proven that plant polyphenols have anticancer effects [7].

A number of Uzbek scientists have developed hepatoprotective and choleretic agents based on the raw materials of this plant, and studied their pharmacological activity: Kh.U. Aliev, R.T. Tulyaganov, A.A. Abzalov, A.Yu. Ibragimov, Kh.M. Komilov, N.K. Olimov, A.K. Saidvaliev, K.A. Ubaidullaev conducted scientific research.

This paper presented the results of studying the amount of some water-soluble vitamins in the artichoke leaf using HPLC.

Experimental part: Leaves of the spiny artichoke plant *(Cynara scolymus L.)* were collected in June, dried at 25 °C and a sample was prepared for analysis. The moisture content of plant leaves was determined as follows according to the XI DF. A sample weighing 5,0030 g was dried on an analytical balance and weighed to a constant weight. Then the product was dried in an oven at a temperature of 100-105 °C until constant weight. The heated batch was cooled in a desiccator for 30 minutes before weighing and the constant mass was measured. The moisture content was 9,31%.

The method for determining total ash was determined according to the XI DF. A crushed sample weighing 2,0021 g, accurately weighed on an analytical balance, was heated in a muffle furnace at high temperature and placed in a porcelain crucible brought to constant weight. Then the crucible was placed on a specially prepared stand and slowly heated with alcohol until the drug burned (until the smoking stopped). After smoking stopped, the crucible was placed in a muffle furnace and heated for 3 hours at a high temperature of - 700 °C to constant weight. It has been established that the total amount of ash is no more than 11,60%.

Reagents and equipment used. Vitamins B_1, B_2, B_6, B_9 and C were obtained from “DSM Nutritional Products GmbH” (Germany), B12 from “Rhydburg Pharmaceuticals” (Germany). Gallic acid “Macklin” (China) HPLC grade water, acetonitrile, acetic acid and reagent grade sodium hydroxide reagents were used.

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

Preparation of standard solutions. Solutions of vitamins B_1 (CAS 70-16-6), B_6 (CAS 65-23-6) and B_{12} (CAS 68-19-9), C (CAS 50-81-7) (100 mg/l) of each vitamin. A quantity of 5 mg was prepared by dissolving in 50 mL of HPLC grade water. Standards of vitamins B_2 (CAS 83-88-5) and B9 (CAS 59-30-3) were prepared by dissolving 5 mg in 50 ml of 0,025% sodium hydroxide solution. Then 200 µl of all vitamins were mixed and a solution was prepared with a concentration of 16.67 mg/l of each vitamin. By diluting it, solutions with concentrations of 3,333 mg/l, 0,667 mg/l and 0,133 mg/l were prepared, poured into a vial and used for analysis.

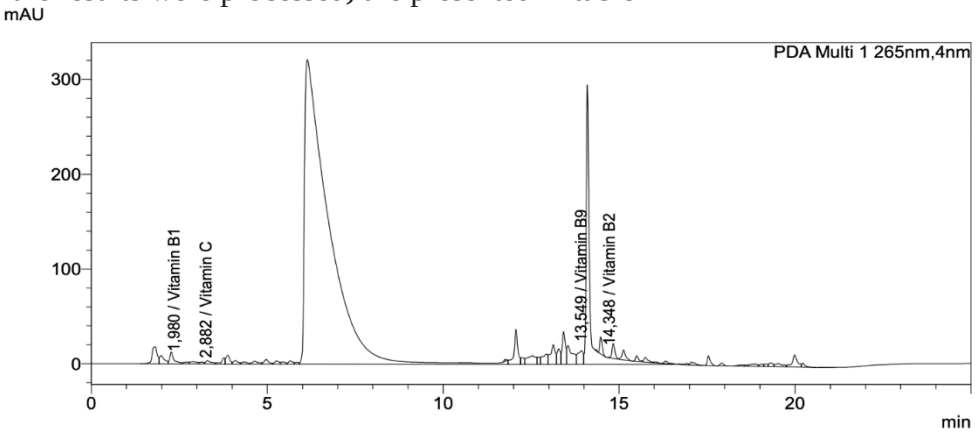
Preparation of plant extract. The test sample for the extraction of water-soluble vitamins was weighed with an accuracy of 0,01 g on an NV222 scale manufactured by OHAUS (USA), placed in a 50 ml conical flask and 25 ml of a 0,1 N HCl solution was added. . The mixture was extracted in an ultrasonic bath GT SONIC-D3 (China) at a temperature of 60 °C for 20 minutes. Then the mixture was cooled, filtered and the volume of water was brought to 25 ml in a volumetric flask. 1.5 ml of extract was filtered through a syringe filter with a pore size of 0,45 µm, placed in a vial and used for analysis.

