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**ECOLOGICAL FEATURES, BIOCHEMICAL COMPOSITION AND USE
OF Plantaginaceae Juss. IN THE FLORA
OF THE NAKHCHIVAN AUTONOMOUS REPUBLIC**

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**ЭКОЛОГИЧЕСКИЕ ОСОБЕННОСТИ, БИОХИМИЧЕСКИЙ СОСТАВ И
ИСПОЛЬЗОВАНИЕ Plantaginaceae Juss.
ВО ФЛОРЕ НАХЧЫВАНСКОЙ АВТОНОМНОЙ РЕСПУБЛИКИ**

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Abstract. The territory of the Nakhchivan Autonomous Republic is very rich in vegetation. The location of the territory in a sharply continental climate zone has also had a great influence on the flora. Whether it be high mountain, medium mountain, lowland or flat areas, various groups of plants inhabit this territory. Thus, plant species with medicinal, fodder, technical, vegetable and other properties are found in our Republic. One of the most widespread families in the Nakhchivan Autonomous Republic is the Plantaginaceae Juss. family. During my research, I studied in detail the taxonomic composition, bioecological characteristics, distribution areas and life forms of species of the Plantaginaceae family (Plantaginaceae Juss.) common in this territory. During the research, the vegetation period of all three species of the family was fully traced over a certain period (one year). It was established that species of the Plantaginaceae family (Plantaginaceae Juss.) are also widely used in folk medicine.

Аннотация. Территория Нахчыванской Автономной Республики очень богата растительностью. Расположение территории в резко континентальном климатическом поясе оказало большое влияние на растительный мир. Будь то высокогорные, среднегорные, равнинные или равнинные районы, здесь произрастают различные группы растений. Таким образом, на территории нашей Республики встречаются виды растений с лекарственными, кормовыми, техническими, овощными и другими свойствами. Одним из широко распространенных на территории Нахчыванской Автономной Республики семейств является семейство Подорожниковые (Plantaginaceae Juss.). В ходе моих исследований я подробно изучил таксономический состав, биоэкологические особенности, ареалы распространения и жизненные формы видов семейства Подорожниковые (Plantaginaceae Juss.), распространенных на данной территории. В ходе исследований в течение определенного периода (один год) проводился полный мониторинг вегетационного периода всех трех видов семейства. Было установлено, что виды семейства Подорожниковые (Plantaginaceae Juss.) также широко используются в народной медицине.

Keywords: flower, biochemical composition, xerophyte.

Ключевые слова: цветок, биохимический состав, ксерофит.

The plant world differs from other groups of living organisms in its special significance. Plants are classified as edible, decorative, medicinal, poisonous, honey-bearing, etc. In this regard, we have studied in detail the bioecological characteristics and chemical composition of species of the *Plantaginaceae* Juss. family, which are widespread in the territory of the Nakhchivan Autonomous Republic and also have medicinal and nutritional value.

The taxonomic composition of the chapter is as follows:

Fam: *Plantaginaceae* Juss. - Plantaginaceae

Genus: *Plantago* L. - Plantain

P. saxatilis Bieb. - Rocky areas

P. major L. - Big b.

P. lanceolata L. - Lanceolate b.

Plants of the Plantaginaceae family (Plantaginaceae, Juss.) are cosmopolitan in distribution. They are mainly represented by three genera: *Plantago*, *Littorella*, and *Bougueria*. In Azerbaijan, only species of the genus *Plantago* L. are found. Three species are widespread in the Nakhchivan Autonomous Republic: *P. saxatilis* Bieb., *P. major* L., and *P. lanceolata* L. (Figure 1-3).

Material methodology

The research was conducted in the mountainous regions of the Nakhchivan Autonomous Republic. The objects of study were the Batabat Plateau, Mount Garagush, and the villages of Payiz, Asaghy Buzgov, Yukhary Buzgov, Bichenaka, Badamly, Geynuk, Nahajir, and others. Expeditions were regularly conducted in these areas. All three species of the family were studied in detail in the areas under investigation. The research used biomorphological, ecological, taxonomic, floristic-systematic and phytocenological methods. A number of literature sources were cited during the preparation of the article [1-13].

Discussion and conclusions of the study

Plantago major is known as a medicinal plant and is also used as animal feed. It is found in all regions of the Nakhchivan Autonomous Republic, from the Aran to the subalpine belt. In the Gunnut-Gapchig strip, it is widespread everywhere: along roadsides, in meadows, forests, shrubbery, wet valleys, and sandy areas. It also grows in crops and hayfields as a fodder plant.

This is a perennial herbaceous plant with a thick, strong stem. The leaves develop from the root collar, i.e. they are gathered around the root. The leaves are 2–18 cm long, and the flower stalk is 6–50 cm long. It is a multi-seeded plant with very small, bare seeds. The stem (usually several) is leafless and ends in a narrow, long inflorescence. The broad, ovate, entire-edged, 5–7-veined, glabrous leaves are located on a broad stem and emerge directly from the basal rosette. It flowers and fruits from May to October.

