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RUBUS CESIUS L O'SIMLIGI ILDIZI VA POYASI TARKIBIDAGI VITAMINLARNI TAHLIL QILISH

АНАЛИЗ ВИТАМИНОВ В КОРНЯХ И СТЕБЛЯХ РАСТЕНИЯ RUBUS CESIUS L

ANALYSIS OF VITAMINS IN THE ROOTS AND STEMES OF THE PLANT RUBUS CESIUS L

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Annotatsiya

Maqolada Farg'ona viloyati, Farg'ona tumanida qish faslida yig'ib olingan Rubus caesius L. (ko'kimtir maymunjon) o'simlikining yer usti va yer osti qismlaridagi vitaminlar miqdorini aniqlash usullari bayon etilgan. Olingan natijalar jadval va diagrammalar shaklida taqdim etiladi. Vitaminlar miqdorini aniqlash uchun yuqori samarali suyuqlik xromatografiyasidan foydalanilgan.

Аннотация

В статье описаны методы определения количества витаминов в надземной и подземной частях растения Rubus caesius L. (ежевика сизая), выращиваемая в Ферганской области, Ферганской район зимой. Полученные результаты представлены в виде таблиц и диаграмм. Для определения количества витаминов использовали высокоэффективную жидкостную хроматографию.

Abstract

The article describes methods for determining the amount of vitamins in the above-ground and underground parts of the plant Rubus caesius L. (blackberry), grown in the Fergana region, Fergana region in winter. The results obtained are presented in the form of tables and diagrams. High performance liquid chromatography was used to determine the amount of vitamins.

Kalit so'zlar: *askorbin kislotasi, sianokobolamin, piridoksin, Rubus caesius L. (ko'kimtir maymunjon), riboflavin, tiamin.*

Ключевые слова: *аскорбиновая кислота, цианокоболамин, пиридоксин, Rubus caesius L. (ежевика сизая), рибофлавин, тиамин.*

Key words: *ascorbic acid, cyanokobolamin, pyridoxine, Rubus caesius L. (blackberry), riboflavin, thiamine.*

INTRODUCTION

Nowadays the types of exports and imports in Uzbekistan are increasing. When assigning international code numbers, it is very important to know their chemical composition and be able to use them in practice [1].

Medicinal use of fruits and berries has been practiced in the systems of traditional medicine for thousands of years. No nutritionist, doctor, or any reasonable person, even unencumbered with higher or secondary medical education, would deny the enormous benefits, nutritional and medicinal value of fruits and berries [2].

Study of natural forests of Uzbekistan and protection of forests is the main task of foresters. For this purpose, in order to identify and reproduce endangered species with nutritive properties,

we studied Blackberry (Rubuscaesius L.), which is naturally distributed in mountain and riparian forests of our republic [3].

Rubuscaesius L. has been around since time immemorial. Historians find the first mention of it in the treatises of Avicenna, Theophrastus, and Dioscorides. From these records we know that in those times blackberry fruit was considered a full-fledged medicine, not a food product. The homeland of the cultivated Rubuscaesius L. is considered to be North America. It was there that it was domesticated in the 1920s of the 19th century. At the end of the 19th century, blackberries were introduced to European countries as well. Blackberry (Rubuscaesius L.) is a species of plant in the genus Rubus of the family Rosaceae. This genus includes more than 300 plant species worldwide, which are mostly native to the Northern Hemisphere.

Blueberry is a semi-shrub that reaches 50 to 150 cm in height. It is distributed in Uzbekistan and Central Asia, also throughout Europe, Central Asia and North America. In natural conditions, it grows in forests, in shrub thickets, along roads, along riverbanks, etc. In our country there are known blueberry (Rubuscaesius L.), giant or Himalayan blackberry (Latin: Rúbusarmeniácus), cut blackberry (Latin: Rúbuslaciniátus) and others.

Fig.1. Fruit and leaves of Rubus caesius L.

Rubus caesius L. is a shrub with shoots lying or rising up to one and a half meters in height. Blackberry shoots are usually of two types: annuals are herbaceous, abundantly covered with small bristle-like thorns, and biennials are woody, covered with hard thorns. Only two-year shoots bear fruit. After fruiting they die off. In natural conditions, the shoots grow so large that they form impenetrable thorny thickets.

The leaves of Rubus caesius L. are divided into three lobes, colored light green, have lanceolate bracts and petioles covered with spines. Draped with hairs on both sides. The edges of the leaf are toothed.

