

Feijoa (lat. Ácca sellowiána)

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 feijoa and its impact 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 product are indicated, the use of feijoa in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of feijoa 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: feijoa, benefit, harm, beneficial properties, contraindications

Beneficial features

Table 1. Chemical composition of feijoa (according to <u>Food+</u>).

Main substances (g / 100 g):	Fresh feijoa [1]
Water	83.28
Carbohydrates	15.21
Sugar	8.2
Alimentary fiber	6.4
Squirrels	0.71
Fats	0.42
Calories (kcal)	61
Minerals (mg/100 g):	
Potassium	172
Calcium	17
Phosphorus	19
Magnesium	9
Sodium	3
Iron	0.14
Zinc	0.06
Manganese	0.084

Copper	0.036
Vitamins (mg/100 g):	
Vitamin C	32.9
Vitamin PP	0.295
Vitamin E	0.16
Vitamin B6	0.067
Vitamin B2	0.018
Vitamin B1	0.006

Water-soluble iodine is the key ingredient in feijoa. But the estimate of its concentration in different sources varies greatly.

So, according to the TSB, 1 kilogram of fresh berries contains from 15 to 25 "servings" equal to the daily norm of iodine needed by an adult (or from 10 to 20 daily norms of pregnant women, whose need for iodine increases). In absolute numerical terms, the content of this trace element ranges from 2.06 mg to 3.9 mg per kilogram of raw product.

However, in the information tables for this trace element, data are often given in terms of dry matter. And in this expression, according to the research of R.G. Melkadze (2007), carried out using a modified method of Kh.N. Pochinok, in 100 g of feijoa, there are from 8-9 mg to 35 mg of iodine. Such a difference (more than 4 times between the indicators) is due to the territorial remoteness of the plant (or plantation) from the sea (more precisely, from soils rich in iodine). As a rule, the closer to the coast feijoa grows, the higher the iodine content in the fruit.

For example, in the village of Makhinjauri, adjacent to the sea, the iodine content turned out to be maximum (35 mg / 100 g), at a distance of a kilometer from the sea (in the Batumi Botanical Garden) - 22 mg / 100 g, and 10 km from the coast (Ozurgeti) - 12 mg / 100 g. At a distance of 100 km from the sea, the amount of iodine in the fruit was close to the minimum values (8 mg / 100 g), but still large enough to eliminate iodine deficiency when feijoa was included in the daily diet [2] . At the same time, it should be noted that not all soils, even those directly adjacent to the sea, are equally rich in iodine, and vice versa - there can be a lot of iodine in territories that are located far from the coast today, but in the past covered by the ocean.

The authors of the varietal analysis of the chemical composition of the Abkhazian feijoa determined in their study the iodine content in fruits at the level of 0.012-0.0146 mg ($12\text{-}14.6~\mu\text{g}$) / 100~g, although they rated this concentration as high, since iodine content in the berries of other crops does not exceed $0.005~\mu\text{g}/100~\text{g}$ [3].

Despite the fact that "essentially" the data of various studies indicate a sufficiently large amount of iodine in feijoa fruits, there is also a critical opinion on this matter. In particular, Grigory Gerasimov, Doctor of Medical Sciences, professor and WHO expert considers feijoa (just like persimmon and kiwi) a poor source of iodine, calling common ideas about the listed fruits naive and arguing that among plant products only seaweed can accumulate in their tissues a sufficient amount of a valuable element.

Researchers are more unanimous in assessing the potential of feijoa in providing the human body with ascorbic acid. It is believed that 100 grams of vitamin C contains about a third of the daily requirement (about 30-40 mg / 100 g if you need to consume 90 mg of vitamin C for men and 75 mg for women per day). The riper the fruit, the greater the concentration of vitamin C in it. Although significant varietal variations are also possible in this indicator even within the same growing region (for example,

from 44 mg / 100 g for the Allegro variety to 5.23 mg / 100 g for the grade "HCP 0.5"). Fruits from Australian plantations contain much more vitamin C, up to 63 mg/100 g [4].

The same studies found high levels of antioxidant flavonoids, pantothenic acid (0.2 mg/100 g), fiber (6.8 g/100 g) and potassium (255 mg/100 g). Moreover, the edible skin of this fruit contains more flavonoids and vitamin C than the pulp.

