Rowan (lat. Sórbus)

Eliseeva Tatyana, editor-in-chief of the EdaPlus.info project

Yampolsky Alexey, nutritionist

E-mail: eliseeva.t@edaplus.info, yampolsky.a@edaplus.info

Abstract. The article discusses the main properties of mountain ash and its effect on the human body. A systematic review of modern specialized literature and relevant scientific data was carried out. The chemical composition and nutritional value of berries are indicated, the use of mountain ash in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of mountain ash on the human body under certain medical conditions and diseases are analyzed separately. The scientific foundations of diets with its application are considered.

Key words: mountain ash, benefit, harm, beneficial properties, contraindications

Beneficial features

Table 1. Chemical composition of rowan (according to Food+).

Main substances (g / 100 g):	**Fresh Berries [1]**
Water	81.1
Carbohydrates	8.9
Sugar	8.5
Alimentary fiber	5.4
Squirrels	1.4
Fats	0.2
Calories (kcal)	fifty
Minerals (mg/100 g):	
Potassium	230
Calcium	42
Magnesium	33
Phosphorus	17
Iron	2
Zinc	4.34

Vitamins (mg/100 g):	
Vitamin C	70
Vitamin E	1.4
Vitamin B3	0.5
Vitamin B1	0.05
Vitamin B2	0.02

The chemical composition of mountain ash, as well as its yield or fruit size, varies significantly by variety and growing region. But a wide vitamin and mineral complex is characteristic of almost all "modern" mountain ash, since already at the beginning of the 20th century, breeders could boast of noticeable success in breeding resistant large-fruited varieties with a rich chemical composition and improved taste characteristics of berries.

To this day, the variety *Pomegranate has retained its popularity* , which I. Michurin singled out among others. But even in recent history there are "champions". For example, the *Titan* variety is considered the most valuable in terms of anthocyanin content (up to 260 mg/100 g). The same variety is among the best in terms of the content of ascorbic acid, carotene, catechins, but not in all respects it can be called the undisputed leader.

The distribution by the amount of listed nutrients in different popular varieties can be presented in the following list (from largest to smallest, in mg / 100 g, rounded to whole numbers):

- Ascorbic acid: Sorbinka - 141, Vefed - 95, Titanium - 67, Dessert - 55, Ruby - 51.
- Carotene: Sobrinka - 9, Titan - 8, Dessert, Ruby and Vefed - about 6.
- Catechins: Titanium - 915, Dessert - 675, Ruby - 645, Vefed - 360, Sorbinka - 290. [1]

In addition to ascorbic acid, the rich vitamin complex presented in the fruits of mountain ash includes fat-soluble P, A, E, K, PP, B vitamins (in descending order: B3, B1, B2). In terms of the content of flavonoids (quercetin, isoquercetin, rutin, etc.), as well as free amino acids (18 species, 8 of which are essential), mountain ash is ahead of most fruit and berry crops.

Among the sugars in mountain ash, most of all are fructose (up to 4-4.5%), glucose (up to 3.5-4%) and "sugar" alcohol sorbitol (up to 25%). There are also sorbic and parasorbic acids, macro- and microelements, essential oils.

Useful substances are also found in other parts of the plant: in seeds, leaves, bark. The seeds are characterized by an abundance of fatty oils, but also include the tainted glycoside amygdalin. Flavonoids and vitamin C were found in the leaves. The bark, like many other plants, is rich in tannins.

Medicinal properties

The medicinal properties of mountain ash are mainly associated with its ability to cause choleretic, laxative and diuretic effects, lower blood cholesterol levels, and also have a general strengthening and tonic effect on the body due to the presence of many vitamins. A number of studies also noted hemostatic, antimicrobial, antifungal, analgesic, anti-inflammatory and antitumor effects (in varying degrees of severity).

