Walnut (lat. Júglans régia)

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Abstract. The article discusses the main properties of the walnut 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 the nut are indicated, the use in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of walnut on the human body under certain medical conditions and diseases are analyzed separately. The scientific foundations of diets with its use are considered.

Keywords: walnut, benefit, harm, beneficial properties, contraindications

Beneficial features

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

Main substances (g / 100 g):	**Walnut [1]**
Water	4.07
Carbohydrates	13.71
Sugar	2.61
Squirrels	15.23
Alimentary fiber	6.7
Fats	65.21
Calories (kcal)	654
Minerals (mg/100 g):	
Potassium	441
Phosphorus	346
Magnesium	158
Calcium	98
Zinc	3.09

Iron	2.91
Sodium	2
Vitamins (mg/100 g):	
Vitamin C	1.3
Vitamin PP	1.125
Vitamin E	0.70
Vitamin B6	0.537
Vitamin B1	0.341
Vitamin B2	0.150
Vitamin A	0.006

The high content of vitamin C is especially noticeable in comparison with other vitamin-containing products of plant origin, which are considered by the people to be leaders in this indicator: in an unripe (green) walnut, vitamin C is about 40-50 times more than in a lemon, and 8-10 times more than blackcurrant.

According to the content of zinc, walnuts are included in the top 10 products of plant origin, characterized by a high content of this mineral. Among nuts, it is inferior in this indicator only to cedar.

In addition to the vitamins and minerals listed in the table, walnut kernels contain fatty oil, the main components of which include glycerides of various acids (stearic, palmitic, linolenic, oleic), amino acids such as asparagine, valine, histidine, glutamine, serine, cystine, phenylalanine , as well as essential oil, tannins and proteins.

The leaves also contain essential oil and tannins (for example, caffeic and ellagic acids). In addition, the composition includes flavonoids, naphthoquinones, vitamins (C and B groups), carotenoids. This diversity makes it possible to use various parts of the walnut tree in folk and official medicine.

Medicinal properties

The beneficial properties of the walnut, due to its chemical composition, are being studied today in the context of the fight against cancer, Alzheimer's disease, oxidative stress, the possibility of improving the functioning of blood vessels and the heart, and normalizing reproductive function is being studied. The walnut is also being researched for its use in various dietary programs to prevent type 2 diabetes.

Researchers from around the world believe that some components of the walnut kernel can, under certain conditions, exhibit antitumor activity and become key components in the creation of new anticancer drugs. This, for example, is evidenced by the studies of a group of Chinese scientists [2] .

Spanish experts come to similar conclusions, who believe that the walnut in the early stages helps to inhibit the development of cancer, cardiovascular and neurodegenerative diseases [3] . Among the various useful components, scientists have identified the polyphenol ellagitannin, finding that after all the chemical transformations provoked by interaction with the intestinal microflora, ellagitannin has an antioxidant and anti-inflammatory effect. An optimistic forecast for the use of nut components in the fight against breast, prostate and rectal cancer was also given by independent studies by Mexican and Iranian scientists.

Experts recommend including walnuts in your daily diet and to maintain heart health. There are many reasons for the development of cardiovascular diseases, but proper nutrition is one of the most

important ways to reduce risks. Walnut in the diet lowers the level of bad cholesterol (by about 9-16%), lowers blood pressure (by 2-3 mmHg), improves the functioning of the endothelium [4].

Reducing the risk of developing cardiovascular diseases is associated with a large amount of alpha-linolenic acid in walnuts. One study showed that the higher the level of this acid, the greater the chance of avoiding the disease [5].

Indirectly, eating walnuts helps prevent the development of type 2 diabetes, which is associated with obesity. This is due to the fact that the nut menu helps to control the appetite and, accordingly, the weight of patients [6].

