# USE AND PHARMACEUTICAL PROPERTIES OF ROCKET (ERUCA VESICARIA) AND COMMON GOLDENROD (SOLIDAGO VIRGAUREA) PLANTS

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**Annotation:** This article focuses on the research of two plants—arugula (Eruca vesicaria) and European goldenrod (Solidago virgaurea)—which have been traditionally used in folk medicine and are also significant in the food industry. The study presents the results of scientific investigations into the systematics, geographic distribution, origin, and bioecology of these plant species cultivated in various regions of our country. The research also addresses important issues such as providing the population with high-quality food and medicinal plant products, and gaining a deeper understanding of their biological and agrotechnical characteristics

**Keywords:** Eruca vesicaria, Arugula, Solidago virgaurea, common goldenrod, pharmaceutical properties, medicinal plants, phytotherapy, chemical composition, bioactive compounds, traditional medicine.

In recent years, significant attention has been given in our country to the development of medicinal and spice plants, particularly to the effective and efficient use of natural resources. Notably, the Presidential Decree of the Republic of Uzbekistan No. PQ-4670 dated April 10, 2020, "On measures for the protection of wild medicinal plants, their cultivation, processing, and rational use of existing resources," has laid the legal foundation for the fundamental development of the sector.

As a result of implementing the tasks outlined in this decree, the number of farmers and entrepreneurs engaged not only in harvesting medicinal plants from the wild but also in cultivating and processing them through plantation methods has significantly increased. Today, due to increased attention to the field and the rational use of available opportunities, more than 100 types of medicinal plants have been officially approved for use in medical practice in the republic, with the majority of these being naturally growing plants.

The raw material reserves of these naturally growing medicinal plants are limited, and thus it is an urgent issue to protect them, study their bioecological characteristics, use the raw materials properly, and develop scientifically-based methods for their reproduction. Therefore, it is essential to meet the needs of the pharmaceutical industry in Uzbekistan with raw materials from medicinal plants, enrich the local flora with newly introduced plant species, and develop technologies for their cultivation.

In particular, at the beginning of 2020, plantation areas of 27 types of medicinal plants covered a total of 11.5 thousand hectares across all regions of the republic. By the end of 2021, plantation areas were expanded to 15.8 thousand hectares by 162 entities, and 17.3 thousand tons of raw materials from 45 types of medicinal and spice plants—highly demanded in domestic and international markets—were produced.

Among the medicinal plants rich in healing properties, arugula is considered one of the most promising species for cultivation. The arugula plant (*Eruca sativa*) is an annual, dicotyledonous herbaceous plant. Its value lies in the fact that it contains a wealth of vitamins such as vitamin A (beta-carotene), B1, B2, B4, B5, B6, B9, C, K, and E, as well as micro- and macroelements including zinc, selenium, magnesium, manganese, copper, phosphorus, sodium, and iron. Its aphrodisiac properties and the presence of the compound sulforaphane further contribute to its medicinal value.

The arugula plant (*Eruca vesicaria*), also an annual dicotyledonous herbaceous plant, belongs to the *Indau* genus of the *Brassicaceae* (mustard) family. Rich in essential nutrients and beneficial compounds required for the human body, this medicinal plant is widely cultivated in Italy and many other countries, particularly in Northern Europe and America. In Uzbekistan, the cultural cultivation of this plant has only recently begun in certain regions.

Arugula is known by several names, including rocket salad, indau, eruca, arugula, and others. This leafy green has existed since ancient Roman times and is widely cultivated in Europe and America, where it is considered a superfood. It does not grow wild in Uzbekistan and has only been cultivated since 2016. While in many countries arugula grows on its own like a weed, in our country it requires special care and attention. It needs frequent watering and protection from direct sunlight. For this reason, it is possible to grow arugula at home in pots or containers.

In early spring, the plant is sown in pre-prepared soil at a depth of 3–5 mm. Taking into account the biological characteristics of the plant, it is advisable to

plant it on ridges 30 cm wide, with 25–30 cm spacing between the ridges and 10–15 cm between the plants in a checkerboard pattern. The seeds are very small and require moist soil. At 12°C, the seeds germinate in 3–5 days, and they grow well at temperatures between 18–24°C.

