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**BIOECOLOGICAL CHARACTERISTICS OF SPECIES
OF THE GENUS *Potentilla* L. IN THE *Rosaceae* Juss. FAMILY
OF THE FLORA OF THE NAKHCHIVAN AUTONOMOUS REPUBLIC**

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**БИОЭКОЛОГИЯ ВИДОВ РОДА *Potentilla* L. СЕМЕЙСТВА *Rosaceae* Juss.
ФЛОРЫ НАХЧЫВАНСКОЙ АВТОНОМНОЙ РЕСПУБЛИКИ**

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Abstract. The article provides detailed information about the bioecological characteristics of species belonging to the genus *Potentilla* L. within the *Rosaceae* family, which are spread across the flora of the Nakhchivan Autonomous Republic. Our research, analysis of collected herbarium materials, and comparative review of literature sources have shown that the genus *Potentilla* is represented by 17 species in the Nakhchivan Autonomous Republic, and the current status of these species is also reflected in the article. The studied species are perennial, biennial, or annual herbs and can be found in fields, fallow lands, meadows, forests, shrubs, dry slopes, as well as in the lowland and mountain regions. Based on our research, species of this genus are not only valuable medicinal plants but are also widely used in decorative, food, fodder, and phytomeliorative activities. Additionally, the species *Potentilla argentea* is of particular importance as a plant that also produces nectar and pollen.

Аннотация. Приведены подробные сведения о биоэкологических особенностях видов рода *Potentilla* L. семейства Розовые (*Rosaceae*), произрастающих в флоре Нахичеванской Автономной Республики. В ходе проведённых исследований, анализа собранных гербарных материалов и сравнительного анализа литературных источников было установлено, что в Нахичеванской АР род представлен 17 видами. Информация о современном состоянии видов отражена в статье. Изученные виды являются многолетними, двухлетними или однолетними травами и встречаются на пашнях, оставленных под отдых, на лугах, в лесах, кустарниках, на сухих склонах, в равнинных и горных районах. Согласно проведённым исследованиям, виды, принадлежащие этому роду, широко используются не только как ценные лекарственные растения, но и в декоративных, пищевых и кормовых целях, а также для фитомелиоративных мероприятий. Кроме того, вид *Potentilla argentea* обладает особым значением как растение, дающее нектар и пыльцу.

Keywords: bioecology, life form, environmental group, *Potentilla* L.

Ключевые слова: биоэкология, жизненная форма, экологическая группа, *Potentilla* L.

The Nakhchivan Autonomous Republic, an integral part of the Republic of Azerbaijan, stands out from other botanical-geographical regions with its natural resources. This wealth has developed and formed over a long evolutionary process, influenced by the combined effects of natural-

historical, ecological, and anthropogenic factors. Among the natural resources of the Autonomous Republic, its flora, in accordance with its soil and climate characteristics, holds significant importance. The region's high mountain, middle and lower mountain, as well as plain areas, are home to various plant communities.

The flora of Nakhchivan AR is primarily composed of dicotyledonous plants, with the *Rosaceae* family being particularly notable. The plants in the *Rosaceae* family are widely distributed in nature, encompassing more than 3,000 species. The species in this family are predominantly perennial herbs, shrubs, and trees. It is well known that species belonging to this family are widespread and of significant importance. In this regard, the herbaceous plants of the family also play an essential role. Among the useful plants, those from the genus *Potentilla* L. are of particular significance. Based on numerous studies and literature sources, it has been revealed that species of this genus are used as medicinal, food, forage, and ornamental plants. Additionally, it has been found that these species are also used in phytoremediation measures.

Material and research methods

During the research, commonly accepted floristic, geobotanical, bioecological methods, and phenological observations were used. The main research materials were based on literature sources and factual data obtained during field studies. The research object included various areas of the region, and the research material focused on species of the genus *Potentilla* L. In the study area, materials related to species of the *Rosaceae* family can be found in several literature sources [3-6, 16, 19, 20, 23].

For the identification and clarification of the names of species of the genus *Potentilla* L., works such as "Flora of Azerbaijan" [13], "Flora of the Caucasus" [14], A. M. Asgarov's "Flora of Azerbaijan" [2], and others were used. The most recent taxonomic changes were based on World Flora Online (<https://about.worldfloraonline.org/>).

Discussion and conclusions of the study

In the flora of the Nakhchivan Autonomous Republic, species of the genus *Geum* hold a special role among economically significant plants. Based on the analysis of literature data and personal field research materials, 17 species of the genus *Potentilla* L., belonging to the *Rosaceae* family, are found in the Nakhchivan AR. The bioecological characteristics of the species of this genus are presented in the following Table 1.

