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DETERMINATION OF MEDICAL PROPERTIES OF VALERIAN (VALERIÁNA OFFICINÁLIS) PLANT AND SOME VITAMINS IN ITS CONTENT

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Annotation
Taking into account the actual problems of the present time, we found out that the medicinal plant Asorun has the properties of effective treatment of nervous diseases. This article presents the results of the research on determining the amount of vitamins in the natural medicinal plant. The amount of water-soluble vitamins in the plant was measured using a LC-40 Nexera Lite high-performance liquid chromatograph manufactured by Shimadzu, Japan.

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Introduction. Vitamins are substances that ensure that biochemical and physiological processes pass within the normal range by participating in the control of metabolism in the body, including medicinal plants and nutritional factors found in food [1]. These substances are required for the body in very small quantities, and are directly dependent on the supply of the body with them [2,3].

In addition to certain substances, it was found that vitamins are necessary for the body, although they are in very small quantities. At the same time, the origin of various diseases due to lack of certain vitamins in food was known since ancient times [4,5]. Failure to pass the exchange process at a reasonable level is often due to insufficient intake of vitamins into the body or their absence in food at all [6,7]. The complete cessation of vitamin intake into the body causes avitaminosis disease, and their insufficient intake causes hypovitaminosis disease. Vitamins are low-molecular organic substances with different chemical nature and different structures, which are mainly synthesized by plants and partly by microorganisms [8].

Experimental part.

Reagents and equipments used. Vitamin B12 was obtained from "Rhydburg Pharmaceuticals" (Germany), vitamin C from "Carl Roth GmbH" (Germany), B9 from "DSM Nutritional Products GmbH" (Germany), vitamins B1, B2, B3, B6, 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 satandard solutions. C (CAS 50-81-7), B1 (CAS 59-43-8), B6 (CAS 58-56-0), B3 (CAS 59-67-6), B12 (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 B2 (CAS 83-88-5) and B9 (CAS 59-30-3) were prepared by dissolving 5 mg of these vitamins in 50 ml of 0.025% sodium hydroxide solution.Then, 200 ml of the initial B1, B6, B3, B12, 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 60 oC 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. The analytical signal (peak area) of each vitamin was recorded at three wavelengths of 265, 291, 550 nm (Figures 1-3). A 15-minute gradient was used for the determination of vitamin C (Table 2) and the analytical signal was measured at a wavelength of 265 nm.

Table 1. The phase gradient program in the determination of vitamins

Time, minutes	Atsetonitril (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. The phase gradient program for the determination of vitamin C.

Time, minutes	Atsetonitril (A), %	0,5 % acetic acid (B), %
0	0	100
2	0	100
6	50	50
6,01	0	100
15	Finish	

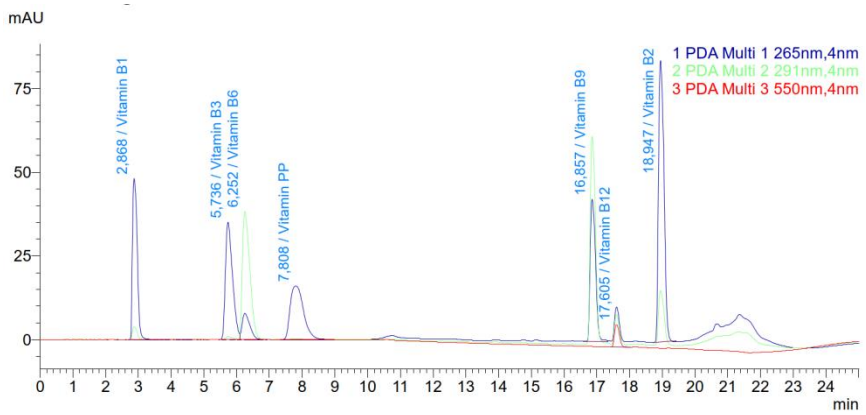


Figure 1. Chromatogram of standard solution of vitamins.

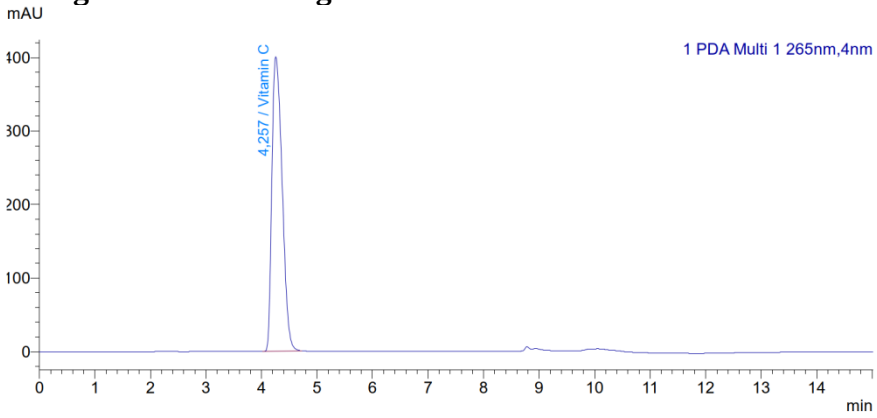


Figure 2. Chromatogram of Vitamin C standard solution.