Flowers are oviparous, five-membered, relatively large, up to 2-3 cm in diameter. They appear sparsely and late - from June to August. They have pubescent green calyxes and white, less often pink petals. The flowers contain many stamens and pistils, almost equal to each other in length.

The fruit consists of few black or black-red bones with large flattened pips. They are covered with a blue plaque and do not separate from the soft peduncle. The fruits taste sour-sweet, juicy, aromatic. They ripen chaotically, from July to September, so the harvest can be collected several times a season. Many wild species are promising for culture, as they produce large tasty fruits that are not inferior in biochemical parameters to cultivated varieties [4].

There are genetic differences between Rubuscaesius L. and Rubusidaeus L: they have different numbers of chromosomes in cell nuclei. Raspberry is diploid (2n=14), while blackberry is polyploid, reaching the dodecaploidploidy level. Most European cultivated forms of blackberry are tetraploids, so blackberries are more vigorous and yielding than raspberries.

Morphologically, Rubuscaesius L differs from raspberry by triple or palmate leaves (raspberry leaves are pinnate, rarely palmate), complex inflorescence (raspberry leaves are semi-umbrellate), thin filaments of stamens (raspberry staminate), black, sometimes dark red or glossy

blue fruits - multicysts (red or yellow in raspberries), which are fused to the peduncle (in raspberries the fruits easily separate from the peduncle when ripe).

Significant disadvantages of Rubus caesius L: collapsing bush type and prickles. If at first the blackberry bush is erect, later it forms arc-shaped bowed branches rooting at the tops. The shoots are covered with a waxy patina, studded with numerous thorns of different structures or bristles, rarely bare.

The root system of Rubus caesius L, except for seedlings, consists of a rhizome (underground stem) and adventitious roots. It is deeper, more powerful, less branched than in raspberries. Adventitious roots depart from the rhizome and grow in the surface layer of soil, spreading a considerable distance from the bush.

On the rhizome and roots in mid-summer, adventitious buds are laid and the rudiments of shoots develop. The peculiarity of such shoots is their slow growth, as a result of which by autumn they do not reach the soil surface and remain in the ground in the form of etiolated 4-8-centimeter shoots with small scaly leaves. Depending on their location on the roots and development, blackberry shoots appear the following spring not simultaneously, but throughout the summer. The shoots that grew in early spring, as the most valuable, are left to form a bush or strip plantation; shoots that appeared in the second half of the summer are usually destroyed when loosening the rows.

Shoots at the base of a two-year fruit-bearing branch developing from buds of a young rhizome are called replacement shoots, and shoots arising from adventitious buds on roots are called root shoots (root shoots).

The main mass of roots of Rubus caesius L is located in the soil layer from 10 to 40 cm. Individual roots penetrate to a depth of 125-135 cm along earthworm paths. The highest density of roots, departing horizontally, is observed in the radius of 50 cm from the center of the bush base, their maximum distance - up to 2-3 m.

Life expectancy of Rubus caesius L plantation depends not only on the number of replacement shoots and abundance of root shoots, but also on soil and climatic conditions, methods of its culture and thoroughness of pest and disease control measures.

Blackberry plants have specific requirements for environmental factors. So, with a lack of light young shoots of blackberries are strongly stretched out, shading fruit-bearing. The growth of shoots slows down, and they do not have time to prepare for winter. Side fruit branches also grow slowly, pushing back the beginning of berry ripening. As a result of poor lighting, the processes of vital activity are disturbed and the plants become less resistant to pests and diseases, the quality of berries is sharply reduced.

Rubus caesius L. is believed to be more resistant to drought than raspberries. This is due to the fact that its roots receive moisture from deeper layers of soil. The greatest need for water in plants is at the beginning of berry ripening.

For Rubus caesiusL. it is important not only to moisten the soil, but also the air, not only in summer, but also in winter. In winter, in strong winds, shoots suffer due to desiccation. Under optimal temperature conditions, a uniform rainfall of 700-750 mm throughout the year is considered sufficient.

Medicinal use. Known antipyretic, antifever, diaphoretic properties of berries and drinks from it, which are used in acute respiratory infections and other infectious diseases. Well, well, blackberries are the closest relative of raspberries. On the other hand, there are similarities with blackberries and unrelated to her blueberries: fresh berries loosen, and dried and unripe berries strengthen. They are used for dysentery, salmonellosis, food poisoning, dyspepsia, diarrhea of various origins. "And if you give unripe berries, it will fix the nature, stop bleeding and deprive sexual power. Its juice dried in the sun is good. It is worthy of all praise" (Amirdovlat Amasiaci, XV century, 1990). Berries, leaves, juice of blackberries are effective in dyspepsia in children. The possibility of their preventive and therapeutic use in dysbacteriosis and antibiotic treatment deserves special attention [5].