Table 1
 BIOECOLOGICAL CHARACTERISTICS OF SPECIES OF THE GENUS *Potentilla*

<i>Species name</i>	<i>Geographical elements</i>	<i>Altitude belts</i>	<i>Ecological groups</i>
<i>Potentilla adenophylla</i>	Front Asia	in the lower and mid-mountain belt	Xeromesophytes
<i>P. agrimonioides</i>	Caucasus	subalpine and alpine zones	Mesophytes
<i>P. anserina</i>	Holarctic	mid-mountain belt	Mesophytes
<i>P. argaea</i>	Front Asia	subalpine and alpine zones	Mesophytes
<i>P. argentea</i>	Western Palearctic	to the mid-mountain belt	Mesophytes
<i>P. canescens</i>	Caucasus	to the mid-mountain belt	Mesoxerophytes
<i>P. crantzii</i>	Holarctic	subalpine and alpine zones	Mesoxerophytes
<i>P. cryptophila</i>	Iran	subalpine and alpine zones	Xeromesophytes
<i>P. gelida</i>	Central Asia	alpine zones	Mesophytes
<i>P. lomakinii</i>	North Atropatan	high mountain belt	Mesophytes
<i>P. obscura</i>	Not known	to the mid-mountain belt	Mesoxerophytes

<i>Species name</i>	<i>Geographical elements</i>	<i>Altitude belts</i>	<i>Ecological groups</i>
<i>P. pedata</i>	Caucasus	to the mid-mountain belt	Mesoxerophytes
<i>P. pimpinelloides</i>	North Atropatan	high mountain belt	Mesophytes
<i>P. recta</i>	Western Holarctic	to the mid-mountain belt	Mesoxerophytes
<i>P. reptans</i>	Western Palearctic	to the mid-mountain belt	Mesoxerophytes
<i>P. supina</i>	Palearctic	in the lower and mid-mountain belt	Mesoxerophytes
<i>P. szovitsii</i>	Atropatan	mid-mountain belt	Xerophytes

Species of the genus *Potentilla* are perennial, biennial, or annual herbs. The studied species are found in various cultivated fields, meadows, forests, shrublands, dry slopes, and in both lowland and mountainous regions. Alongside species with a wide distribution in the republic (such as *Potentilla erecta*, *Potentilla fruticosa*, etc.), there are also rare species (such as *Potentilla crantzii*, *Potentilla officinalis*).

Morphologically, species of this genus have erect or spreading stems, with leaves that are trifoliolate or palmate and sometimes pinnate. The flowers are small, bisexual, and are gathered either singly or in corymb-like, panicle-like clusters, and occasionally in an umbrella-shaped inflorescence. The sepals and petals are usually five in number, rarely four, and the stamens range from 10 to 30. The fruit is characterized by a dry achene, which takes the form of a nutlet. Nearly all species are valuable medicinal plants. Additionally, among these species, there are many that are ornamental, pollinators, as well as those used for dyeing, phytoremediation, and those that produce pollen and nectar [1, 8-12, 15, 17, 18, 21, 22, 24].

Potentilla adenophylla Boiss. & Hohen. A plant up to 10 cm in height, densely pubescent and glandular. The lower leaves have 5-7 leaflets, which are elongated, lanceolate, with 3-6 blunt teeth, and the lower leaflets are serrated, while the others are ovate. The calyx is pubescent and glandular, and the petals are yellow. It is found in the dry grassy slopes of the middle mountain zone. Flowering occurs in May and June. Xeromesophyte. Geographical type: Near East. Distribution: Greater Caucasus, Lesser Caucasus, Lankaran mountains, Nakhchivan mountains. General distribution: Small Asia.

Potentilla agrimonioides Bieb. A plant with a pubescent stem and branched at the top. The lower leaves are long-petioled with 3-6 pairs of lateral leaflets, while the middle and upper leaves have 1-3 pairs of lateral leaflets. The underside of the leaves is covered with grayish hairs. The flower group is few-flowered, and the petals are yellow. It is found in the subalpine and alpine meadows. Flowering occurs in June and July. Mesophyte. Geographical type: Caucasus. Distribution: Greater Caucasus, Nakhchivan mountains.

Potentilla anserina L. A plant with a delicate, creeping flower-bearing stem that roots at the nodes and is pubescent. The basal leaves are numerous, with long petioles, and the leaflets are large with white hairs on the petioles. The middle leaves are similar to the lower ones, while the upper leaves are much reduced, with numerous leaflets and leaflets. The petals are relatively large and bright yellow. It is found in the humid areas of the middle mountain zone. Flowering occurs in May to August. Mesophyte. Geographical type: Holarctic. Distribution: Lesser Caucasus, Diabar, Nakhchivan mountains. General distribution: Europe, Asia, China.

