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## **Economic and Biological Importance of Legumes: Industrial and Phytotherapeutic Applications**

### **Abstract**

The article discusses the biological and economic benefits of leguminous plants, as well as their role in soil nitrogen enrichment and the utilization of different species. The legume family is a widespread group of plants with a wide range of applications worldwide. Legumes are used in agriculture as fodder and sideral plants, in industry as technical and dyeing raw materials, and in medicine as medicinal plants.

More than 440 species of leguminous plants grow in Azerbaijan. Thanks to bacteria of the genus *Rhizobium* living in their root system, legumes play an important role in increasing the nitrogen content of the soil. The types included in the section, such as *Styphnolobium japonicum* (L.) Schott., *Spartium junceum* L., *Ononis arvensis* L., *Melilotus officinalis* (L.) Pall. and *Glycyrrhiza glabra* L.– have both medicinal and anti-inflammatory properties. Many of these plants contain many colorants, essential oils, vitamins and biologically active substances. They are popular in both industrial production and folk medicine because of their rich chemical composition. Legumes are also known as ornamental plants and honey bees. Thus, legumes have enormous biological and economic potential.

**Keywords:** legumes, medicinal plants, nitrogen fixation, forage plants, dye plants, phytotherapy

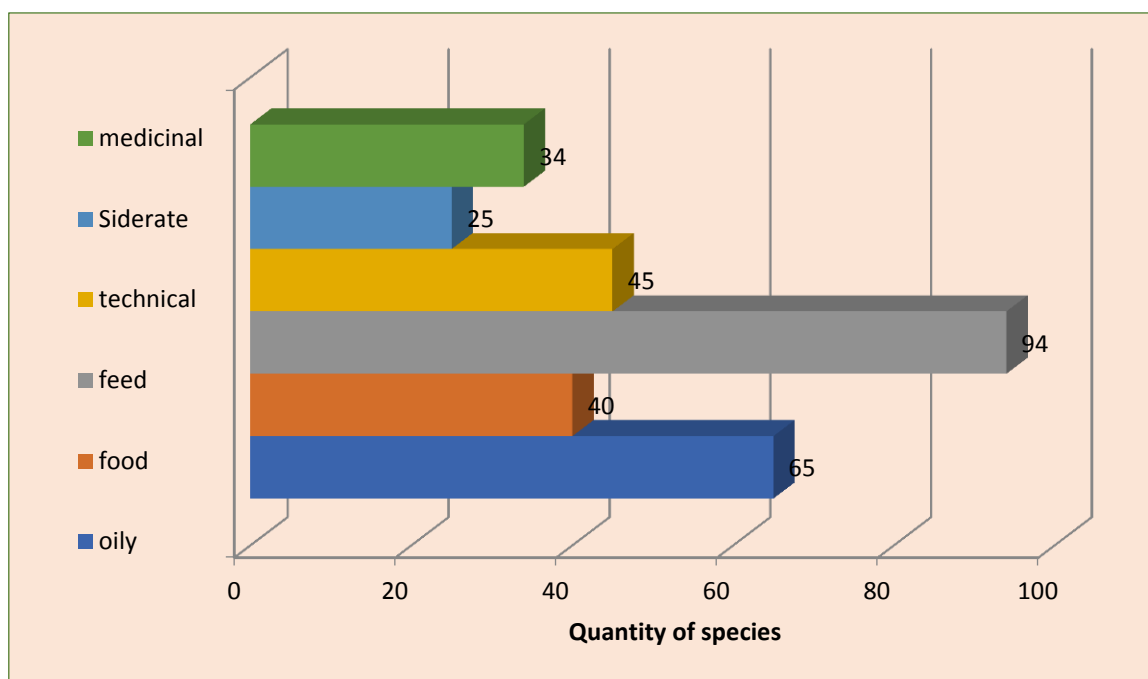
### **Introduction**

*Fabaceae* Lindl. - is one of the largest and most important plant families in the world. Plants of this family are crucial for agriculture, industry, medicine and ecology. They are widely distributed and suitable for multiple uses due to their nitrogen-fixing, melliferous, medicinal and ornamental properties. Numerous representatives of this family are widely distributed in Azerbaijan and used in local medicine in different areas.