Feijoa berries are distinguished by a fairly pronounced acidity (from 1.26% to 2.64%) with a clear predominance of citric acid and a significantly lower amount of malic, tartaric and succinic acids. They have a high content of minerals, exceeding these figures in pears, apples and fruits of most stone fruits. Silicon in 100 g of feijoa fruits contains about 55-60% of the daily norm, boron - 45-50%, chromium and cobalt - 15%, rubidium - 10%. Phytosterols (up to 50%), pectin substances (up to 40%), monosaccharides (with a predominance of glucose) and disaccharides were also found in feijoa.

Medicinal properties

Feijoa is valued not only for its special taste, but also for its medicinal and dietary properties. The fruits of this plant are used to treat thyroid diseases, metabolic problems, and are prescribed when symptoms of atherosclerosis occur. For therapeutic purposes, feijoa is used with a lack of ascorbic acid, as well as with inflammation of the gastrointestinal tract, pancreas, pyelonephritis.

Despite conflicting opinions in assessing the iodine content in feijoa fruits and a real significant difference in indicators for this parameter, depending on the location of the plant, it is believed that when buying berries from regions with iodine-rich soils, you can still get the daily norm of a valuable element by eating 2 to 7 fruits per day.

Iodine is critical for the functioning of the thyroid gland, which controls the body's metabolism. This element also affects cerebral circulation (with iodine deficiency, a violation of cognitive functions occurs). With a lack of iodine in the body of a pregnant woman, a hormonal imbalance occurs, which affects the state of the central nervous system of the developing child, which, ultimately, can lead to mental retardation of the newborn. Symptoms of pathology can also occur in previously healthy people who are faced with chronic iodine deficiency. In addition to the thyroid gland, iodine therapy is necessary for the ovaries, mammary glands, large intestine, gastric mucosa, and skin.

Feijoa can be used as a remedy that can prevent gastrointestinal disorders and restore the digestive system by activating intestinal motility.

This product has anti-inflammatory, immunostimulatory, tonic, anti-sclerotic, antioxidant properties. In particular, the antioxidant effect is created by phenolic compounds of the feijoa peel (caterines, leucoanthocyanins). Thanks to them, the prevention of the development of oncological processes is also ensured. The antifungal activity of feijoa berry essential oil and antibacterial activity against Staphylococcus aureus and Escherichia coli have been experimentally confirmed.

Vitamin P contained in feijoa helps to lower blood pressure, and pectin in the composition helps to eliminate toxins and free radicals. It also improves peripheral blood supply, preventing cell damage and, as a result, aging of the body.

Use in medicine

In the existing pharmaceutical practice, the possibility of harvesting feijoa leaves as a raw material for medicinal preparations is being considered. And the extracts of the fruits of the plant are already on the market today in the status of dietary supplements and herbal supplements.

So, for example, on sale you can find a vegetable complex of oils in capsules "Women's Health", which contain extracts of feijoa berries, kelp, flax seed oil. The drug is declared as a means to normalize the functioning of the thyroid gland and prevent the development of female diseases.

In folk medicine

Traditionally, the use of feijoa fruits and leaves in folk medicine is wider. Healers use "pineapple grass" (as feijoa is sometimes called) to regulate the functioning of the stomach and intestines (for the treatment of inflammation of the mucous membranes of the large and small intestines), get rid of constipation, treat Graves' disease, gout, atherosclerosis, dermatitis of various nature, pyelonephritis.

The essential oil of the fruit is considered an effective anti-inflammatory agent that can cope with dermatitis and strengthen hair. A decoction of the leaves as an antiseptic and wound healing agent is prescribed for periodontitis, lesions of the oral mucosa and other diseases of the teeth and gums.

Like other iodine-rich foods, traditional medicine recommends feijoa as a prophylactic in the fight against a possible hangover. In addition to other measures that reduce the risk of a hangover syndrome (for example, the use of vitamin B6, glutargin, mezim, succinic acid, choleretic drugs, etc.), healers advise including feijoa in the diet 1-2 days before the feast, which should ease the effect of alcohol on the body.

Decoctions and infusions

In folk medicine, mainly decoctions and infusions of feijoa leaves are used, less often - tree bark.

Infusion (tea) from leaves and flowers from urological problems. For one glass (200 ml) of boiling water, you need 1 tablespoon of dried leaves. Tea is prepared for 30 minutes, after which it is drunk half a glass twice a day with the addition of honey. The course lasts 2 weeks.

Leaf decoction for periodontitis. In this recipe, the ingredients are taken in the same proportion (1 tablespoon per 200 ml of water), but the raw materials are boiled over low heat for 20-30 minutes. Apply a decoction in the form of lotions or frequent rinses of the mouth.