Potentilla argaea Boiss. & Bal. A plant with a creeping and ascending stem, 20-25 cm in height, pubescent, with doubly pinnately divided leaves and narrow linear segments. The basal leaves have 3-4 obovate leaflets. The flower group contains 1-5 flowers, and the petals are light yellow. It is found in the subalpine and alpine meadows. Flowering occurs in May and July. Mesophyte. Geographical type: Near East. Distribution: Lesser Caucasus, Nakhchivan mountains. General distribution: Small Asia, Northern Iran.

Potentilla argentea L. The plant has a straight, branched stem and reaches a height of 20-60 cm. The edges of the leaves are slightly curled, the underside is covered with white hairs, and the upper side is either bare or soft-hairy. The lower leaves are finger-like and have 5-7 leaflets, while the uppermost leaves are divided into three segments. It is multi-flowered. The petals are light yellow. It is found in the meadows, forests, and grassy slopes of the middle mountain zone. Flowering occurs in June and July. Mesophyte. Geographical type: Western Palearctic. Distribution: Greater Caucasus, Lesser Caucasus, Lankaran, Nakhchivan mountains. General distribution: Scandinavia, Europe.



Figure 1. *Potentilla argentea*

Potentilla canescens Bess. The stem and leaves are covered with grayish hairs. The basal and lower stem leaves are long-petioled, finger-like, with 5-7 leaflets, while the upper leaves have 3-5 leaflets. The leaflets are elongated, inversely ovate, with short petioles and hairy. The flowers are small and yellow. It is found in the dry, grassy slopes and shrublands of the middle mountain zone. Flowering occurs in June to August. Mezoxerophyte. Geographical type: Caucasus. Distribution: Greater Caucasus, Nakhchivan mountains. General distribution: Central Europe, Aral Sea, Balkans, Small Asia.

Potentilla crantzii (Crantz.) G. Beck. A high-altitude plant without glandular and star-shaped hairs. The non-fruit-bearing shoots are short, and the basal leaves have ovate leaflets with 3-4 pointed teeth. The flowers are on long pedicels, and the yellow petals are longer than the calyx. It is found in the alpine meadows and rocky slopes. Flowering occurs in June to July. Mezoxerophyte. Geographical type: Holarctic. Distribution: Nakhchivan mountains.



Figure 2. *Potentilla crantzii*

Potentilla cryptophila Bornm. Height: 6-20 cm, stem pubescent, silvery-gray plant. The basal leaves are long-petioled, palmately compound with 5-7 leaflets; the leaflets are lanceolate to oblong, deeply serrated, the stem leaves are trifoliate, with small, ovate stipules. The flowers are 3-15 in number, with light pink petals and red veins. It is distributed on rocky slopes in the subalpine and alpine zones. Flowering period: June-July. Xeromesophyte. Geographical type: Iranian Mountains. Distribution: Diabar, Nakhchivan Mountains. General distribution: Iran.

Potentilla gelida C. A. Mey. Height: 5-30 cm, weakly pubescent, the basal leaves are long-petioled and trifoliate, the middle ones with short petioles, the uppermost leaves are simple and sessile. The leaflets are reverse ovate-lanceolate or rounded, serrated. The flowers are small and yellow. It is found in grassy areas of the subalpine zone. Flowering period: June-August. Mesophyte. Geographical type: Central Asia. Distribution: Baku, Karabakh, Nakhchivan Mountains.

Potentilla lomakinii Grossh. The stem is pubescent and long-haired, 85 cm in height, with the basal leaves being long-petioled and composed of 3-4 pairs of closely spaced leaflets. The terminal leaflet is larger than the others, and all leaves are pubescent and serrated. The flower cluster is either a cyme or a panicle. The petals are yellow. It is distributed in the meadows of the subalpine zone. Flowering period: July-August. Mesophyte. Geographical type: Northern Atropatene. Distribution: Karabakh, Nakhchivan Mountains.

Potentilla obscura Willd. The stem is rigid, 40-60 cm long, mainly reddish, with short, jointed glandular hairs and long dark pubescence. The leaflets are lanceolate or narrowly lanceolate, not widening toward the front. The petals are light, predominantly orange-yellow. It is found in dry, grassy slopes and shrublands of the middle mountain zone. Flowering period: June-July. Mesoxerophyte. Geographical type: Unknown. Distribution: Baku, Karabakh, Lankaran, Nakhchivan Mountains. General distribution: Europe, Minor Asia, Iran.

Potentilla pedata Willd. ex Hornem. Fist-root return is a perennial herb, reaching a height of 30-60 cm. The upper part of the stem has numerous small leaves and multi-flowered clusters. The flowers are white and yellowish. The leaves are palmately compound, consisting of 5-7 leaflets. Each leaflet is connected by long petioles extending from the center. Fist-root return propagates by seeds. The seeds are small and dispersed by wind. Flowering period: April-June. Mesoxerophyte. Geographical type: Caucasus. Distribution: Baku, Karabakh, Lankaran, Nakhchivan Mountains. General distribution: Europe, Minor Asia.