In newly cultivated areas, it grows singly in the first year, then gradually begins to reproduce by rhizomes. It also reproduces by small seeds. It is resistant to trampling. It rarely grows in areas that have been trampled for a long time. When dry, it is readily eaten by livestock, but not when green. It has been observed that sheep eat it in sufficient quantities. It is readily eaten by geese during flowering and by ducks during fruiting.

Plantain is part of the Palearctic forest group of the Palearctic boreal geographical type. It is widespread in Europe, the Balkans and Asia Minor, Iran, Afghanistan, India, the Himalayas, Japan, China, Mongolia, North America, Russia, Central Asia and the Caucasus. In Azerbaijan, the large plantain grows in all regions from the forest edge to the subalpine belt (up to 2,600 m above sea level).

It is more common in sparse forests, shrub thickets, and river valleys. Its reserves are most extensive in the Gilanchay, Havush, Bilev, Behruz, Paraghin, Nasirvaz, Teyvas, Milakh, Boyahmed, Nahajir, Geynuk and other districts of the Nakhchivan Autonomous Republic.

Plantain is widely used in the pharmaceutical and vaccine industries. Its leaves contain vitamins A and B. It has been established that it contains 3.3% fat and 12.6% vitamin E.

It is a xeromesophyte found in forest shrubbery, mountain meadows and weed vegetation. It grows mainly in small groups in meadows, forests, shrubs, sandy areas, roadsides, crops, gardens and vegetable gardens.

It contains mucilage, the bitter glycoside aucubin (rhinanthin), the enzymes invertase and emulsin, polysaccharides, flavonoids, traces of alkaloids, phytoncides, bitter substances, carotene, vitamin C (ascorbic acid) and vitamin K, citric acid, 4% tannin and a small amount of vaccine substances. The mucilage contains galactose, arabinose, and rhamnose. Its leaves contain polysaccharides, caffeic acid derivatives, flavonoids, iridoid glycosides, and terpenoids.

This medicinal plant is included in the pharmacopoeia. It is widely used in scientific, practical, experimental, Tibetan, Chinese, Korean and folk medicine, pharmacology and homeopathy, as well as in veterinary medicine. It is mainly used for diseases of the skin, kidneys, eyes, diabetes, bladder, gastrointestinal tract, stomach and duodenum, epilepsy, pulmonary tuberculosis, bronchitis, as well as burns, malignant tumours, fractures, sprains and bruises, inflammatory processes in the oral cavity, purulent wounds and ulcers, toothache and headache. It has bactericidal, antiparasitic, sedative, hypotensive, haemostatic, expectorant, laxative and radioprotective effects. The above-ground parts of the plant are used for medicinal purposes: leaves, flowers, roots and seeds. Edible; flour obtained from roasted and ground seeds is used to make sauces and seasonings (for soups). It is a fodder plant.

Plantago sakhatilis is one of the most common species in mountainous areas. It is widespread in the mountainous areas of the Nakhchivan Autonomous Republic. It is found in the upper forest, subalpine and alpine zones of the Gunnut-Gapchig physical-geographical region. It is common in forest glades, meadows and rocky areas. It is part of the plant groups of forest glades, but does not form large quantities. It is considered one of the main plants of the southern slopes. It grows singly along roadsides, on mountain rocks, in crops and on hayfields.

It is a perennial plant with silvery pubescence. The leaves are lanceolate, slightly blunt-lanceolate, with a very sharp tip. The flower stalk is slightly longer than the leaves (5-25; 35 cm). The capsule is oblong-ovoid, two-seeded. The seeds are 4 mm long, oblong. It blooms in May-June and bears fruit in July-September. It is readily eaten by small ruminants on pastures, as well as to a sufficient extent by large ruminants. *Plantain lanceolate* (*P. lanceolata*) is a species of plant belonging to the genus *Plantago* of the family Plantaginaceae of the order Asteraceae of the plant kingdom.

Lanceolate plantain is a species that has nutritional value. It is widespread in all arid mountainous areas of the Nakhchivan Autonomous Republic, from arans to subalpine meadows. It is widespread on dry grassy slopes in the mountainous regions of the Nakhchivan Autonomous Republic as a weed in gardens, vegetable gardens, on personal plots, along rivers and roads. The plant is undemanding to the soil.

It is perennial, glabrous or densely pubescent. It grows to a height of 20–60 cm, with numerous ascending or erect flowers and a stem composed of numerous ascending or erect, 5–6 or more wrinkled, densely hairy or glabrous segments. Leaves are gathered in a basal rosette, elongated-lanceolate, transitioning to linear-lanceolate (sometimes broadly lanceolate), pointed, narrowed towards the base. Veins 3–7. Spike short, cylindrical, oblong or ovoid. The pedicels are ovoid, pointed, glabrous or sparsely pubescent, leathery, with a brown midrib. The corolla is 2–3 mm long, glabrous, whitish or brown, ovoid-lanceolate, sometimes with a pointed tip. The capsule is 3–4 mm long, ovoid, and contains two seeds. The seeds are up to 2 mm long, almost blackish, concave on the ventral side, with bent edges. It blooms in May–August and bears fruit in June–October (Figure 3).