Sources dating back to the first centuries BCE mention the medicinal and aphrodisiac properties of arugula. In ancient Rome, it was used as a spice to enhance the taste of vegetable and meat dishes. It has long been known to help digest protein-rich foods like beans and peas, which are typically hard to digest.

Arugula is rich in iron and calcium, which improve bone and cardiovascular function, slow down cellular aging, help regulate water and salt balance in the body, provide energy, and calm the nervous system. It is considered an excellent product for people following a diet. Arugula contains many connective tissues that contribute to a prolonged feeling of fullness.

100 grams of arugula contains 25 kcal, of which 0.7 grams are fats, 2.6 grams are proteins, and 3.7 grams are carbohydrates. The compound sulforaphane found in arugula is known as an agent used in the prevention of oncological (cancer) diseases. This component helps prevent the development of cancerous tumors caused by the division of cells affected by cancer in the body.

Due to the presence of sulforaphane in arugula, its regular consumption can provide effective benefits in preventing and combating the development of oncological (cancer-related) diseases.

Common goldenrod (*Solidago virgaurea*), also known as goldenrod or solidago, is classified as a perennial herbaceous plant. It can grow from 30 cm to 2 meters tall. The stem is upright, and the leaves are elliptic in shape, slightly pointed, and arranged regularly. The lower leaf blades form winged petioles, while the middle and upper leaves are narrower and sessile. All parts of the plant exhibit light pubescence. The rhizome is short, strong, and woody. The flowers are yellow, and their small flower heads are grouped into inflorescences. The fruits are cylindrical, ribbed achenes, topped with brown tufts of hairs.

Flowering occurs in August and September. The small, bright yellow flower heads are gathered into paniculate inflorescences. After pollination, the plant produces fruits—brown achenes with a small tuft of hairs.

Goldenrod is widely distributed across Siberia, the European part of the Russian Federation, the North Caucasus, the Far East, Scandinavia, the Mediterranean region, and North America due to its high tolerance to soil types, light conditions, drought, and harsh cold. It can be found on forest edges,

meadows, clearings, and roadsides. It thrives in light forests, riverbanks, and grasslands.

This perennial plant grows well in light, sandy, well-fertilized, breathable soils with regular watering. The fragrant aroma of solidago is explained by its chemical composition, which includes essential oils (up to 1.4%) and aromatic acids. During the flowering period, the plant emits a pleasant, sharp herbal fragrance with notes of pine needles and camphor.

The plant is valued for its medicinal properties. For medicinal raw material preparation, the upper part of the stem, inflorescences, and leaves are used, while the root system is used less frequently.

The chemical composition of goldenrod includes:

- Flavonoids
- Essential oils
- Coumarins
- Resins
- Tannins
- Acids
- Bitters
- Traces of alkaloids
- Phytoecdysteroids
- Triterpenoids
- Saponins

Inulin is found in the root system, fatty oils in the fruits, and galactose, carbohydrates, glucose, and arabinose in the inflorescences

The medicinal properties and uses of goldenrod are indicated for the treatment of the following conditions:

- Purulent inflammatory processes on the skin
- Swelling
- Kidney diseases
- Bone fractures
- Bronchitis
- Liver problems
- Influenza
- Nephritis
- Bronchial asthma
- Urolithiasis (kidney stones)
- Hypertension

- Common colds
- Abdominal pain
- Pyelonephritis
- Bladder disorders

The plant helps relieve gout and rheumatism. It is also used to treat fresh skin abscesses and boils.

Mouth rinses with an infusion of the plant are used to treat:

- Stomatitis
- Tonsillitis (angina)
- Gingivitis
- Bleeding gums

A decoction of goldenrod helps eliminate unpleasant mouth odor.

The pain of arthritis can be relieved by external application of goldenrod in the form of ointments or compresses. In cases of burns, it helps to soften the skin and accelerate the healing of joints.

Goldenrod also helps in weight management. It regulates the genes responsible for fat synthesis and the size of fat cells, thereby aiding in the fight against excess body weight.

Today, interest in medicinal plants is steadily increasing. During the global pandemic, people have begun to pay more attention to their health, becoming more aware of the secrets of well-being. Individuals suffering from aging and chronic diseases increasingly prefer natural remedies to boost their immune systems. The absolute harmlessness and benefits of natural products have led to a sharp rise in both the volume of investment in scientific research in this field and the demand for medicinal plants in international markets.

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