Potentilla pimpinelloides L. The stem is branched, 30 cm in height, with basal and lower leaves that are long-petioled, lanceolate, with 15-25 leaflets, and the three terminal leaflets are united at the base. The flowers are gathered in a multi-flowered panicle. The petals are light yellow. It is found in the meadows of the subalpine zone. Flowering period: July-August. Mesophyte. Geographical type: Northern Atropatene. Distribution: Nakhchivan Mountains.

Potentilla recta L. The stem is 40-60 cm tall, pubescent, with lower leaves consisting of 5-7 leaflets and upper leaves of 3-5 leaflets. All leaflets are lanceolate or elongated, with a narrowing at both the base and apex, and serrated. The petals are twice as long as the sepals and are yellow. It is found in the dry grassy slopes of the middle mountain belt. Flowering and fruiting period: June-August. Mezoxerophytic. Geographic type: Western Holarctic. Distribution: All over Azerbaijan. General distribution: Central Europe, Mediterranean, Balkan-Small Asia.

Potentilla reptans L. A perennial herb with a pubescent stem, reaching a height of 20-30 cm. It is known for its creeping and twisted stems. The leaves consist of 5-7 leaflets, which are inverted triangular, sparsely pubescent, and arranged in a spiral. Both the base and apex of the leaflets are narrowed and serrated. The petals are twice as long as the sepals and are yellow. The plant propagates through rhizomes and spreads by creeping along the ground, forming new roots and

shoots. Flowering and fruiting period: May-June. Mezoxerophytic. Geographic type: Western Palearctic. Distribution: All over Azerbaijan. General distribution: Central Europe, Mediterranean, Balkan-Small Asia.



Figure 3. *Potentilla pimpinelloides*

Potentilla supina L. The stem is soft and pubescent, with lower stem leaves having long petioles and leaflets, which consist of 2-5 pairs of elongated, pinnately divided or pinnately lobed, pubescent leaflets. The upper leaves are almost sessile and trifoliate. The petals are yellow and slightly notched. It is found in the grassy slopes of the middle mountain belt. Flowering and fruiting period: June-July. Mezoxerophytic. Geographic type: Palearctic. Distribution: Eastern and Western Greater Caucasus, Kura-Araz plain, Lankaran mountains, Nakhchivan. General distribution: Central Europe, Asia, Mongolia, North America, Tibet, Iran.

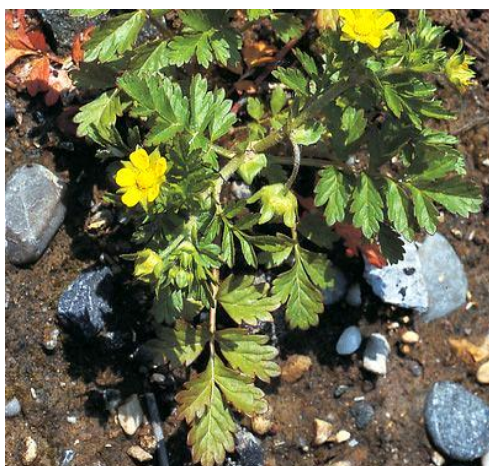


Figure 4. *Potentilla supina*

Potentilla szowitsii Th. Wolf. The stem is a soft pubescent plant, 25-60 cm tall. The basal leaves are long-petioled and consist of 7 leaflets. The middle leaves are five-lobed, while the upper leaves are trifoliate, sessile, and inversely ovate, with 5-6 serrations along the edges. The flower cluster is a cymose inflorescence. The flowers are yellow. It is found on the rocky slopes of the middle mountain belt.

Flowering and fruiting period: June-July. Xerophytic. Geographic type: Atropatene. Distribution: Lesser Caucasus, Nakhchivan mountains. General distribution: Iran.

Conclusions

1. As a result of the conducted research, the systematic composition of the species of the genus *Potentilla L.* from the Rosaceae family in the flora of the Nakhchivan Autonomous Republic has been studied, and it has been found that 17 species of the genus are present in the study area.

2. According to the analysis of the geographic range classes, the species of the genus *Potentilla L.* are grouped into 10 range classes, and it has been determined that 3 species belong to the Caucasian range class, 2 species to the Western Palearctic, 2 species to the Near East, and 1 species to each of the other range classes. The range type of *Potentilla obscura* has not been determined. The analysis of the ecological groups of the species in the genus revealed that there are 7 mesoxerophytes, 7 mesophytes, 2 xeromesophytes, and 1 xerophyte. The research results show that the species of the genus spread from the lower mountain belt to the alpine belt.

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