### **Research**

*Fabaceae* Lindl. it is one of the largest and most important plant species in the world. Plants in this family are crucial for agriculture, industry, medicine and ecology. Their widespread and versatile properties include nitrogen-fixing, honey-producing plant, medicinal and ornamental properties. This family has numerous species that are widely distributed in Azerbaijan and used in local medicine in various places.

Scientists have discovered that the legume family is one of the most common and important families on the planet. Members of the legume family are used for a variety of purposes in both agricultural and domestic applications. Legumes are classified according to their applicability: medicinal, technical, fodder, honey-producing plant, food, ornamental, soil strengthening, dyeing, etc.



**Figure 1.** Classification of legumes according to their uses

There are 12,000 species of the legume family worldwide, united in more than 500 genera (Askerov, 2016). In the Caucasus is represented by more than 550 species, in Azerbaijan - 440 (Hajiyev, Musayev, 1996). Among the important genera of the season: *Trifolium* L, *Trigonella* L, *Vicia* L, *Onobrychis* Hill, *Lathyrus* L, *Amoria* C. Presl, *Chrysaspis* Desv. etc. included. Many of them are valuable fodder plants. Also, *Medicago* L., *Onobrychis* Hill, *Vicia* L., *Trifolium* L., *Lathyrus* L., *Melilotus* Hill., etc. are plant species used as siderats. Many species of the legume family are valuable technical and medicinal plants with rich natural resources. In this respect, such species of citrus plants as *Astragalus* L., *Glycyrrhiza glabra* L., *Alhagi* Hill, species of *Melilotus* Hill, *Ononis* L., etc. are more useful. One of the valuable properties of legume crops is their high honey production. Legumes with high honey production include *Melilotus albus* Medik., *Onobrychis cyri* Grossh., *O. transcaucasia* Grossh. and most species of the genus *Trifolium* can be noted (Abbasova, Ibadullayeva, 2017).

In addition, nodules that absorb and fix atmospheric nitrogen are present on the roots of about 70% of legumes. *Rhizobium* Frank is a type of root nodule that is formed by the outgrowth of root parenchyma cells and has different shapes. provides endogenous reproduction of related bacteria. As a result of interaction between legumes and bacteria, legumes return 100-140 kg of nitrogen per hectare of soil per year.

Woody representatives of legumes are used to produce high quality furniture. *Pericopsis elata* (Harms) Meeuwen is the most valuable legume in the world for wood.

Ornamental plants such as *Albizia* Durazza, *Acacia* Hill, *Robinia* L., *Laburnum* Medik., *Spartium junceum* and *Gleditsia caspia* Desf. are of great importance.

Representatives of legumes are rich in B vitamins, fiber and protein. Since ancient times, many species have been grown for food and used for oil production (*Glycine* Willd., *Arachis* L., *Cicer* L., *Pisum* L., *Phaseolus* L., *Vicia* L., etc.) (Isayev, 2008).

*Spartium junceum* L. is an unpretentious ornamental shrub that is drought and light tolerant. During the flowering period, which lasts from May to July, the outside of the shrub is covered with fragrant, densely-waved yellow flowers resembling a large golden ball, which bloom for more than a month. Medium quality ropes, sacks, and paper are made from the saricol rod. Its flowers have essential oil and important coloring agents flavonoids. This substance can create a dyeing solution that can dye woolen yarn yellow or any other color such as yellow, green, brown, beige, etc. This can be dyed in several colors.

There are up to 50 species of *Styphnolobium japonicum* (L.) Schott. In the Caucasus, including Azerbaijan, 1 species is cultivated: *Styphnolobium japonicum* (L.) Schott. *Styphnolobium japonicum* (L.) Schott. is both an ornamental and a valuable medicinal and dye plant (Nasibova, 2018). It is widely used in Azerbaijan as a decorative plant in parks and gardens. During the flowering period of Safflower (approximately from the second half of July to the end of August), its large yellow flowers are striking in their beauty (Gahramanova, Ibadullayeva, 2017).

Because of its healing properties, safflower was considered mysterious and sacred in ancient times in Japan and China. Various extracts from the shoots and flowers of the plant are used to treat eczema and skin diseases.

The method of treatment with safflower alcohol in folk medicine has been passed down from generation to generation and has survived to this day. The patient does not feel any harm from the alcohol, because it is easily digested by him. Alcoholic essences accelerate the healing of hard-to-heal purulent wounds and burns of the first and second degree. It is also used to treat hair loss, dry pleurisy and skin rashes.