Rowan amygdalin increases the degree of acidity of gastric juice, so rowan is used for low acidity and is not recommended for high acidity. Also, this plant glucoside has an X-ray protective effect. In some experiments on animals, he showed analgesic properties (when injected intramuscularly). [2] Pectins in the composition of berries slow down gas formation in the digestive tract. The iodine in the flowers

can help with thyroid disorders. Rowan sorbitol can cause a mild laxative effect. Rowan phenols exhibit pronounced antioxidant activity. [3] In addition, fruits, inflorescences, and leaves of the plant exhibit antioxidant activity. [four]

In studies of recent years, other medicinal properties of rowan extracts are also found:

- Berry and leaf extracts of mountain ash showed antimicrobial activity against gram-negative microorganisms. Therefore, researchers believe that they can be considered as a potential source of new antimicrobial agents specific for Gram-negative bacteria. [5] The emergence of such a plant-based alternative is also important because it helps fight antibiotic resistance in bacteria.
- In an experiment on laboratory mice, the effect of anthocyanin-rich extract of rowan berries on the development of such pathologies as B-16 melanoma and Lewis lung carcinoma was studied. As a result, the antitumor activity of rowan extract and its ability to increase the antimetastatic activity of other antitumor drugs were established. [6] The prospects for the use of rowan anthocyanins in the complex therapy of experimental tumors are being seriously studied. [7]
- Some antifungal properties of sorbic acid extracted from rowan berries have been found. [8] Such extracts are prepared from fresh and dried berries by treatment with potassium hydroxide.

Today, in experimental programs, plant extracts are being tried to treat kidney diseases (glomerulonephritis). With the help of rowan preparations, the body's sensitivity to ionizing radiation is reduced (when used before and after the irradiation procedure). And the biologically active components of ripe rowan fruits neutralize the action of toxins.

It is assumed that for people with diabetes, rowanberry sorbitol helps to safely “sweeten” the menu and become an important source of vitamins C and P, which are important in the prevention of atherosclerosis, hemorrhagic diathesis, and hypertension. In addition, the same sorbitol may help lower blood cholesterol and liver fat.

Use in medicine

Official medicine does not systematically use mountain ash preparations as medicines, however, in private, doctors can recommend phytotherapeutic methods of treatment using mountain ash infusions, decoctions, syrups. So, endocrinologists plant preparations with mountain ash are sometimes prescribed as a means of normalizing the function of the glands in hypo- and hyperthyroidism (thyroid conditions with insufficient or excessive production of triiodothyronine and thyroxine), with thyrotoxicosis (excess hormones).

On sale there are both dry packaged berries and biologically active liquids (from different manufacturers). Such liquids are considered an effective vasoconstrictor agent, which can, in addition, activate the coronary circulation. But in general, manufacturers do not reduce the effect of the drug to some specific effect on the body, listing in the description the entire list of therapeutic properties of mountain ash, described, first of all, in traditional medicine.

For example, whole rowan fruits (along with crushed rose hips) are included in the "Vitamin Collection No. 2", which refers to multivitamin preparations of plant origin. It is designed for:

- regulation and normalization of metabolic processes and carbohydrate metabolism,
- decrease in the degree of vascular permeability,
- activation of tissue repair,
- enhancing the synthesis of hormones,

- moderate stimulation of the secretion of the glands of the digestive system, urine and bile secretion.

According to the instructions given, the remedy should be used to recover from colds and infectious diseases, with beriberi of a different nature and during complex therapy with a lack of vitamins C, A, P, K. They take a collection in the form of an infusion, the recipe of which is also widely used in traditional medicine .

In addition, work is underway to create medicines based on rowan berries, and some of these projects are progressing very successfully. In particular, Russian scientists have developed a technology for manufacturing an original dosage form - a dermatological ointment containing vitamins A, E, a phytocomplex of rowan fruits. Biopharmaceutical studies of the optimal composition of the ointment were carried out in in vitro tests ("in vitro"), a hardware-technological scheme for obtaining an ointment based on a lipophilic complex was developed. The results of microbiological and pharmacological studies of the lipophilic complex and ointment demonstrated their strong antimicrobial and anti-inflammatory effects. [9]

In folk medicine

Rowan fruits have been used as a folk medicine in Europe since antiquity. First, the ancient Greeks, and then the Romans, ate berries to strengthen the stomach, stop nausea and vomiting, and slow down drunkenness during a feast. And in order to even prevent gastrointestinal upset, rowan clusters were used prophylactically to purify drinking water. It was believed that a branch of a plant thrown into a jug would keep the water fresh longer and provide it with a pleasant taste.