The ability of walnut polyunsaturated fatty acids, polyphenols and vitamin E to relieve oxidative stress and thereby prevent the occurrence of neurodegenerative diseases and age-related mental disorders is highly valued. Experiments in a test tube and on laboratory animals have shown that antioxidants and polyunsaturated fatty acids not only prevent the development of oxystress and inflammation in brain cells, but also improve interneuronal connections and promote neurogenesis [7]. A high concentration of tannins, which have a strong antioxidant effect, was found not only in the kernels, but also in the nut film [8].

Thanks to the regular use of walnuts, reproductive function and sperm quality in men improve. Due to the imbalance of the "typical Western diet" high in fat and fast carbohydrates, fertility is reduced, but animal studies have shown that walnuts can partially correct the effects of even such an unhealthy diet [9].

In medicine

In official medicine, walnuts have been used since the time of Avicenna, who treated tuberculosis with crushed kernels with honey, “suppuration from the ear” with squeezed leaf juice, and eye fistulas, gangrene and erysipelas with oil. Hippocrates used a decoction of green shells to stop bleeding, as well as to remove roundworms parasitic in the human body - ascaris, later switching to walnut oil mixed with wine. Already today (before the discovery of more effective remedies), a preparation based on walnut fruits was used to treat tuberculosis, and a medicine based on walnut leaves was used to treat lupus.

Now, for the production of pharmacological agents and phytocomplexes, various parts of walnut fruits, harvested at different degrees of maturity, are also used. So, raw materials are harvested from unripe nuts for the creation of fortified products and vitamin concentrates, and green peel becomes the raw material basis in the production of juglone.

Juglone is a red-yellow crystalline toxic compound isolated from walnuts in 1851. As early as the beginning of the 20th century, doctors in America prescribed juglone for the treatment of skin diseases. Today, juglone is also part of the ointments and solutions prescribed to get rid of skin tuberculosis, epidermophytosis, staphylococcal and streptococcal infections, eczema, and lichen. In some cases, dentists will prescribe juglon-containing drugs for periodontal disease.

Today there is a drug of the same name - "Yuglon", which is registered as a dietary supplement. It is made from pericarp and leaf extract and is recommended not only for the treatment of skin diseases, but also for improving the functioning of the gastrointestinal tract, getting rid of parasites, and therapeutic effects in gynecological disorders. Claimed as a powerful bactericidal, antioxidant, antitumor agent with adaptogenic properties.

In addition to Yuglon, various companies commercially produce other preparations based on black (American) walnut:

- Black walnut syrup with pericarp juice. Contains 50% juice and sucrose. Manufacturers recommend it as a hemostatic and healing agent that improves the functions of the gastrointestinal tract, increases appetite, and normalizes blood pressure.
- Oil (extract) of black walnut. Claimed as a broader drug, used not only to normalize the gastrointestinal tract, reduce pressure and eliminate allergic reactions, but also as a tool that helps in the fight against anemia and diabetes. Iodine in the composition helps maintain thyroid function. It is used as a massage oil and in cosmetic procedures.
- Alcohol tincture. The list of diseases for which this tincture is recommended by the manufacturer includes multiple sclerosis, arthritis, pyelonephritis, and thyroid diseases.
- "Yugor-2". This juice from the kernels of the leaves of the walnut, obtained by cold pressing, in addition to juglone, contains vitamins, organic acids and tannins. It is recommended by the manufacturer as an antifungal and bactericidal agent to combat parasites.

Preparations and dietary supplements based on walnuts with a similar spectrum of action are widely produced by almost all domestic and foreign companies specializing in the production of products from natural ingredients. The creators of homeopathic remedies did not bypass the walnut.

In folk medicine

The practice of using various parts of the walnut tree in folk medicine extends from the Far East to the British Isles.

- In the countries of Southeast Asia, astringents are made from the leaves of the walnut tree.
- In China, the liver and kidneys are treated with walnuts.
- In Nanai healing practice, the bast of a local variety of walnut is used as a means for healing wounds and as an analgesic.
- In Tajikistan, crushed walnut kernels are mixed with grapes for stomach diseases.
- In Georgia, the juice of green nuts is added to honey, which is used to gargle with sore throat.
- In the Caucasus, eating 2-3 nuts a day is recommended to improve vision.
- In Bulgaria, healers include walnut ingredients in remedies for inflammation of the lymph nodes and gums.
- In England, the kernels of mature nuts are used as an ingredient in drugs in the fight against atherosclerosis and diabetes.

