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THE ROLE OF FABOIDEAE FAMILY REPRESENTATIVES IN HUMAN LIFE

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Annotation: Representatives of the legume (Faboideae) family live in symbiosis with root nodule bacteria and have the ability to absorb free nitrogen from the atmosphere. Therefore, these plants are widely used in crop rotation. Due to the presence of protein in several species of the family, they are used as nutritious food. Some representatives are used to produce oil, dye, and medicines. Certain species are also cultivated as ornamental plants. The legume family plays a wide and important role in human life in the fields of food, medicine, agriculture, industry, and ecology.

Keywords: Fabaceae, bean, mung bean, shinmiya, soybean, astragalus, zygomorphic, food, medicine, agriculture, industry, ecology, azotobacter, anthropogenic factors, amino acids, carbohydrates, vitamins, potassium, phosphorus, magnesium.

The legume (Fabaceae) family plays a very important role in human life. This family consists of dicotyledonous plants and is widely distributed across all regions of the world. Nearly 12,000 species belonging to 490 genera of this family are spread across tropical, subtropical, and temperate climate zones of the Earth. These plants occur in the form of trees, shrubs, subshrubs, and herbaceous forms. Their leaves are pinnate, palmate, compound or simple, with lateral leaflets. The flower is zygomorphic, bisexual, pentamerous, and has an unchanging structure. The calyx consists of 5 fused sepals. The corolla has 5 petals (the upper one is the "standard," the two on the sides are the "wings," and the two at the bottom form the "keel" that encloses the stamens), and there are 10 stamens.

To distinguish between the genera within leguminous plants, the structure of the stamens is of significant importance. In some genera, the stamens are not fused, and all 10 stamens are positioned freely (e.g., *Sophora*, *Thermopsis*), while in others all stamens are fused to form a staminal tube, within which the pistil is located (e.g., *Lupinus*). In most genera, 9 stamens are fused and 1 remains separate (e.g., *Pisum*, *Medicago*, *Vicia*, *Lathyrus*, and others). The pistil is formed from a single carpel. The ovary is superior and unilocular. [2]

Importance in Human Life:

Food Source:
Plants belonging to the legume (Fabaceae) family, such as mung beans, chickpeas, beans, soybeans, and peanuts, are rich in protein and serve as an essential food source for both humans and animals.

Medicinal Plants:
Medicinal plants like licorice (*Glycyrrhiza glabra*) are used in the treatment of allergies, asthma, stomach ulcers, and other diseases. Their chemical composition is characterized by low toxicity

and high effectiveness.

Medical Applications:
Soybean seeds are used in the treatment of diseases such as diabetes and cancer, as well as for stimulating the central nervous system. Some leguminous plants are also rich in alkaloids, glycosides, resins, and vitamins, and are used in treating various illnesses.

Agriculture and Ecology:
Nitrogen-fixing azotobacter live in the roots of legumes, which helps increase soil fertility and allows these plants to grow well even in nitrogen-poor soils.

Industry and Technology:
Some legumes are sources of valuable wood, balsams, and toxic substances used as insecticides.

Ornamental and Forage Plants:
Species like *Acacia* and *Gleditsia* are grown as ornamental plants, while *clover*, *alfalfa*, and *sainfoin* are cultivated for animal fodder.

Thus, the legume family plays a broad and important role in human life in the fields of food, medicine, agriculture, industry, and ecology.

Role of Fabaceae in Food, Industry, Ecology, and Economy:

In the Food Industry:

Leguminous plants such as mung beans, chickpeas, beans, soybeans, and peanuts are rich in protein and serve as a major source of protein for humans. Soybeans are processed into flour, groats, oil, milk, cottage cheese, sausages, bread, cookies, chocolate, sauces, and many other food products. Soybean seeds contain high-quality protein, fats, vitamins, and minerals, and are also used medically in the treatment of diabetes and other diseases.

In Industry:

Some leguminous plants serve as sources of valuable industrial products such as balsams, fine wood, and insecticides. The oil and protein content in soybeans are widely used in the production of edible oil products in the industrial sector. Azotobacter found in the roots of legumes improves soil fertility and helps boost crop productivity in agriculture.

Thus, the Fabaceae family is not only an essential part of human nutrition but is also widely used in industry and agriculture.