The results obtained.

Determination of vitamins in sample extract. A chromatogram of the sample extract (Figures 3, 4) was obtained, and based on the results, the amount of vitamins in 100 g of fruit was calculated using the following formula and presented in Table 3.

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

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

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

$V_{extract}$ – volume of sample extract , l;

M_{sample} – sample taken for extract preparation.

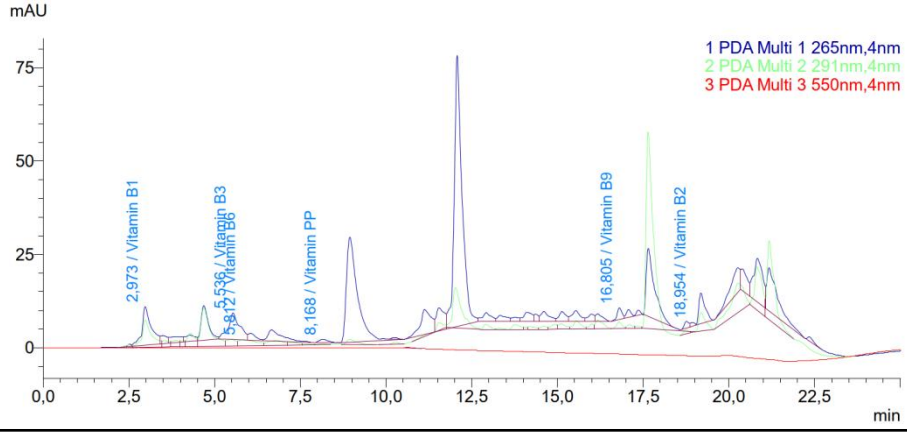


Figure 3. Chromatogram for determination of vitamins in sample extract.

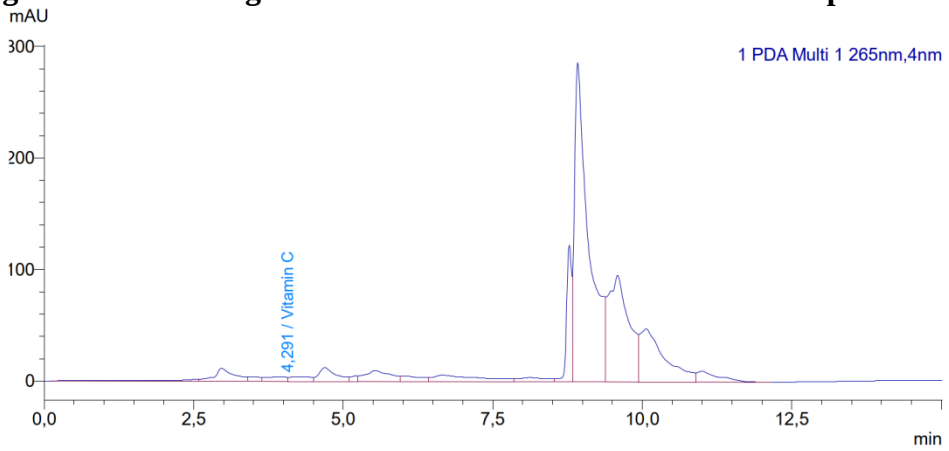


Figure 4. Chromatogram for determining the amount of vitamin C in the sample extract.

Table 3. Amount and retention times of vitamins in the extract.

Vitamin	Hold time, sec	Concentration, mg/l	100 g sample amount , mg
Vitamin B_1	2,973	5,791	14,478
Vitamin B_3	5,536	4,45	11,125
Vitamin PP	8,168	0,551	1,378
Vitamin B_9	16,805	0,898	2,245
Vitamin B_2	18,954	0,394	0,985
Vitamin B_6	5,812	1,338	3,345
Vitamin B_{12}	Not identified	0	0,000
Vitamin C	4,291	5,317	13,293

As can be seen from the table, medicinal asorun contains the most vitamin B1, its amount is 14,478 mg per 100 g of product. The remaining vitamins were in the following amounts: Vitamin B3 (11,125 mg), Vitamin PP (1,378 mg), Vitamin B9 (2,245 mg), Vitamin B2 (0,985 mg).

Conclusion. One of the most important biologically active properties of vitamins is that they greatly contribute to the normal development of the body, they help to prevent and actively fight certain diseases. This helps to prevent various diseases in the body.

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