Gradually, the range of use of mountain ash in folk medicine began to expand, including through the exchange of therapeutic practices between peoples. Until now, traces of ancient medicinal traditions of using mountain ash can be found in national herbalists:

- in Austria and Hungary, berries of the plant are used to treat dysentery,
- in Poland - kidney disease and diabetes,
- in Bulgaria and Eastern Europe - rheumatism, nephrolithiasis, diarrhea, gynecological diseases, nervous disorders,
- in Turkey - the leaves of Rowan home (Crimean) are used to treat burns, coughs, abdominal pain, kidney stones, and the fruits - for diarrhea,
- in Scandinavian countries - dropsy, open wounds, fractures (in the form of poultices),
- in Estonian ethno-medical texts, mountain ash is mentioned among natural anti-cancer agents [10] , etc.

In general, in modern folk medicine, various healing properties of mountain ash are used, but, first of all, urine, bile and diaphoretic, laxative and hemostatic. As a result, with the help of rowan home-made drugs, they eliminate rheumatic and gouty pains, restore the functioning of the gastrointestinal tract, and reduce pressure.

In addition, rowan preparations, due to their rich vitamin composition, are recommended for colds, due to the vascular strengthening effect - for atherosclerosis and heart disease, due to the presence of sorbic acid - for microbial and fungal infections. Dying practices include the use of mountain ash as a contraceptive. Therapy in all these cases is carried out mainly with the help of berries, but other parts of the plant (buds, flowers, leaves, bark) are also used.

The fruits of the plant in a number of folk recipes can be used without additional processing. For example, using fresh raw berries, healers recommend eliminating vitamin deficiencies, increasing

appetite and general protective properties of the body. They are also eaten to prevent the formation of liver stones, in diseases of the gallbladder. Unripe fruits with their pronounced astringent properties are considered an excellent remedy for diarrhea. They prevent fermentation and gas formation in the intestines. At the same time, rowan tea, juice, infusion, decoction and syrup in most cases solve the same problems and are equally popular in home therapy.

- Freshly squeezed rowan juice

It is considered an effective choleretic and diuretic that relieves swelling and removes harmful substances from the body. Diluted juice gargle for colds, and also include it in the complex treatment of hemorrhoids.

With low acidity of the stomach, juice is recommended to be taken for the prevention and treatment of gastritis. You need to drink only 1-2 tsp. half an hour before meals.

With hypertension, atherosclerosis and high cholesterol, fresh rowan juice helps and softens drug treatment, having a moderate effect on the cardiovascular system. The dosage and schedule of admission are almost the same as in the previous case - 2 tbsp. l. half an hour before meals.

- Porridge from fruits and leaves

Such a mixed slurry of mountain ash is prepared at home for the treatment of fungal diseases and eczema. First, the fruits are finely ground with leaves into a paste-like mass, and then wrapped with a bandage for a day to the affected areas of the skin. After removing the bandage, the procedure is repeated, after allowing the skin to dry. A longer, daily break is made a week after the start of the procedures. On these days, fungus or eczema is smeared with sea buckthorn oil.

- Rowan infusions

Infusions are drunk to treat a wide range of diseases (and pathological conditions): aretosclerosis, anemia, beriberi, hypoacid gastritis, as well as diseases of the kidneys, liver, and heart. In case of bleeding, the damaged areas are covered with bandages soaked in rowan infusion.

To prepare an infusion of rowan for a full glass of boiling water (250 ml), you will need 25 g of dry or 60 g of fresh rowan berries. In a thermos, the fruits poured with boiling water are infused for about 4-5 hours, and they drink 100 ml half an hour before meals.

- A decoction of rowan

Rowan decoctions are usually intended for the same purposes as infusions, and although they take longer to prepare, they are also stored longer. First, the berries (dry 25 g / fresh 60 g per 250 ml of water) are kept in a water bath for up to 15 minutes, and then they should be infused in a thermos for another 10 hours.

In addition to a decoction of berries, in folk medicine, the use of a decoction of the flowers of a plant is sometimes practiced. For 250 ml, about 10-12 g of raw materials will be needed. Indications for the use of such a decoction are women's diseases, senile sclerosis, goiter, colds, cough. A decoction of the bark is prepared to treat hypertension.