In Food Production:

Leguminous plants are extensively used in food production. Their seeds are rich in protein, and species like mung beans, chickpeas, beans, soybeans, and peanuts are considered staple food products.

Soybeans are processed into flour, groats, oil, milk, curd, sausages, bread, cookies, cakes, candies, chocolate, coffee, various sauces, canned foods, and pasta.
Canned foods made from pod-like legumes in their tender stage are also nutritious and beneficial.

Some legumes, such as Bambara groundnuts, are used as food due to their high protein and carbohydrate content; their seeds are consumed as snacks, roasted, or boiled. Moreover, legumes serve as a source of food products used for medical purposes, including in the dietary treatment of diabetes and other illnesses. [5]

Ecological Impact:

Azotobacter living in the roots of legumes converts atmospheric nitrogen into compounds usable in the soil, increasing soil fertility and enabling crop cultivation even in nitrogen-deficient areas. These plants biologically enrich the soil and contribute to the stability of ecosystems. Many legume species also serve as ornamental plants, enhancing the ecological landscape. Some legumes grow in deserts and arid regions, helping to reduce soil erosion.

Economic Impact:

Legumes play a central role in the food industry: crops such as mung beans, chickpeas, beans, soybeans, and peanuts are widely cultivated as rich sources of protein.
Their wood, balsam, and alkaloids are used as valuable raw materials in various industries.
In animal husbandry, legumes such as clover, alfalfa, and sainfoin are highly significant as forage crops.
Legumes enhance soil fertility, improving the yield of other crops and increasing agricultural productivity.

Thus, the legume family plays a key role in maintaining ecological balance and promoting economic development.

Plants of the legume family have significant roles in medicine and pharmacology. Certain species possess medicinal properties and are used to treat conditions such as allergies, asthma, stomach ulcers, and more. For example, preparations made from the root of licorice (*Glycyrrhiza glabra*) are known for their low toxicity and high efficacy, and are widely used in traditional medicine.

Leguminous plants contain alkaloids, glycosides, resins, and vitamins that are used in the treatment of various diseases. Additionally, soybean seeds are applied for medical purposes in cases such as diabetes and cancer.

In general, legumes are valued as natural sources of medicine and their therapeutic properties have been studied in numerous scientific investigations.

Although plants from the legume family are generally beneficial to human health, in some cases, certain species or improperly prepared products can be harmful.
For example, wild or inadequately processed legumes may contain toxic substances that can be detrimental to human health.
Moreover, residues of pesticides and chemicals used in plant protection may remain in food products, posing health risks if consumed. [5]

However, many legume species possess high protein content and medicinal properties. When properly prepared and consumed in moderation, they strengthen human health and aid in the treatment of various diseases. Therefore, it is essential to pay attention to quality and safety when consuming them.

The ecological impact of the legume family is generally positive. Azotobacter bacteria living in their roots convert atmospheric nitrogen into compounds in the soil, increasing soil fertility and promoting plant growth. This characteristic naturally enriches the soil, reduces the need for chemical fertilizers, and helps maintain ecological balance in agriculture. Moreover, in many regions, legumes are cultivated as ornamental plants, enhancing the environment and supporting biodiversity.

However, anthropogenic factors—such as deforestation, overuse of natural pastures, industrial waste, and the degradation of water bodies—can negatively affect the habitats where legumes grow. These conditions can hinder the growth and development of the plants and disrupt ecological systems. Therefore, to preserve the environmental benefits of legumes, it is important to cultivate them responsibly and protect their natural habitats.

Some species of the Fabaceae family found in Asia Central Asia is considered one of the main distribution centers for this distinctive polymorphic genus. Over 600 species of *Astragalus* are widespread in this region, with 350 species considered endemic. In southern Uzbekistan alone, 140 species of *Astragalus* have been recorded, accounting for 55% of the species found in Uzbekistan. Most of them are distributed across foothills, mountainous, and pasture regions and are considered important forage plants.