A decoction of the bark for healing skin lesions. To prepare a lotion, chopped tree bark (1 cup) is boiled in a liter of water for an hour. Then the mixture is filtered, and the bandages soaked in the broth are applied to the damaged areas of the skin.

in oriental medicine

feijoa was not known outside of South America until the end of the 19th century, there are no ancient Eastern traditions of using this berry for medicinal purposes. However, modern followers of the principles of Chinese and Tibetan medicine, by analogy, include feijoa in various therapeutic programs.

In some works, the fruits of the plant are mentioned as antidepressants, in others - among the foods with hepatoprotective properties (having a positive effect on liver function). Like other acidic feijoa berries, it is recommended to suppress excessive lung energy. But since the abuse of sour food supports the energy of Fire, with its excess, it is not recommended to lean on these fruits.

In scientific research

In search of new ways to combat various diseases, scientists are studying both the pulp of the feijoa fruit and the leaves.

Test-tube experiments on cells have shown that feijoa essential oil can have antioxidant effects and fight free radicals. In addition, it also works as a cytoprotector - it protects lymphocytes from damage and oxidation. There is also preliminary evidence that feijoa essential oil affects Staphylococcus aureus (S. aureus) and diploid fungus (C. albicans) bacteria. The severity of the effect depends on the dose of essential oil [5].

The anti-inflammatory properties of feijoa have been found in extracts from the pulp, skin, and whole fruit. For the study, 4 varieties Appolo, Unique, Opal were used star and Wiki Tu. Experiments were carried out on cells, finding that among the three extracts, the preparation created from the peel was the most effective, and among the varieties, Appolo demonstrated the best results. The researchers claim that feijoa extract has been shown to be more effective than ibuprofen in some cases. From this, scientists concluded that the feijoa fruit can be very useful in the treatment and prevention of inflammatory diseases, especially those associated with the intestines [6].

The scientists tested the effects of phenol-rich feijoa skin and pulp extracts on mercury-affected red blood cells. Mercury can enter the human body even with food, provoking various pathologies: from kidney disease to cardiovascular problems. During the tests, it turned out that the extracts successfully combat mercury toxicity and oxidative stress. In general, the skin extract had a more pronounced protective effect, but the pulp extract showed itself better in some individual parameters. More extensive research is needed to make definitive conclusions about the use of feijoa to combat diseases caused by exposure to mercury [7].

Due to its composition, feijoa leaf extract can function as an Ach inhibitor in the body, slowing down the activity of certain enzymes and at the same time increasing the level of the neurotransmitter acetylcholine. This is necessary for the treatment of dementia with Lewy bodies, Alzheimer's disease, myasthenia gravis, etc. In addition to the standard set of components (proteins, carbohydrates, fats, fiber), the leaf extract contains various phenolic compounds, including flavonols (quercetin glycosides, catechins, proceanidins) [eight].

Feijoa extract obtained with ethanol is effective in the fight against toxoplasma. Toxoplasma is a genus of parasites that cause toxoplasmosis in animals and humans. Cats are especially susceptible to this disease, but sometimes it occurs in humans. Despite the fact that the disease usually proceeds without complications, existing drugs have a number of limitations, so scientists are trying to find new methods of therapy. The results of test-tube studies were confirmed after experiments with mice that were given intra-abdominal injections of parasites. When treated with feijoa extract (100 and 200 mg/kg/day for 5 days), they showed much better survival [9].

Feijoa can be considered an effective natural antidepressant . This conclusion was reached by Iranian scientists who took Swiss albino mice for the experiment. They were subjected to 2 tests (forced immersion test and forced suspension test), the results of which are usually judged on the effectiveness of antidepressants. One group of mice was given the fruit extract, another was given the leaf extract, and a third (control) was given the antidepressant imipramine. By comparing the two extracts and the drug, it turned out that the reaction of mice was better, and the immobility time was shorter in the case of using feijoa extracts. At the same time, the leaf extract was more effective than the fruit extract [10].

Feijoa acetone extract has anti-cancer properties. Feijoa extract acts selectively on infected cells and does not have a toxic effect on normal myeloid precursors. The extract is especially effective in leukemia, and scientists consider flavone to be the main active substance in this process [11].

Weight regulation

Feijoa, with its 50-70 kcal / 100 g, cannot be called a very high-calorie product, but it is rarely made the basis of diets. Most often, the berry is included in the diet as an element of a loose dinner or precedes a meal, since the fiber and pectin in the pulp of the fruit increase intestinal motility and stimulate the digestion process.