In Slavic folk medicine, walnuts, as well as decoctions and infusions from leaves, shells and partitions, heal wounds, improve digestion and metabolism, cleanse the body of toxins, heavy metals, radionuclides, parasitic organisms, relieve psychological and physical overwork.

The astringent properties of walnut leaves allow them to be used for diarrhea. They are also included in the fees prescribed for diseases of the liver and gallbladder. An infusion of partitions is used to treat varicose veins in the legs and pain in the joints. With gout, rheumatism and skin diseases (eczema, abscesses, rashes), walnut-based rubdown infusions and ointments are applied externally. Nut compositions relieve inflammation of the oral cavity, fight scurvy and eye diseases. Green (immature) walnut fruits are used as a multivitamin remedy for beriberi, and are also used as a diaphoretic.

In the second half of the 20th century, a drug became popular among fans of the treatment of folk remedies, which later received the name "Todikamp" (on behalf of its creator Mikhail Petrovich Todik). There are several ways to make this tool, but one of the simplest is the following.

A three-liter jar is filled with green walnuts in the amount of 80-100 pieces and filled with purified kerosene, which must not be topped up by about 7-10 cm. Then the jar is rolled up and lowered into the basement or buried by 60-70 cm. 10-12-kilogram weight or other weight. In this form, the product is aged for 3 months.

The author argued that despite the toxicity of kerosene, its combination with a nut ceases to be a poison and becomes a medicine. With the help of the drug, M. Todik's patients sought to cure sciatica, prostatitis, arthritis, sclerosis, thrombophlebitis, pyelonephritis, hypertension, schizophrenia, cirrhosis, ischemia, and even oncology. In recent history, some followers of M. Todik replaced kerosene with an alcohol solution, while others began to plant American black walnuts instead of European varieties of walnut. But although the basic idea has undergone a number of changes lately, it remains quite popular today.

Decoctions

For decoctions in folk medicine, most often they use not walnut kernels, but leaves, a green shell, partitions and shells. Useful substances in the shell are stored for years, without being destroyed, even in the light. However, after hot water releases them, it is recommended to consume the decoction within 2-3 days after preparation. Often, additional ingredients are added to such decoctions that determine their medical purpose.

- Crushed shells of 10 walnuts in combination with 100 grams of dried hazel leaves are poured into water brought to a boil in advance and simmered over low heat with a loose lid for 30-40 minutes. The decoction cools naturally for about 3-4 hours, after which it is used to treat skin diseases twice a day before meals for 10 days.
- Washed in cold water, crushed walnut shells (2 handfuls), dry bean pods (1 handful) and dry white mulberry leaves (1 handful) in decoctions, some folk healers recommend using for the treatment of diabetes. First, the shell is poured into boiling water (3.5 l) for half an hour, then the beans are added there, and five minutes later - mulberry leaves. The whole mixture is aged on fire for another 10 minutes, after which it is cooled in a natural way, filtered and placed in a refrigerator in a glass container. For therapeutic purposes, the decoction is consumed daily in a glass before bedtime.
- Dried walnut leaves, depending on the concentration of raw materials, are used for menstrual irregularities. To do this, take one and a half tablespoons of chopped walnut leaves, infused for 3 hours in 0.5 liters of boiling water. In case of inflammation in the oral cavity, 2 tablespoons of raw materials are poured into 200 ml of water and brought to a boil, after which they insist for another hour.

In a similar way, decoctions are prepared from partitions extracted from their nutshells. With their help, for example, they restore the functioning of the thyroid gland, the problems of which were caused by a lack of iodine in the body. To do this, the partitions are boiled over low heat for about 10 minutes. Raw materials for one serving are taken in the ratio: 1 cup of water (200 ml) per quarter cup of partitions.

infusions

In folk medicine, green walnut tinctures are used for various purposes: from fighting tuberculosis and diabetes, to protecting the thyroid gland, blood vessels and digestive organs. Most often, the product is

infused in a dark place for 1 to 2 weeks. But there are recipes in which the infusion must be kept in the light during cooking.