Hemostatic effect of decoction of branches, dried juice, infusion of dried berries are used in folk medicine for hemoptysis, pulmonary, uterine, hemorrhoidal (internally and locally) and other bleeding. The use of blackberries in acute respiratory viral infections, tracheitis, bronchitis, pharyngitis is shown not only in connection with antipyretic, but also expectorant, secretolytic effect

it. In Poland, berries are used for joint pain (arthralgia), their inflammation, cystitis, pyelonephritis. Abu Ali ibn Sina (XI century) recommended juice from berries and leaves for "ulcers in the intestines" (typhoid fever), intestinal bleeding, urolithiasis, for "hot pains in the mouth" (stomatitis) [6]. In Iranian-Tajik, Arab, Indian traditional medicine, the therapeutic properties of blackberry have been used for thousands of years. The experience of its use is summarized, for example, by Muhhamad-Hussein in "Treasury of Medicines" (XVIII century). "All parts of blackberries - fruits, flowers, leaves, stems - have a drying property, cool, retain substances in the body, stop hemoptysis and bleeding of internal organs, strengthen the intestines. Blackberry leaves are chewed for ulcers on the gums and their looseness, bad breath, as well as fresh scratches and sores in the mouth, exactly the same actions have and ripe blackberry fruit.

Blackberry leaves are used topically to treat trophic ulcers, long non-healing wounds, wet, eczematous lesions. Their decoction acts dermatotonic, improves skin turgor, its trophicity, hair growth, prevents their loss.

The main indications for the use of leaves are neuroses, atherosclerosis of cerebral vessels and hypertension, menopause, bleeding, the need to correct the flavor of the infusion of a polycomponent collection. Following the above indications of domestic, traditional medicine, combine blackberry leaf with other plants:

Preparation: 3 tablespoons of crushed collection pour 0,7- 0,8 liters of water, bring to a boil, stew on low heat for 5 minutes, drain everything with raw materials overnight in a thermos. Take the infusion warm on an empty stomach on the principle: the more often, the better. Infusion of the collection is indicated for prolonged pathological menopause, increased blood pressure, vivid manifestations of neurosis [7].

METHODOLOGY

In the middle of winter in Fergana district, stem and roots of Rubus caesius L. The collected plant was washed from soil residues and dried in a shady place.

In the above-ground part of blackberry full complex of nutrients and medicinal substances, including sucrose, glucose, fructose (up to 5%), citric, tartaric, malic, salicylic and other organic acids, vitamins B, C, E, K, P, PP, provitamin A, minerals (salts of potassium, copper and manganese), tannins and aromatic compounds, pectin substances, fiber and other macro- and microelements.

Also in the fruits of Rubus caesius L. there are such minerals as sodium, potassium, calcium, magnesium, phosphorus, iron, copper, nickel, manganese, molybdenum, chromium, barium, vanadium, cobalt, strontium, titanium. Blackberry leaves are rich in tannins (up to 20%), mainly leucoanthocyanides and flavonols, vitamin C (ascorbic acid), amino acids and minerals. The seeds of Rubuscaesius L. contain 12% fatty oil. Fresh berries Rubuscaesius L. in its composition have per 100 g of product: water 88.15 g, proteins 1.39 g, fats 0.49 g, carbohydrates 9.61 g, sugars 4.88 g, dietary fiber 5.3 g, B-carotene 128 mcg, ascorbic acid (vitamin C) 21 mg, tocopherol (vitamin E) 1.17 mg, vitamin K 20 mcg, calcium 29 mg, iron 0.62 mg, magnesium 20 mg, potassium 162 mg, sodium 1 mg, zinc 0.53 mg. Energy value of 100 g of berries - 43 kcal (180 kJ).

Studies conducted on this species growing in the Russian Federation show that characteristic biologically active compounds vitamins such as ascorbic acid, thiamine, niacin, riboflavin, retinol, phylloquinone, tocopherol, etc. have been identified [8].

The content of vitamins in the aboveground and underground parts of blackberries growing in Fergana region and their amounts were determined by high-performance liquid chromatography.