Notable species include:

- *Astragalus isphaganicus* (Isfahan astragalus), growing 30–60 cm tall in rocky and gravelly mountain foothills;
- *Astragalus boisunensis* (Boysun astragalus), a perennial reaching 30–80 cm in height;
- *Astragalus retamocarpus* (fruit-bearing astragalus), growing up to 70–120 cm;
- *Astragalus siversianus* (Sivers astragalus);
- *Astragalus massagetovii* (Massagetov astragalus), commonly found in pastures;
- *Astragalus schugnanicus* (Shugnan astragalus) and *Astragalus schutensis* (Shut astragalus), which are annuals occurring in nearly all zones.

Other species include:

- *Astragalus schmalhausenii* (Schmalgauzen astragalus),
- *Astragalus harpilobus* (sickle-shaped astragalus),
- *Astragalus vicarius* (snake-like astragalus),
- *Astragalus campilotrichus* (hook-shaped astragalus),
- *Astragalus sesamoioles* (sesame-like astragalus), and
- *Astragalus filicaulis* (slender-stemmed astragalus). [1]

Astragalus species play an important role in the formation of Uzbekistan's plant cover. They are widely distributed in deserts, foothills, mountains, and pasture regions. Rich in protein, they are considered important forage crops—used as a key source of fodder in deserts during spring and in foothills, mountains, and pastures during summer months.

The **Medicago genus (alfalfa)** includes about 100 species widely distributed in the tropical parts of both hemispheres and in the Mediterranean floristic region, including Europe, the Caucasus, and Central Asia. There are 36 species in the Commonwealth of Independent States, 23 species in Central Asia, and 11 species in Uzbekistan. Alfalfa is a significant annual and perennial forage crop. In Uzbekistan, perennial species such as *Medicago sativa* (common alfalfa), *M. falcata* (yellow or sickle alfalfa), *M. tianschanica*, and *M. transexana* are widely distributed in deserts,

foothills, and mountain regions. Annual species such as *Medicago orbicularis*, *M. lupulina*, *M. rigidula*, and *M. minima* are also common.

Cultivated varieties of alfalfa are grown for feeding livestock. Particularly, two species—*Medicago sativa* and *M. falcata*—have significant agricultural value.

The **Lathyrus genus (vetchlings or sweet peas)** includes both perennial and annual herbaceous plants. Their leaves are pinnately compound, ending in tendrils. Their stamens are fused into a tube, and the fruit is a pod. More than 50 species are known in the Commonwealth countries, with 17 species found in Central Asia. Notable species include *Lathyrus cicera* (flatpod vetchling), which grows on rocky and gravelly mountain slopes, near river tributaries, and among cultivated plants; *Lathyrus asiatica* (Asiatic vetch), which grows as a wild weed among cultivated crops; and *Lathyrus mulkak*, found at elevations of 2,500–3,000 meters above sea level in rocky and shrubby areas.

The **Onobrychis genus (sainfoin)** includes perennial and annual herbs, and in some cases, semi-shrubs and small shrubs. There are 150 species worldwide, 76 in the Commonwealth countries, and 20 in Central Asia. In Uzbekistan, notable species include *Onobrychis horassanica* (Khorasan sainfoin), a drought-resistant plant reaching up to 70 cm in height and growing on gravelly, fine-soiled mountain slopes; *Onobrychis zeravchanica* (Zarafshan sainfoin); *Onobrychis echidna* (spiny sainfoin), which grows on mountain slopes and in juniper forests, reaching up to 85 cm; and annual species such as *O. micrantha* and *O. pulchella*, which are widespread on the northern slopes of mountain zones.

The Chickpea (Cicer) genus includes 75 species distributed across the subtropical and temperate regions of the globe. There are 24 species in the Commonwealth countries, including 16 in Central Asia. Most of them grow wild, and nearly all species are perennial, except for the only cultivated annual species — *Cicer arietinum*. Among notable types are: the cultivated annual chickpea (*C. arietinum*) grown at altitudes from 800 to 2,000 meters above sea level; the Songor chickpea (*C. songorica*), which grows on mountain slopes among juniper trees; the spiny chickpea (*C. pungen*), which grows at 3,000 meters above sea level; and the long-beaked chickpea (*C. micranthum*), found at altitudes up to 3,800 meters.

The Bean (Phaseolus) genus consists of nearly 200 species mainly distributed across the American continent. About 20 species are cultivated across almost all continents, including 5 in Central Asia. Notable types include the common bean (*Ph. vulgaris*), the many-flowered bean (*Ph. multiflorum*), the moon bean (*Ph. lunatus*), the leaf-tender bean (*Ph. autifolus*), and the mung bean (*Ph. aurens*), which is widely consumed in Uzbekistan.