- To make a remedy for nodes in the thyroid gland, three dozen green walnuts are cut and poured with 1 liter of alcohol (70%). The mixture is kept in the sun for 2 weeks. After straining, sugar is added to the mixture, with which it is infused for another month.
- For gastritis, a walnut tincture is used, including 0.5 kg of chopped green fruits, a liter of alcohol, 0.5 liters of water and 100 g of sugar. The composition of these ingredients is infused for 3 months. It is used in a tablespoon twice a day for one and a half months. Between courses you need to take a 2-week break. (In the instant recipe, 2 dozen green nuts are poured into 0.5 liters of vodka and aged for 24 days).
- For problems with the urinary tract and gastrointestinal disorders, traditional medicine recommends honey-nut infusion. Nut kernels are crushed (for example, using a meat grinder) and mixed with the same proportion of honey (enamel or glassware is used for mixing). The jars into which the mixture is poured do not need to be sterilized. The infusion is closed with a lid and sent to a dark, cool place for a month.

Alcohol infusions are also made from walnut shells. Despite its hardness, the shell relatively easily releases coumarin, which can be used for antibacterial treatment, as well as other useful substances. Moreover, unlike decoctions, useful substances are stored in infusions longer, and healing agents are made easier.

in oriental medicine

In traditional Tibetan medicine, the vital functions of the body (health and disease) are controlled by three energies: Wind, Bile and Mucus. One energy can dominate in a person, but two (very rarely three) energies can be combined. Depending on this combination (constitution), a person determines his diet, taking into account the criteria of food: 6 tastes, 5 elements, 17 properties.

Among these properties there is, for example, the “cold-warm” parameter. Thus, "warm" food enhances vital "warmth" and weakens "cold". According to this parameter, a walnut is considered a warm food, which enhances the energy of Bile, weakening Wind and Mucus. And in cold seasons, people with a predominance in the constitution of "Wind" and "Slime", as well as old people who lead a sedentary lifestyle, should use a walnut. Moreover, according to daily biorhythms, it should be eaten from 16 to 20 hours and, in most cases, preferably separately from other products. But this rule does not work for people with the constitution of "Bile".

Such an intricate arrangement of the diet may seem unnecessarily complicated to a European. But it should be taken into account that Tibetan medicine assigns 30% to the share of competent nutrition in matters of health (another 30% is responsible for the mental state and 40% for the spine), so every little thing is important in this science.

In scientific research

Even if scientists already know a lot about the benefits of the chemical elements that make up the nut, experimental confirmation is still needed that these beneficial substances are absorbed by the body when consumed and really have a positive effect on health.

Researchers from the USA tested the bioavailability of the antioxidants contained in the nut in an experimental group. The walnut has been selected as one of the richest sources of ellagitannin and tocopherol in the plant world. As a result, according to the increased amount of y-tocopherols (but not

α-tocopherols) and catechins, scientists came to the conclusion that walnut does indeed alleviate oxidative stress, but it is still premature to call it an antioxidant panacea [10].

Scientists from the University of California (Los Angeles, USA) in practice tested the widespread belief that regular consumption of walnuts improves sperm quality. The experiment was conducted on 117 healthy volunteers aged 21 to 35 years. For 3 months, men consumed 75 grams of walnuts daily, without changing anything in the rest of the diet, representing the so-called. "typical western diet". The results were compared with those of the control group, whose representatives did not diversify their menu with walnuts. In men of the first group, both the viability and mobility of spermatozoa improved [11].

An experiment involving 194 healthy adults who ate 43 grams of this product every day for 8 weeks demonstrated the improvement in digestion when eating walnuts. Compared to the period when these same people did not consume walnuts, they had an increase in the number of beneficial bacteria [12].