In cooking

Due to the pleasant combined taste, which may contain notes of strawberry (strawberry), pineapple, gooseberry, lemon and kiwi, feijoa is eaten mainly fresh, cutting the fruit in half and eating out the jelly-like pulp. However, sometimes "out of childish habit", along with the pulp, they also eat the peel, which gives the berry an astringent bitter taste.

Recently, the "southern" tradition of making preserves and jams from feijoa has spread. To prepare raw jam, it is enough to grind the fruits in a meat grinder (it is possible together with the skin), add sugar at the rate of 600 g per 1 kg of fruit and, after dissolving it, arrange it in sterile jars (containers). Store this jam in the refrigerator, in the freezer. If necessary, they can fill pies.

In addition, soft drinks, wine, tinctures are made from feijoa. So, to create a feijoa aperitif at home, the jar is filled with fruits cut in half (or into 4 slices), sugar is added (2-3 tsp per liter), poured with vodka, tightly closed and shaken. This "shaking" is repeated once a week. The aperitif is infused for 2-3 months in a dark place, after which it is bottled with straining.

Although heat treatment reduces the benefits of feijoa, this does not prevent cooking the famous Georgian churchkhela based on the juice of this berry thickened with flour, which many consider more delicious than the traditional sweetness from grape or pomegranate juice.

In cosmetology

On the basis of feijoa extract, which exhibits anti-inflammatory, antibacterial, antifungal and hemostatic effects, a number of cosmetic preparations are made:

- therapeutic mixtures against psoriasis and for the restoration of the skin,
- antioxidant agents,
- anti-couperose compounds,
- skin tightening, anti-cellulite, toning and tightening serums,
- pastes and rinses for oral care,
- shampoos and conditioners for hair care.

The therapeutic effect that feijoa fruit oil and extract has is used both in home cosmetology and in the beauty industry by manufacturers of skin and hair care products. Creams and shampoos based on feijoa fruit oils are created not only in foreign countries, but also in the post-Soviet countries. Known, for example, body cream "Yuzu and Feijoa" from TM Cafe Mimi (Russia), serum-cocktail for hair "Litchi-Feijoa" from Estel Professional Mohito (Russia), cream-shower gel with flower oils "Feijoa and mint » from Vitex (Belarus) and others.

The severity of the therapeutic effect depends on the concentration of the feijoa extract, and in the manufacture of cosmetics at home, it varies from 2% in shower gels, lotions and light creams, to 30% in concentrated serums. So, for example, antiseptic formulations and anti-couperose agents usually contain from 5 to 15% of the extract, moisturizers - 8-10%, creams and ointments with a therapeutic

effect - 3-10%, etc. To maintain the effect, feijoa extract is introduced into the composition of the final product at a temperature not exceeding 40 C. The pH level of this ingredient is about 4.7-4.9.

As an example of making homemade cosmetics with feijoa, we can give a recipe for a mask for oily skin: the pulp of a berry (1/2 cup) ground into gruel is mixed with lemon juice (1 tablespoon) and camphor alcohol (1 tablespoon), applied on the face and after 15 minutes it is washed off with warm water. To get the result, it is enough to make such a mask twice a week.

Dangerous properties and contraindications

It is believed that the systematic abuse of feijoa can be harmful due to the high content of iodine in it, which is not indicated with an increase in the concentration of hormones T4 and T3 (with thyrotoxicosis) and adenoma (autonomous thyroid gland nodes). But the risk of overdose is minimal, since the inhabitants of our country (as an iodine-deficient region) are at great risk of deficiency of this element.

Feijoa berries can also harm people who are overweight and have diabetes. You should not eat unripe fruits. This can lead to digestive upset. Also, in order to avoid frustration, you should not eat pectincontaining feijoa fruits along with milk.

Selection and storage

When choosing feijoa, they are guided, first of all, by the elasticity of the berry and its appearance. Fruits should be chosen without darkening, black blotches and stripes. If you want to immediately pick up more ripe fruits, then before buying, you should determine their rigidity by pressing: very hard berries have not yet ripened and they will have to be ripened at home.

If it is possible to see a sample of the presented batch of feijoa in a section before buying, then you can focus on the color of the pulp, which for ripe berries will be creamy at the edges, and closer to the center - almost transparent, jelly-like consistency. The brown color of the pulp and darkening on it indicate the beginning of the processes of decay and the need to reject such a product, and the white pulp indicates the immaturity of the fruit.

Feijoa storage is an acute problem, since the season of this berry lasts from September (when it is still very expensive) until the end of January (when it is already very expensive). Moreover, the first batches are still completely immature fruits that would ripen on a tree only by the end of autumn and the beginning of winter.