Coloring agents such as rutin, sophorin and quercetin are found in various above-ground parts of Japanese saphora. Acquired dyes can be used to apply millet, golden yellow, orange, brown and other colors to wool and silk.

*Ononis arvensis* L. - up to 70-80 species of the genus *Ononis* live around the world. Five species are found in the Caucasus, including Azerbaijan.

People since ancient times have known about the medicinal properties of the *Ononis arvensis*. The root of the plant is used as a medicine. From the root part of the *Ononis arvensis* was prepared infusions, which were used to treat edema, diuretic and styptic diseases. Its extract eliminates kidney and bladder stones, stops bleeding in acute hemorrhoids and relieves chronic constipation.

*Astragalus* L. The genus *Astragalus* includes 1600 to 2000 species worldwide. Of these, 150 species are distributed throughout the Caucasus, including Azerbaijan.

Herbs harvested between May and June are used for medicinal purposes. Collection should start at the end of May and continue until the sowing phase. However, the plant cannot be harvested by hand, because the shoot may be damaged. As a tonic and immunostimulant, astragalus preparations are used to increase the body's resistance. It also lowers blood pressure, improves blood circulation, increases sexual activity and is very good for chronic heart failure (Nasibova, Ibadullayeva, 2018).

*Arachis hypogaea* L. Up to thirty species of the genus peanut are found worldwide. Up to 53% of oil is contained in peanut seeds.

Since it contains a high amount of fiber, peanuts satisfy hunger. It is also considered a plant with medicinal properties. In his works, French professor Boudreau noted that peanut consumption led to improved health of hemophilia patients. The plant is also used to improve sexual function and improve the functioning of the liver and other organs (Mammadova, Nasibova, Ibadullayeva, 2023).

*Melilotus officinalis* L.- This medicinal plant is highly prized. This aromatic plant is also useful for fodder and honeydew. Coumarin is the substance that gives khashanbul a sweet flavor. The amount of coumarin increases during the flowering period. Coumarin is used as a flavoring agent in soaps, tobacco and perfumes. Hashambul is used in both scientific and folk medicine for treatment. A decoction of the dried herb is drunk for colds, to reduce suppuration, and to treat pain and malaria. For the treatment of respiratory diseases it is used as an expectorant and chest emollient (Mammadov, 2010).

*Galega officinalis* L.- It is used in scientific and folk medicine because it improves heart function, reduces blood clotting, improves diuresis and increases lactation. It is used to treat minor cases of diabetes mellitus. It is done by using the above-ground part of the plant. It exists in forested areas of the lower and middle mountain ranges and in open areas.

*Lotus corniculatus* L. is used as a medicinal remedy. It mainly contains bioactive substances that help dissolve, crush and remove kidney stones from the body. It has a pleasant odor, so it can be used in the perfume and cosmetic industry.

*Glycyrrhiza glabra* L.- Roots and roots of the plant are used to treat stomach ulcers, whooping cough, pulmonary tuberculosis, dry bronchitis, meat and mushroom poisoning, eczema and other

inflammatory diseases (Aliyev, 2016). Animals greatly appreciate the above-ground part of licorice bare. Its roots contain valuable dyes that can create up to fifty different colors.

The extract from the root of licorice bare root is of great importance in mechanics for coating metals, hardening steel alloys and extinguishing fires. The trunk and roots impregnated with soundproof cardboard, rope, shoe polish and other materials. The waste material is used to make fertilizer.

*Indigofera* L.- It is a valuable plant that can be obtained from nature. It is cultivated in many countries because its leaves contain the famous dye indigo. Its fruits can also have gray, brown and beige shades. The resulting colors are very resistant to various chemical attacks.

The most common natural source of vitamin C is indigofera. It is widely used in folk medicine in the form of decoction for scurvy, rickets, choleric and diuretic treatment, as well as for tuberculosis and jaundice.

### Conclusion

Members of the legume family have many useful properties and, because they are widely used in agriculture, industry and medicine, they are of vital importance. Their value is increasing because of their ability to increase soil fertility, their use as medicinal and industrial plants, and as honeybees and ornamental plants. Legumes are of strategic importance for food security and the development of alternative medicine as demonstrated by the species studied.

Thus, much attention should be paid to the diversity of leguminous grasses that are useful and productive in various industries and agriculture in both summer and winter pastures. In addition, leguminous grasses are widely used in grassland reclamation and grassland farming.

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