Scientists tried to confirm the therapeutic effect of nuts in preventing oncology of the breast and rectum in a statistical study involving 104 healthy women and 97 patients suffering from breast cancer. The scientists concluded that those women who regularly consumed at least a few nuts had a 2-3 times lower risk of developing cancer. At the same time, the increase in the amount of walnuts eaten was not as significant a factor as the complete rejection of them. [13]. These statistics were confirmed in a test-tube experiment by another group of scientists who tested a "nut" preparation that stopped the growth of cancer cells taken from the breast and rectum [14].

The potential of walnuts in the fight against Alzheimer's disease was demonstrated by a 10-month experiment on laboratory rodents, which were fed with 6-9% walnuts (this corresponds to about 28-45 grams of the same product per day for a person). In mice, according to the results of test tasks, memory improved, anxiety decreased, they succumbed to learning better, in comparison with those rodents that did not receive a walnut. Researchers have concluded that a dietary nut supplement may help reduce the risk of developing, delay or slow the progression of Alzheimer's disease [15].

Weight regulation

Walnut is a high-calorie product. 100 grams contains about 650 kcal. And, nevertheless, with its help you can control weight and keep yourself in shape.

- First, according to a joint team of researchers from the US Department of Agriculture and the Beltsville Center for Nutrition Research, a person absorbs 21% fewer calories and, accordingly, gains weight more slowly than one would expect from such a high-calorie product [16].
- Secondly, when eating nuts, the feeling of hunger decreases, and with faster saturation, a person overeats less. In a collaborative experiment by an Israeli, Boston, and Massachusetts research group, 10 obese people drank a serving of a smoothie containing 48 grams of ground walnuts daily for 8 days. As a result, they had a decrease in hunger compared to those who drank a placebo with the same amount of nutrients and calories [17].

Similar experiments were carried out by other centers with a large number of participants. For example, scientists from San Diego invited almost three hundred women of different ages (from 25 to 72 years old) who lost weight by reducing the amount of calories they consumed. The menu of the first group of women was compiled with the inclusion of 40 g of nuts per day. As a result, by the end of the experiment, the representatives of the first group lost an average of 10% of their weight, while the representatives of the second group lost only 5%. Scientists see the reason that thanks to nuts, women from the first group were satiated faster and did not want to eat for a longer time.

In cooking

As a product, walnuts are universal - they can be used in baking, in meat or fish dishes, in salads, and in sauces. Therefore, recipes with its inclusion are numerous and varied. Caucasian cuisine is considered one of the champions in the use of nuts in cooking. There, the nut component can even be in soups that are thickened with the help of ground kernels. In particular, this is how, for example, Georgian soup with chicken and walnuts is prepared.

Roasting the kernels brings out their flavor and adds nicotine bitterness. However, in addition to fried, pickled and candied kernels can be found on sale. So, in sugar syrup, walnuts can be found, for example, in Vin de Noi or Nocino liqueurs.

In Turkish, Georgian and Russian cuisines, walnuts are often paired with eggplant. In Georgia, small eggplants are divided into two halves, fried and seasoned with a mixture of ground walnuts with garlic, onion, coriander, tarragon, paprika, celery. Sometimes the dish is sprinkled with pomegranate seeds. Similarly, nearly cut eggplants are stuffed with nuts in Lebanon.

In Mexico, there is a special national dish in the colors of the national flag: "Chiles en nogada". It is a stuffed green chili pepper with a white sauce made from ground walnuts, garnished with red pomegranate seeds. A character in one of the novels by the Mexican author Laura Esquivel died after tasting this dish served at the climax of the wedding, because he, without waiting for the prescribed 20 minutes, immediately went to the marriage bed and did not allow Chiles en nogada to sink into the stomach.

In cosmetology

Even in ancient Greece, walnut fruits (more precisely, a solution of ash from the shell) were used by women to remove body hair. Modern women widely use various nut components in cosmetic procedures. For example, walnut shells are included in facial scrubs. However, nut oil extracts are most widely used.