Water-soluble vitamins were analyzed by HPLC using gradient elution mode and diode matrix detector (DAD). Acetonitrile and buffer solution were used as mobile phase. The spectral data were investigated in the spectral range from 200 to 400 nm.

RESULTS

For the determination of water soluble vitamins in the plant, 5 g of sample was taken on analytical balance and placed in a flat flask of 300ml capacity. To it was added 50ml of 40% ethanol solution. The mixture was heated under constant stirring for 1 hour on a magnetic stirrer fitted with a reflux condenser and then stirred at room temperature for 2 hours. The mixture was cooled and filtered. To the remaining portion, 25 mL of 40% ethanol was added and re-extracted

two times. The filtrates were combined and topped up to the mark with 40% ethanol in a 100 mL volumetric flask. The resulting solution was taken from the underground and above ground parts for analysis.

Identification and quantification of vitamins were carried out by comparison with standard solutions of vitamins. For this purpose, standard solutions of each vitamin were prepared with a concentration of 1 mg/mL.

Chromatography conditions:

Mobile phase (gradient mode) - acetonitrile - buffer solution pH=2.92 (4%:96%) 0-6 min, (10% : 90%) 6-9 min, (20% : 80%) 9-15., (4% : 96%) 15-20 min.

Injection volume - 10 µl.

Mobile phase velocity - 0.75 ml/min.

Column - Eclipse XDB - C18. 5.0 µm, 4.6x250mm.

Detector - Diode matrix detector, wavelengths 272, 292, 254, 297, 360 nm.

The results obtained are summarized in the table below.

Table 1.

Vitamin content in the plant Rubuscaesius L.

№	Name of vitamins	Quantity (mg/100 g)
1	B1 (thiamine)	0,00
2	B2 (riboflavin)	2,941 mg/100 g
3	B3 (PP-nicotinic acid)	2,147 mg/100 g
4	B9 (folic acid)	1,289 mg/100 g
5	B6 (pyridoxine)	0,986 mg/100 g
6	C (ascorbic acid)	11,131 mg/100 g
7	B12 (cianocobolamine)	9,012 mg/100 g

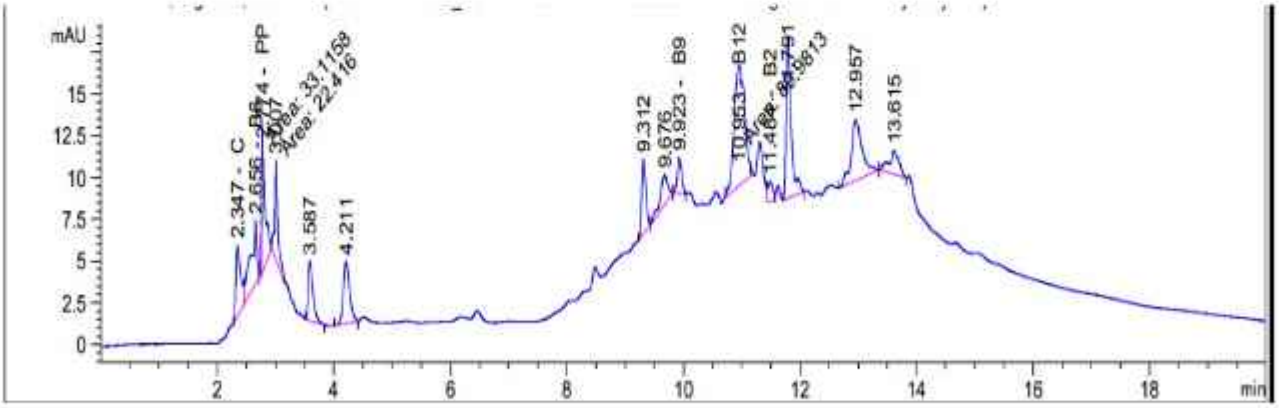

Fig.2. *DAD1 A, Sig=265,4 Ref=off (Witamin Waters_LC 2024-03-14 12-47-55\003-P2-A2-Rubus caesius L.)*