Chromatographic conditions. Standard Solutions and Sample Extracts LC-40 Nexera Lite High Performance Liquid Chromatograph, consisting of an LC-40D pump, SIL-40 autosampler, SPD-M40 photodiode array detector (PDA) and LabSolutions ver. Software 6.92 has been analyzed. Reverse phase column GIST C18 (150 × 4.6 mm; 5 µm, Shimadzu, Japan) with a gradient mobile phase consisting of acetonitrile (A) and 0.25% acetic acid in water (B) (Table 1) , used. The injection volume was set to 10 µL, the flow rate to 0,9 mL/min, and the column oven temperature to 35°C. The analytical signal (peak area) of each vitamin was recorded at three wavelengths: 265, 291, 550 nm

Table 1. Mobile phase gradient software

Time, min.	Acetonitrile (A),%	0,5% acetic acid (B), %
0	0	100
6,8	0	100
15,5	50	50
17,4	95	5
17,5	0	100
25	End	

The discussion of the results. Determination of vitamins in artichoke extract. A crushed plant leaf with an average weight of 1 g was extracted with 0,1 N HCl, a chromatogram was obtained (Fig. 1) and the results were processed**,** are presented in table 2



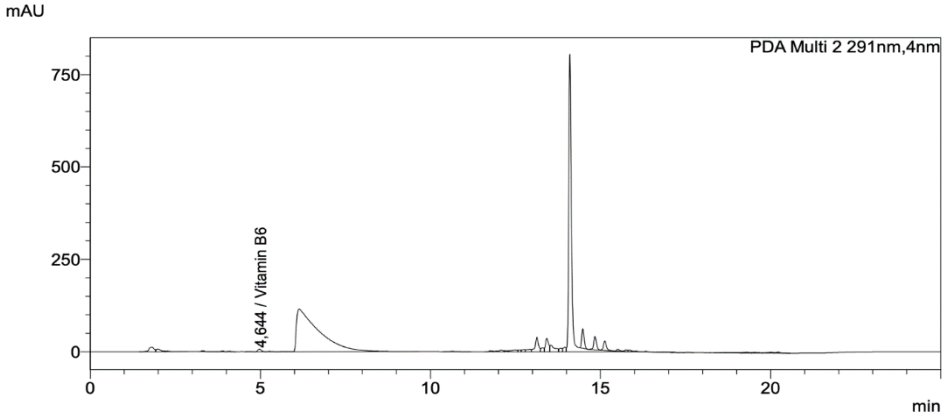


Figure 1. Chromatograms for determining vitamins in extract samples.

Table 2. Amount and retention time of vitamins in the extract.

Vitamin	Holding time, min.	Concentration, mg/l	Amount per 100 g sample, mg
Vitamin B_1	1,980	4,470	11,175
Vitamin B_2	14,348	0,078	0,195
Vitamin B_6	4,644	0,133	0,3325
Vitamin B_9	13,549	6,475	16,1875
Vitamin B_{12}	-	-	-
Vitamin C	2,882	5,324	13,31

Conclusion: Based on the research results, the amount of water-soluble vitamins from the barr leaves of the prickly artichoke *(Cynara scolymus L.)* grown in the Andijan region was determined for the first time. In all the studied samples, the amount of moisture and ash, water-soluble vitamins was qualitatively studied using JSS. It has been established that prickly artichoke leaves *(Cynara scolymus L.)*, collected in June, contain 5 types of water-soluble vitamins: B_1, B_2, B_6, B_9, C. According to it, in 100 g the leaves of the plant contain vitamin B_2 in the smallest amount – 0,195 g, and the largest amount – 16,1875 g of vitamin B_9.

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