The Camelthorn (Alhagi) genus contains only 5 species, with its distribution area stretching from the Sahara to Central Asia and the Himalayas. In Central Asia, particularly in Uzbekistan, species such as *A. persarun*, *A. pseudoalhagi*, *A. kirgisorum*, and *A. camelorum* are widely distributed. Camelthorn is used as fodder in the deserts of Central Asia.

The Licorice (Glycyrrhiza) genus includes perennial herbs that reach 70–100 cm in height. Eighteen species are known scientifically, with five found widely in Central Asia. In Uzbekistan, notable species include *G. glabra* (red licorice), 50–80 cm tall, which grows in tugai forests, irrigated lands, riverbanks, and rain-fed areas; and *G. apera* (spiny licorice), found as a wild weed in mountainous and foothill zones.

Legumes play an extremely important role in the national economy. First and foremost, all parts of these plants are rich in protein and contain nitrogen-fixing bacteria (azotobacteria) in their roots, which absorb free nitrogen from the atmosphere.

Plants belonging to this genus are important food and fodder crops and have agro-technical significance due to nitrogen accumulation in the soil.

Legumes differ from other plants due to their content of essential amino acids, carbohydrates, vitamins, potassium, phosphorus, magnesium, and many complex compounds. They are rich in nectar, and some are highly decorative with beautiful flowers. More than 20 sectors of the national economy have a high demand for licorice products. The root of licorice is a source of alkaloids, glycosides, saponins, flavonoids, various sugars, starch, and other industrially important substances. Licorice root is used in the production of low-alcohol beverages such as beer and wine, confectionery products; in the preparation of various dyes, watercolors, special types of paper; and in the treatment of gastrointestinal, kidney, skin, and respiratory diseases; as well as in the preparation of various medications. Licorice is considered one of the oldest medicinal plants, and its medicinal effect is similar to the hormone cortisone produced by the adrenal glands. In addition to the aforementioned uses, many legume species are used in various sectors of the national economy. For example, **Thermopsis dolichocarpa** (Thermopsis) contains alkaloids, saponins, tannins, and essential oils.

The white sweet clover (*Melilotus albus*), spiny sweet clover (*M. dentatus*), Indian sweet clover (*M. indicus*), and medicinal sweet clover (*M. officinalis*) are widely found in Uzbekistan. These species are widely used in tobacco and pharmaceutical industries. Moreover, the flowers of these plants produce excellent honey.

Wild legumes are also a primary resource for plant introduction and breeding, playing a significant role in developing new varieties for agriculture.

In conclusion, it can be said that the history of legumes is closely intertwined with human civilization. They originated around 6000 BC in early Asia, the Americas (common bean and several varieties), and Europe (broad bean), where they served as a primary and essential food source.

Their ability to fix atmospheric nitrogen reduces fertilizer costs for farmers and gardeners who grow legumes, and it also means that legumes can be used in crop rotation to replenish nitrogen-deficient soils. The seeds and leaves of legumes contain relatively higher levels of protein compared to non-leguminous materials, thanks to the additional nitrogen they obtain during this process. Legumes are often used as natural fertilizers. Some legume species even perform hydraulic lift, which makes them ideal for cutting.

Legumes cultivated in agriculture can belong to many categories, including **forage, grain, ornamental, pharmaceutical/industrial, fall-planted cover crops/green manure**, and **timber species**. Most types cultivated for commercial purposes serve two or more roles simultaneously.

There are two broad types of **forage legumes**. Some, such as alfalfa, vetch, and peanut (*Arachis*), are planted in pastures and grazed directly by livestock. Other forage legumes, such as *Leucaena* or *Albizia*, are woody shrubs or tree species that are regularly cut by humans to provide fodder, which is then consumed by livestock.

The members of the Fabaceae (Faboideae) family live in symbiosis with nodule-forming bacteria in their roots and are capable of fixing free nitrogen from the atmosphere. For this

reason, they are widely used in crop rotation. Several species in this family are high in protein, making them a nutritious food source. Some species are also used for oil, dye, and medicinal production. Additionally, certain species are cultivated for ornamental purposes.

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