Walnut oil is used as a softening, moisturizing, anti-inflammatory, anti-aging agent that prevents the formation of wrinkles. Its effect helps to strengthen microvessels, which eliminates the formation of a red capillary network. In summer, oil is applied to the skin to even out tan. Baths for nails, including walnut and lemon oils, are “taken” in order to strengthen the nail plate. And adding a few drops of oil to the shampoo helps to strengthen the hair. For their shine, improvement of structure and staining in chestnut color, a special “nut” powder is also produced.

On an industrial scale, a supercritical CO2 extract is produced from the leaves of the walnut tree. It is an oily mass of a yellowish-brown hue with a specific faint odor. The extract is included in the composition of bactericidal and fungicidal preparations, shampoos, lotions and creams for skin and hair care. Its share in the finished composition is small (from 0.01 to 0.1%), but its role is significant.

There is another non-standard way of using the tannins contained in the nut to protect the skin. In the Far East, when harvesting hay, there was a practice that has survived to this day to rub the palms of walnut leaves to prevent the formation of corns. Although the skin of her hands acquired a brownish tint and coarsened, she was no longer afraid of calluses.

Dangerous properties of walnut and contraindications

Walnut is one of the strongest allergens, which in itself makes it dangerous for people with a severe allergic reaction to this product. There are known cases of the spread of edema in close contact with a

person who had recently eaten several nucleoli. If a child is allergic to this particular nut (and not several other types of nuts), then the chances are high that in the process of growing up the immune system will begin to perceive the product normally, and after 12 years, allergic manifestations will come to naught.

Another, but lesser, threat can occur with intolerance to the nut kernel protein. In this case, the absence in the body of enzymes capable of digesting protein leads to varying degrees of discomfort in the gastrointestinal tract, with extreme manifestations in the form of diarrhea and vomiting.

With caution and after consulting a doctor, you should use a walnut:

- with bowel diseases (irritable bowel syndrome, Crohn's disease, colitis);
- with psoriasis, neurodermatitis and eczema;
- in cases of increased blood clotting and thrombosis;
- with obesity of the 2nd and 3rd types.

A separate serious threat is the use of old rancid nuts, as well as moldy fruits. During long-term storage without a natural shell, fats are oxidized from contact with oxygen (rancidity). Secondary oxidation products are extremely dangerous due to their mutagenic and carcinogenic effects. First of all, the liver, pancreas, and duodenum are hit. In addition, the liver can also become a target for the deadly aflatoxin, an organic compound produced by several types of fungi. Such mold fungi also often develop in walnut fruits.

Selection and storage

The famous Italian chef Giorgio Locatelli advises to buy unshelled nuts at the maximum of flavor intensity and freshness - from December to February. But how to determine the quality of the kernel without destroying the shell, especially since the shape, thickness and smoothness of the protective shell can be more varietal characteristics? Experts advise to reject "bad" fruits according to the following indicators:

1. **Weight** . An empty nut with a dried kernel will be lighter than expected. In a party where a significant part of the nuts are "dummy", the skill to distinguish a full nut from a hollow one comes very quickly and remains for life. But even without this skill, a nut with a dried kernel is relatively easy to guess.
2. **Sound** . Before buying, the fruit should be shaken and listened to the sound: if the nut rattles, then it is most likely old.
3. **Color and spots** . The color of the shell should be even, without dark spots, which may indicate damage to the kernel inside. But in general, this is not the most reliable way to assess quality, since a trace on the outside of the shell may remain from the green shell. But the color of the kernel clearly indicates the quality - you should refuse to buy dark yellow, wrinkled kernels with dark patches.
4. **Smell** . A rancid or sour smell is a very clear sign of a spoiled nut. But usually the shell (if its integrity is not broken) does not let odors through, and therefore this criterion is more related to the evaluation of already peeled nucleoli.

Although the quality of shelled nuts is much easier to assess, they should be purchased with great care. Firstly, in this form, the kernels lose a significant part of their useful properties. Secondly, it increases the risk of contact of the unprotected kernel with harmful substances (the buyer usually does not know where and under what conditions the kernels were stored). If for some reason it turns out to purchase only already purified kernels, it is better to first buy a little “for testing”.