Found on grassy slopes, cultivated fields, in gardens and vegetable gardens, along canals and roads. The leaves contain astringent and bitter substances, carotene, indican glucoside aucubin, ascorbic acid (42.2 mg%), vitamins C and K, alkaloids, flavonoids, mannitol, sorbitol, organic acids (oleic acid). The seeds contain mucilage (up to 16%), oil (20%) and carbohydrates (0.17%).

A solution of plantagluctide prepared from the leaves is used as an antispasmodic and anti-inflammatory agent.

The flowers are green or brownish-green, with a specific smell and taste. Absolute moisture content: 4%, total ash: 20%, blackened and rotten leaves: 5%, rotten flowers: 1%, organic substances: 1%, mineral substances: no more than 1%.



Figure 1. *Plantago major*



Figure 2. *P. lanceolata*



Figure 3. Structure of the flower group

Based on scientific research, it can be said that plantain is best consumed dry, but its content decreases when consumed fresh. Alkaloids have also been found in plantain leaves. In Europe, it is recommended to plant it in mixture with cereal grasses on low-yield dry pastures. It is advisable to use it as a fodder plant to improve the quality of pastures. The young leaves and shoots are consumed. Plantain leaves mixed with nettles, onions and other vegetables are used to prepare salads and various dishes. The leaves and stems of the plant are used to prepare egg stew, porridge, oatmeal, mashed potatoes, etc. Plantain is added to a number of dietary dishes. The plant is used in the preparation of wheat and buckwheat porridge, soups, stews, etc. Plantain is dried and stored as a winter supply.

Some types of plantain, especially large-leaved plantain, have been widely used in scientific and traditional medicine since ancient times. It is considered one of the oldest medicinal plants. The Chinese used its leaves and seeds for medicinal purposes as early as 3,000 years ago. In folk medicine, plantain leaves are used as an expectorant, diuretic and anti-fertility agent. The leaves contain the glycoside rinatin, antioxidants, carotene, vitamins K and C, citric acid, enzymes and carbohydrates. The above-ground part contains carbohydrates, alicyclic compounds, nitrogenous compounds, phenol and phenolcarboxylic acids. Plantain is used to treat stomach and intestinal disorders caused by colds. Its leaves are effective in treating acute bronchitis, healing cuts, purulent wounds, bruises and burns, evening urinary retention and soothing toothache. In rural areas, plantain seed powder is used to treat prolonged diarrhoea, intestinal mucosal diseases and

dysentery. An ointment made from a mixture of seeds and succulent leaves is often used for snake bites and to treat tumours. Plantain's ability to heal skin wounds has long been known in folk medicine. Leaves mixed with chalk are used to treat skin diseases. The bark of the tree is widely used in folk medicine to prepare cough medicines. In scientific medicine, it is included in cough medicines. It contains the glycoside aucubin, polysaccharides, flavonoids, antioxidants, traces of alkaloids, phytoncides, bitter substances, carotene, ascorbic acid, etc. Plantain grows everywhere. It is widely used by herbalists. The species *P. lanceolata* has cytotoxic properties. *Plantain contains* luteolin, which has good anti-cancer properties thanks to its phytochemicals. Its green mass is rich in fibre, making it useful for constipation. The medicinal properties of all three species of the genus have been confirmed not only in folk medicine but also in traditional medicine, and medicinal preparations are made from them. The life forms, ecological groups and ranges of species of the Plantaginaceae family (Plantaginaceae Juss.) distributed in the territory of the Nakhchivan Autonomous Republic have been studied. The life forms of all three species have been determined according to Raunker and Serebryakova. Thus, all three species are perennial herbs. Their ecological groups are mesophytes and xerophytes.

Flowering and fruiting continue from May to October. The altitudinal zones of their distribution are alpine, subalpine and lowland. The geographical elements of the species *Plantago saxatilis* Bieb. and *Plantago lanceolata* L. are not defined. However, the species *Plantago major* L. is classified as belonging to the Mediterranean-Turanian geographical zone. The ranges of *Plantago saxatilis* Bieb. and *Plantago lanceolata* L. are undefined. The range of *Plantago major* L. is xerophilous.

LIFE FORMS, ECOLOGICAL GROUPS AND HABITAT TYPES OF SPECIES OF Plantaginaceae Juss.

Latin names	Life forms		Environment al groups	blooming and fruiting	High altitude zones	Geographical elements	Area type
	Serebryakov	Raunker					
<i>Plantago saxatilis</i> Bieb.	perenn ial, herbaceous plant	Hk	mesop hyte, xerophyte	May- Septembe	sub alpine, alpine	not determined	not determined
<i>Plantago major</i> L.	perenn ial, herbaceous plant	Hk	mesophyte	May- october	Pla in, subalpine	Mediterranean sea, Turan	Xerophile
<i>Plantago lanceolata</i> L.	perenn ial, herbaceous plant	Hk	mesophyte	May- october	Pla in, subalpine	not determined	not determined

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