- rowan syrup

In the treatment of diseases of the stomach, bladder and kidneys, traditional healers prescribe 1-2 tbsp. l. rowan syrup. To prepare it, the berries are ground with sugar in a ratio of 10:6 (for example, 1 kg of raw material per 600 g of sugar) and then kept in a dark place for 3 weeks, periodically squeezing out the syrup. Syrup is usually drunk without dilution, but sometimes mixed with vodka or alcohol. About 50 ml of vodka is taken per liter of syrup. Some folk therapists also treat rheumatism and polyarthritis with this remedy.

In some sources, mountain ash is called a male berry, because its diuretic properties and the ability to improve blood circulation are associated with the prevention of prostatitis. In other sources, rowan is considered a female berry due to the fact that it can be used to reduce excessive amounts of menstrual flow. But, perhaps, it is more correct to call mountain ash a universal plant, the fruits of which, in moderation, are useful to almost everyone.

in oriental medicine

In oriental medicine, red rowan was not a key medicinal plant, but it was still widely used in Tibet, India, and China. Tibetan monks used mountain ash to prepare choleretic and tonic remedies, especially during periods of epidemics. As a rule, complex drinks and multivitamin teas were prepared. In particular, mountain ash was often combined with wild rose and aronia, similar to red mountain ash.

In addition, in Tibetan medicine, rowan fruits were used to treat diarrhea, paralysis, lung diseases, and even anthrax. Lotions from mountain ash tinctures accelerated healing in case of bone fractures. In Indian traditional medicine, rowan remedies were used for scurvy, liver diseases, and hemorrhoids.

In scientific research

Rowan research is currently being conducted in several key areas.

Breeders are interested in the plant's ability to adapt to different growing conditions, the possibility of increasing fruiting and breeding new varieties and hybrids. Technologists and representatives of the food industry - improving the taste and nutritional qualities of berries, the possibility of using mountain ash components in canning products.

In parallel with this, the chemical composition of the fruits of the plant, phenolic and antioxidant profiles of different varieties of mountain ash, as well as changes in the phenolic content and antioxidant activity under different growing conditions and periods (for example, during the growing season) are being actively studied. [11]

However, the most interesting line of research for us is the study of how biologically active substances found in mountain ash can be used in the prevention and treatment of human diseases. There are not very many such projects yet, but a 2019 paper looking at the potential of rowan berry extracts in the treatment of type 2 diabetes can serve as an example. [12]

Scientists have studied the inhibitory activity of rowan berry extract on the digestive enzymes α-amylase and α-glucosidase, since these enzymes are considered important for controlling blood glucose levels in type 2 diabetics.

In the work, 70% acetone extracts of berries of 16 species of mountain ash were tested in vitro (“in vitro”). As a result, the lowest IC50 values against α-amylase and α-glucosidase were obtained in rowan species belonging to Aria subspecies, which had simple leaves compared to pinnately compound leaves of other plant species. Both the carbohydrate and polyphenol fractions were involved

in enzyme inhibition. As a result, scientists came to the conclusion that rowan subspecies Aria could potentially be used to treat type 2 diabetes.

The therapeutic possibilities of mountain ash are also being studied in experiments on laboratory animals. For example, quite recently, in 2020, a group of scientists evaluated the effect of one of the plant species, Sorbus domestica, and its active components on an experimental model of rat colitis caused by acetic acid. [13]

The crude methanolic fruit extract was sequentially fractionated into five sub-extracts; dichloromethane, diethyl ether, ethyl acetate, n-butanol and aqueous extracts. During experiments, the methanol extract and diethyl ether sub-extract resulted in a marked decrease in the levels of MPO, caspase-3, IL-6, TNF-α, MDA, and nitrite in colon tissue and blood. The results of histopathological analysis were confirmed by biochemical parameters.

This led scientists to conclude that the fruits of the plant have important anti-inflammatory and antioxidant activities, making rowan a promising candidate for future use in the prevention and treatment of various diseases, such as inflammatory bowel disease, irritable bowel syndrome, and Clostridium difficile infection.