Feijoa is often referred to as a "capricious" berry, due to the fact that it does not tolerate storage well. However, this applies to a greater extent to already ripened fruits, which are not even recommended to be kept in the refrigerator for more than a week - they begin to darken and wither. Therefore, for transportation, feijoa is still unripe with dense white flesh. But feijoa ripens easily at home, if you just leave the fruits at room temperature (+ 23-25C) in a well-ventilated place. At lower temperatures, the ripening time increases. At a temperature of about 10 C, this process takes about 7-10 days.

The exact parameters of keeping quality of fruits depend on the variety of feijoa. So, for example, it was experimentally found that at a temperature of 0-2 C and a humidity of 85%, the "hardy" variety Sidling after 20 days of storage "loses" only 5% of the fruits (they begin to rot and blacken). The remaining berries retain a smooth skin without dents and damage to the pulp. In varieties with low keeping quality, the rejection rate for the same period is about 20-30%. On average, for three weeks of proper storage in the refrigerator, you can miss about 10-15% of the stock. Experts do not recommend

freezing feijoa. It is believed that the thawed berry changes its physical and technical properties and can only be used for processing into sauces.

The chemical composition also changes unevenly during storage. But when creating conditions for a controlled atmosphere (with 3% CO 2 and the same amount of O 2), in 2/3 of the fruits of the varieties Sidling, Superba, Allegro, etc., it is possible to maintain a chemical composition close to the original values, although even in this case it was observed decrease in the content of ascorbic acid.

How to grow feijoa from seeds at home

Although under natural favorable conditions this plant reaches a height of 4-6 meters, in rooms and on loggias feijoa usually grows no more than 1-2 meters. The decorative effect is enhanced by a well-formed crown, decorated with four-membered white-pink flowers with many scarlet stamens, which appear on the branches by mid-late spring as early as 3 years after planting.

Since feijoa is a photophilous plant, to simplify its care, it is better to sow by the end of winter with increasing daylight hours - then additional illumination is not required.

Seeds. For growing feijoa from seeds, ripe soft fruits are chosen (if necessary, they are ripened in a well-ventilated, warm and bright place). The fruit is cut, and the seeds are separated from the pulp by spreading it over a dense tissue, followed by rinsing under running water. When the cloth dries along with the seeds, they can be poured into a pot.

Sowing. The soil for feijoa seeds should consist of a mixture of turf and sand in equal proportions. Often, turf, sand and humus are taken in equal proportions. Drainage (expanded clay or sand) is laid out at the bottom of the pot. Seeds are not buried, but evenly distributed over the surface of the soil and slightly pressed, but taking into account the fact that light must fall on them for germination. Sometimes, to facilitate sowing, the seeds are pre-mixed with sand, which is then scattered over the surface of the pot. The soil is moistened from the sprayer with a pinkish solution of potassium permanganate.

Germination. Moistened soil is covered with a transparent film or glass jar, and the pot is set in warmth and light. The top layer of the soil must be kept moist until sprouts appear (after about 2-4 weeks). At the same time, it should be ventilated daily, and condensate should be removed from the inner walls of the "greenhouse". Shoots after the appearance will have to be thinned out, pulling out all the weakened and unviable.

Pick. Feijoa seating in separate small pots is carried out during the formation of plants from 2 to 4 pairs of true leaves. To do this, take 6 shares of sod land, 4 shares of leaf humus, and one share of coarse sand and manure fertilizer. Sprouts require regular watering through a sump and daily misting with a sprayer during periods when the air in the room is too dry. Top dressing during active growth is carried out with organic and / or mineral fertilizers once every 2 weeks.

Transplant and pruning. For the first three years, feijoa is transplanted three times, then once every two years, and old bushes are transplanted no more than once every 5 years. This should be done carefully so as not to damage the fragile root system. To form a crown, all shoots and shoots are regularly removed from the lower quarter of the trunk. Do this if necessary, either in early spring or late autumn.

In general, feijoa is considered an unpretentious plant, which from spring to autumn may well be spent on an unshaded balcony or garden. Most of the flowers will not give an ovary, but this is the specificity of the plant itself, and not the care of it - the coefficient of useful ovary in feijoa is at the level of about 15%.

Despite this, even a small harvest will delight with rare and tasty fruits, which, with proper care, will be able to provide the amateur gardener with useful vitamins and trace elements, especially if their content in the soil is adjusted with timely top dressing.

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

Yampolsky Aleksey, nutritionist

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

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