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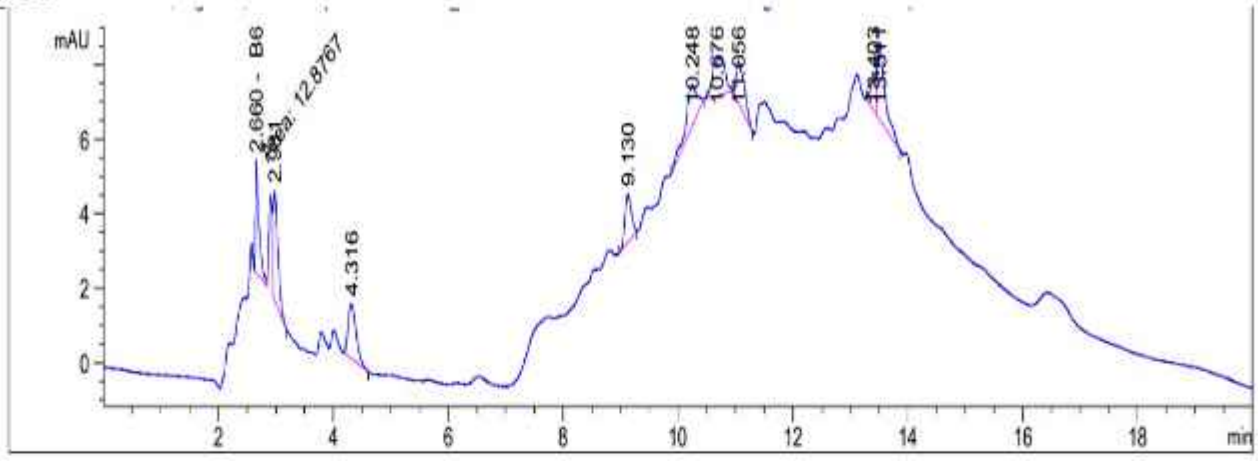

Fug.3. *DAD 1B, Sig=254,4 Ref=off (Witamin Waters_LC 2024-03-14 12-47-55\003-P2-A2 - Rubus caesius L.)*

The results presented in Table 1 show that the above-ground and underground parts of Rubus caesius L. are very rich in B vitamins and vitamin C. As can be seen from the table vitamin B1 are absent. Among the identified vitamins, the high content of vitamin B12 has a positive effect on increasing the biological activity of this plant.

CONCLUSION

The amount of vitamins B and C in Rubus caesius L. compared to many other plants is the basis for considering this plant as a natural source of vitamins.

Vitamin B2 is an active participant in redox reactions. It is responsible for cellular respiration, for carbohydrate, protein and fat metabolism. Riboflavin is involved in the formation of antibodies and red blood cells - blood cells that carry oxygen throughout the body, as well as protect people from bacteria and viruses. It removes toxins from the lungs.

Vitamin B3 (PP) is necessary for the release of energy from carbohydrates and fats, for protein metabolism. It is part of the enzymes that ensure cellular respiration. In the body is converted into nicotinamide, which is part of coenzymes dehydrogenase - hydrogen transfer coenzymes, is involved in the metabolism of fats, proteins, amino acids, purines, tissue respiration, carbohydrates - glycolysis and glycogenolysis, biosynthesis processes.

Vitamin B6 is involved in metabolism: it is important for triggering 150 biochemical reactions in the body. It is also essential for the normal functioning of almost all internal organs, the central and peripheral nervous system, and supports healthy skin, hair and bones. Vitamin B6 is the only micronutrient whose deficiency in the body leads to seizures similar to epilepsy.

Vitamin B9 is a micronutrient necessary for the formation of the DNA molecule and some amino acids (glycine, methionine) that make up proteins. The main purpose: needed in the bone marrow, is involved in the synthesis of neurotransmitters that provide normal appetite, sleep, mood, reduces the development of cancer. Vitamin B9 protects a pregnant woman from miscarriage and premature labor, reduces the likelihood of birth defects of the brain.

Vitamin B12 helps the body to provide important processes:

-DNA synthesis,

-production of energy,

-Maintaining normal nervous system function.

Vitamin B12, together with other B vitamins, is also involved in the folate cycle, the process of converting the amino acid homocysteine into methionine. In addition, vitamin B12 helps prevent the development of anemia-decreased number of red blood cells in the blood.

Vitamin C in the human body acts as a regulator of many biochemical reactions. For example, it takes part in the synthesis of collagen - the main structural protein of connective tissue, which provides functionality and stability of blood vessels, bones, tendons. It plays an important role in the rapid healing of wounds and cuts, increases immunity, reduces the symptoms of flu and colds.

The above data show that the plant Rubuscaesieus L. we studied is rich in vitamins B2, B3 (PP), B6, B12 and C which are very important for human health, which proves that it is an effective solution to meet the needs of vitamins.

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