Weight regulation

Given that the red-fruited mountain ash has a low calorie content (50-55 kcal / 100 g) and a low glycemic index (about 25), it is often included in diet programs aimed at weight loss. At the same time, they do not expect any specific action (for example, associated with fat burning) from mountain ash. Rather, this plant product is replaced by multivitamin complexes to enrich the meager diet on fasting days.

A popular remedy that makes it easier to spend fasting days and lose extra pounds without vitamin losses is a complex of rowan and rosehip fruits. For this, the crushed raw materials (usually 2 tablespoons each) are mixed and poured with a glass of boiling water, after which they are transferred to a dark place for 12 hours. After straining, the liquid is divided into 3 parts (approximately 50-70 ml each) and taken in such portions three times a day after meals.

In cooking

Today you can find dozens of recipes with red rowan, according to which jams, jams, juices, liqueurs, pickled snacks are made. Fashionable chefs are experimenting with different flavor combinations, adding sour mountain ash to fish (instead of lemon) or meat (in the form of a sweet sauce). But these modern trends also have long historical roots.

So, with the onset of autumn in the Ural and Siberian villages, mountain ash was traditionally harvested in various ways (dried, boiled, pickled, frozen) for the subsequent preparation of jelly, kvass, stuffing for pies and stuffed fish, tinctures, wine. By the way, in Tsarist Russia, mountain ash wines successfully competed with French grape wines. Some even received medals (including gold ones) at the World Exhibition in Paris.

Rowan tincture was very popular. They prepared it from the sweet Nevezhinsky mountain ash, but they called it "Nezhinskaya". There was even a legend that in this way the manufacturers (either Shustov or Smirnov) wanted to confuse competitors and add harmony to the name.

Ukrainian villages also had their own traditional rowan "porridge" - frozen fruits were crushed with spoons and mixed with powdered sugar to a paste-like state. The fruits, frozen and sweetened with frost, mixed with flour and honey, were eaten instead of sweets.

In cosmetology

In cosmetology, mountain ash ingredients are used primarily as part of hair care products. But in masks, creams, facial skin tonics, extracts of berries from a number of manufacturers can also be found.

In hair care products, mountain ash is valued for its ability to:

- tone the scalp
- strengthen roots and activate follicles,
- normalize sebaceous secretions,
- eliminate peeling and dandruff.

Hair masks at home are usually made with the addition of a few more natural ingredients: honey, oils (olive, burdock, avocado), flour, etc.

In cosmetics for facial skin, the presence of rowan extracts is due to their antioxidant effect, as well as the ability to:

- prevent the appearance of fine mimic wrinkles,
- reduce sensitivity to the influence of aggressive environmental factors,
- maintain hydrolipid balance.

After applying homemade rowan masks, a “light tan effect” may even occur. This is due to the high content of carotene in the fruit.

And to quickly tone the skin at home, rowan juice is simply frozen in a 1: 1 ratio with distilled water and then the face is rubbed with an ice cube, thereby improving microcirculation, cleansing and narrowing pores.

Dangerous properties of mountain ash and contraindications

Mountain ash (due to the presence of vitamin K in the fruits, which is responsible for blood clotting) should be treated with caution by people who have had a stroke, heart attack, as well as patients with other pathologies of the cardiovascular system due to increased blood clotting.

Mountain ash is prohibited for people with high acidity of gastric juice and associated gastrointestinal diseases. Amygdalin, responsible for the increase in acidity, can potentially be dangerous as a poison that can provoke serious poisoning. Decaying, amygdalin is converted into deadly hydrocyanic acid. However, there is still quite a bit of amygdalin in mountain ash, and the human body neutralizes small doses of cyanide on its own. So if you do not abuse rowan, then the risk of poisoning is minimal.

Mountain ash is also contraindicated in case of signs of individual intolerance and an allergic reaction.

Selection and storage

The best time to collect mountain ash is the period from late September to early November. By this time, the berries have time to gain the greatest amount of nutrients. Later, mountain ash can also be

harvested, but there is a risk of waiting for frosts, and frozen berries are stored worse. However, many people prefer to collect just such fruits, since the taste of mountain ash only improves after the first frost - with the destruction of sorbic acid glycoside, the characteristic bitterness disappears.