In any case, if in doubt, it’s better not to take risks and refuse to buy, because deadly aflatoxins are formed in moldy kernels, which are not destroyed even during heat treatment, so you should not fry such nuts either - this will not help to avoid the threat of intoxication.

GOST allows storage of nuts in shell for no more than a year, and in a purified form - no more than six months, and even then - subject to the requirements for storage conditions. Walnut fruits do not like air or light. Nut fat is relatively easy to oxidize, become rancid, so keep the peeled kernels tightly closed in a glass jar in a dark cabinet or in the refrigerator. For several months, nuts can be stored in the freezer. Inshell nuts can be stored for up to a year in a dry, ventilated and preferably cool place.

Varieties and cultivation

Walnuts are bred by seeds. At the same time, grafted seedlings grown in nurseries have the most powerful potential. Although this tree is undemanding to soils, if possible, a nut is planted in sandy-stony loose soil rich in lime. So that subsequently the tree does not obscure other plants, it is usually “settled” on the edge of the garden. The crown of the plant is extensive, easily reaching 20 meters in diameter or more.

The plant bears fruit, as a rule, from the age of 7-8 years (sometimes from 4-5 years) and until the end of life - up to about 200-300 years. However, there are also much older fruiting specimens. So, in China (Hotan County), there is a tree that is almost 1400 years old, which gives up to 6.5-7 thousand nuts per year. Especially active fruiting is observed in a separate tree (not in plantations) at the age of one and a half centuries. The average yield of such trees is about 120-150 kg per year. But the literature describes champions capable of producing up to one and a half tons of fruits annually.

Varieties of nuts (except for botanical characteristics and conditions of care) differ in yield, fruit size, shell thickness and grain weight. Experts recommend choosing grafted planting material with a lateral (lateral) type of fruiting, choosing varieties according to growth strength, taking into account agro-climatic zoning, and not to abuse the number of pollinators and varietal mixing in the garden. The most interesting varieties for growing are presented in our rating of nuts.

1. **INTR** . This superlateral variety represents the Ukrainian selection. The walnut is intended for industrial cultivation and is capable of producing up to 25 buds per shoot. The fruits are large (up to 60 g) and this means that about a kilogram of fruits can be collected from a branch, and about 5 bags from a tree.
2. **Pieral-Lara (LARA)** . One of the leaders of the French selection, which gives very large spherical nuts with a flat base and a light kernel. In the harvest, up to 75% are fruits with a caliber of 34-35 mm or more. The shell, although strong, is thin, which allows you to get up to 50% of the total mass at the output. The kernel has a sweet taste.
3. **Cossack** . An even greater percentage of the kernel from the total mass (up to 60%) is demonstrated by the classic tall variety, which represents the Moldovan selection in the ranking. Popularity was added to it by resistance to diseases, low temperatures, combined with high productivity (about 3.5-4 t / ha). Medium-sized fruits are cylindrical in shape.
4. **Chandler** . American breeders (from the University of California) brought out a high-performance, but capricious variety to temperature changes. The tree is characterized by a gradual increase in the percentage of lateral fruiting, which reaches 90% with an increase in growing seasons. Small fruits are oval in shape.
5. **Shebin** . This variety, representing the Turkish selection, is distinguished by abundant fruiting and a wide area of \u200b\u200bsettlement (except for coastal areas). Fruits of 40 mm caliber are collected in clusters and from the total mass give about 50% of the output product. They have a thin shell and a dense core of light yellow color.

Regular use of any kind of nut, even in small quantities, improves the functioning of the brain vessels, increases mental and physical performance, normalizes heart function and reproduction, which, combined with its recognizable taste, explains the unflagging popularity of this product.

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

Walnut - useful properties, composition and contraindications

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Abstract. The article discusses the main properties of the walnut 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 the nut are indicated, the use in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of walnut on the human body under certain medical conditions and diseases are analyzed separately. Considered scientific basics diets With his application.