It is best to store the collected berries in a refrigerator or cellar at a humidity not exceeding 70%. By lowering the temperature, you can increase the shelf life:

- 10-15°C - up to 2 months,
- 5-10°C - up to 4 months,
- Around 0°C - before the onset of spring,
- Freezing at -18°C will not only keep the mountain ash until the next season, but will also increase the concentration of carotene.

In any case, before placing in a paper bag or plastic container, the mountain ash should be sorted out, cleaned of leaves, twigs, insects, and damaged berries should be discarded.

An alternative to the "cold" method of storage is drying and drying of berries. Before drying, the berries are washed, and then spread in an even layer on a towel or placed in an oven heated to a temperature of about 70 ° C. At the same time, the door is set aside slightly ajar to allow moisture to escape. A finished product is considered if the berries, with a slight squeeze in a handful, stop sticking together.

Before drying, the berries are also washed and then poured for 3-5 minutes with hot water. After this time, hot water is drained and new, cold water is poured, in which the fruits are soaked for another half a day. Then the mountain ash is dried and mixed with sugar (in the proportion of 1 kg of berries to 2 cups of sugar). A day later, the juice is drained or poured into jars, and then the daily cycle with the addition of 2 cups of sugar and the removal of the juice is repeated again.

Next comes the heat treatment of the product. The berries filled with sugar syrup are boiled (but not boiled) for about 5-7 minutes, the syrup is drained, and the fruits are sent to the oven for drying for half an hour at a temperature of 70 ° C. Sometimes the half-hour drying cycle is repeated twice (after a pause necessary for the mountain ash to cool). Often, then you still have to dry the fruits already at room temperature before laying them out in glass jars.

But there are less time-consuming ways to use sugar as a preservative. For example, mountain ash, sprinkled with sugar in layers, can simply be placed in the refrigerator in a compartment with a temperature of 0-5 ° C, where it will lie for several months without deteriorating quality. In addition, often with sugar, mountain ash is ground into puree (in a ratio of 2: 1), closing in glass jars for up to a year. Or “roll up” compotes.

However, the useful substances originally contained in mountain ash do not “survive” the same way in different ways of storage:

- Flavonols, anthocyanins, tannins almost equally remain in dried mountain ash and compotes.
- Carotene and P-active catechin remain more in compotes, although in some varieties of mountain ash (for example, in Sorbinka) carotene is relatively well preserved even when dried.
- Ascorbic acid in dried rowan is preserved better than in preservation. In addition, in mountain ash compotes, the vitamin composition is richer in quantity and quality than in fruits mashed with sugar.
- If grinding fruits with sugar was nevertheless chosen as a storage method, then please note that the safety of vitamin C, flavonols, carotene and catechins will be higher with a single sterilization for 10-20 minutes in closed jars at a temperature of about 90-95 ° FROM. And

here, too, varietal affiliation plays a certain role. Therefore, for this method of storing mountain ash, the Titan variety is more suitable.
- In mountain ash compotes, vitamins are also better preserved if the product is sterilized once for 10-20 minutes at a temperature of 90 ° C. [fourteen]

At the same time, it is better to consider compotes and, moreover, sugar blanks as a necessary measure, since almost always the presence of biologically active substances in rowan fruits is greater than in prepared solutions.

Literature

1. Kolesnikov S.A., Loginov M.V. Biochemical productivity of mountain ash varieties in the Central Black Earth region // AgroXXI. 2010. No. 1-3. pp. 29-30.
2. Hwang HJ, Kim P., Kim CJ, Lee HJ, Shim I., Yin CS, Yang Y., Hahm DH Antinociceptive effect of amygdalin isolated from Prunus armeniaca on formalin-induced pain in rats // Biol. Pharm. Bull. 2008. Aug. 31(8). P. 1559-1564. doi: 10.1248/bpb.31.1559.
3. Aladedunye F., Matthäus B. Phenolic extracts from Sorbus aucuparia (L.) and Malus baccata (L.) berries: antioxidant activity and performance in rapeseed oil during frying and storage - Food Chem. 2014, Sep 15, 159, 273-281. doi.org/10.1016/j.foodchem.2014.02.139
4. Olszewska MA, Michel P. Antioxidant activity of inflorescences, leaves and fruits of three Sorbus species in relation to their polyphenolic composition - Nat. Prod. Res. 2009, 23(16), 1507-1521. doi: 10.1080/14786410802636177.
5. Turumtay H., Midilli A., Turumtay EA, Demir A., Selvi EK, Budak EE, Er H., Kocaimamoglu F., Baykal H., Belduz AO, Atamov V., Sandallı C. Gram (-) DNA microorganisms polymerase inhibition, antibacterial and chemical properties of fruit and leaf extracts of Sorbus acuparia and Sorbus caucasica var. yaltirikii - Biomed. Chromatogr. 2017, Jun., 31(6). doi: 10.1002/bmc.3901.
6. Razina T.G., Zueva E.P., Ulrikh A.V., Rybalkina O.Yu., Tchaikovsky A.V., Isaykina N.V., Kalinkina G.I., Zhdanov V.V., Zyuzkov G. .N. Antitumor effects of the original highly anthocyanin-rich extract of mountain ash and mechanisms of their development - Bulletin of Experimental Biology and Medicine 2016, 162, 7, 107-112.
7. Ulrich A.V. Rowan extract (Sorbus Aucuparia L.) In the complex therapy of experimental tumors - Prospects for the development of fundamental sciences - Collection of scientific papers of the XIII International Conference of Students, Postgraduates and Young Scientists. National Research Tomsk Polytechnic University. 2016 132-134.
8. Brunner U. Some antifungal properties of sorbic acid extracted from berries of rowan (Sorbus aucupatia). December 2010. Journal of biological education 19(1):41-47. DOI: 10.1080/00219266.1985.9654685.
9. Nikitina N.V., Archinova T.Yu. Creation of a wound-healing dermatological ointment with a phytocomplex from mountain ash - Topical issues of modern pharmaceutical technology - Proceedings of the All-Russian scientific and practical conference with international participation. 2016, pp. 101-106.
10. Sak K., Jürisoo K., Raal A. Estonian folk traditional experiences on natural anticancer remedies: from past to the future - Pharm. Biol. 2014, Jul., 52(7), 855-866. doi: 10.3109/13880209.2013.871641.
11. Olszewska MA Variation in the phenolic content and in vitro antioxidant activity of Sorbus aucuparia leaf extracts during vegetation - Acta Pol. Pharm. 2011, Nov-Dec., 68(6), 937-944.
12. Broholm SL, Gramsbergen SM, Nyberg NT, Jäger AK, Staerk D. Potential of Sorbus berry extracts for management of type 2 diabetes: Metabolomics investigation of 1 H NMR spectra, α -amylase and α -glucosidase inhibitory activities, and in vivo anti- hyperglycaemic activity of S. norvegica. J Ethnopharmacol. 2019 Oct 5;242:112061 . doi: 10.1016/j.jep.2019.112061.

13. Küpeli Akkol E, Gürağaç Dereli FT, Taştan H, Sobarzo-Sánchez E, Khan H. Effect of Sorbus domestica and its active constituents in an experimental model of colitis rats induced by acetic acid. J Ethnopharmacol. 2020 Apr 6;251:112521 . doi: 10.1016/j.jep.2019.112521.
14. Zakharov V.L. Vitamin value of rowan fruits with different methods of their preservation and drying. In the world of scientific discoveries, No. 1(73), 2016, p. 75-88. doi: 10.12731/wsd-2016-1-75-88.

An extended HTML version of this article is available on the edaplus.info website

Rowan - useful properties, composition and contraindications

Eliseeva Tatyana, editor-in-chief of the project EdaPlus.info

Yampolsky Aleksey, nutritionist

E-mail: eliseeva.t@edaplus.info, yampolsky.a@edaplus.info

Received 11/12/20

Abstract. The article discusses the main properties of mountain ash and its effect on the human body. A systematic review of modern specialized literature and relevant scientific data was carried out. The chemical composition and nutritional value of berries are indicated, the use of mountain ash in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of mountain ash on the human body under certain medical conditions and diseases are analyzed separately. The scientific foundations of diets with its application are considered.