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Floristic Analysis of the Gusarchay River

Mislimat Safikhanova

Abstract. *Biological diversity is a complex concept that includes genetic, taxonomic, phylogenetic, and ecological aspects. However, species richness, which is only one of the dimensions of biodiversity, has become the most widely used indicator of biodiversity and its changes. Understanding the diversity and distribution of plants and fungi, including in the Gusar Chaya basin, is crucial for developing effective conservation and restoration strategies, as well as for assessing the impacts of climate change and human activities. The plant environment is a combination of abiotic and biotic stresses, and plant responses to these stresses are just as complex. Climate change also affects plants and contributes to their growth dynamics. It has been shown to cause a number of environmental responses, including rapid shifts in plant distribution, often moving to the poles and higher altitudes in response to rising temperatures. These ongoing changes highlight the urgent need for continuous monitoring and adaptive management of ecosystems to ensure long-term biodiversity conservation.*

Keywords: *biological diversity, ecosystem, biotic factors, species richness, vegetation cover*

Baku State University, Master's student, Baku, Azerbaijan
E-mail: muslimat.safixanova@mail.ru
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Qusarçayın floristik təhlili

Mislimat Səfixanova

Xülasə. *Bioloji müxtəliflik genetik, taksonomik, filogenetik və ekoloji aspektləri əhatə edən mürəkkəb bir anlayışdır. Buna baxmayaraq, qeyd etmək lazımdır ki, biomüxtəlifliyin yalnız ölçülərindən biri olan növ zənginliyi biomüxtəlifliyin və onun dəyişikliklərinin ən geniş istifadə olunan göstəricisinə çevrilmişdir. Qusar çayı hövzəsi də daxil olmaqla, bitki və göbələklərin müxtəlifliyini, eyni zamanda yayılmasını anlamaq effektiv qorunma və bərpa strategiyalarının hazırlanması, eləcə də iqlim dəyişikliyinin və insan fəaliyyətinin təsirlərinin qiymətləndirilməsi üçün çox vacibdir. Bitki mühiti abiotik və biotik stresslərin birləşməsidir və bitkilərin bu stresslərə reaksiyaları da eyni dərəcədə mürəkkəbdir. İqlim dəyişikliyi bitkilərə də təsir edir və onların böyümə dinamikasına töhfə verir. Onun bir sıra ətraf mühit reaksiyalarına səbəb olduğu, o cümlədən bitki paylanmasında sürətli dəyişikliklərin baş verdiyi, tez-tez temperaturun artmasına cavab olaraq qütblərə və daha yüksək hündürlüklərə doğru hərəkət etdiyi göstərilmişdir.*

Bu davam edən dəyişikliklər uzunmüddətli biomüxtəlifliyin qorunmasını təmin etmək üçün ekosistemlərin davamlı monitorinqinə və adaptiv idarə olunmasına təcili ehtiyac olduğunu vurğulayır.

Açar sözlər: *bioloji müxtəliflik, ekosistem, biotik amillər, növ zənginliyi, bitki örtüyü*

Bakı Dövlət Universiteti, magistrant, Bakı, Azərbaycan
E-poçt: muslimat.safixanova@mail.ru
Daxil oldu: 6 Dekabr 2025; Qəbul edildi: 27 Mart 2026; Onlayn dərc edilib: 28 May 2026

Introduction

Tourism activities, economic and commercial development of modern natural complexes, as well as climate changes affecting the territory of Azerbaijan form prerequisites for a comprehensive assessment of plant diversity, identifying areas for its transformation and predicting further dynamics. Under these conditions, the refinement of geobotanical mapping and spatial organization of floral diversity is particularly relevant (Səfərov, 2005).

Wild ornamental plants that grow in the natural ecosystems of the Gusar region, including the Gusarchay River Valley, are among the vulnerable components of the flora. The conducted monitoring showed that a significant part of their populations is localized in areas of active anthropogenic impact — in areas of cattle grazing, recreational use, and construction of seasonal residential facilities (Valiyev, 2019). These factors contribute to the disturbance of natural habitats and population decline.

Research

In addition, a number of species have medicinal properties and are harvested by the local population before the fruiting phase begins, which hinders natural reproduction and leads to fragmentation and reduction of their ranges (Shukurov, 2017).

Together, these processes make it necessary to conduct a regular inventory and monitoring of this group of plants, taking into account their taxonomic structure, biomorphological features, and ecological relevance. The obtained materials can serve as a scientific basis for assessing the long-term dynamics of floral diversity and developing measures for its conservation.

The aim of this study was to analyze the biomorphological structure and ecological groups of wild ornamental flora in the north-eastern part of Azerbaijan (South Caucasus), with an emphasis on the Gusar region, in particular the Gusarchay River basin, with consideration of the features of their root systems and patterns of spatial distribution (Mustafayeva, 2016).

The methodology of the work included the determination of life forms in accordance with the approaches and methods of I. G. Serebryakov and K. K. Raunkier. According to the classification of I. G. Serebryakov, the grouping of plants is based on the life span of their aboveground axes (stems). This system classifies plants into woody (trees, shrubs, and semi-shrubs), semi-woody (semi-shrubs and dwarf semi-shrubs), terrestrial polycarpic herbaceous plants (perennial herbaceous plants that bloom repeatedly), monocarpic herbaceous plants (plants that live from one to several years and

bloom only once before dying), and aquatic herbaceous plants. plants (amphibious, floating, and underwater herbaceous plants) (Mammadov, 2018).

The term "monocarpic plants" refers to plants that flower or bear fruit only once in their lifetime, while "polycarpic plants" describes species that flower and bear fruit repeatedly. These terms can also be used to describe other life forms with similar reproductive characteristics. The study also took into account the type of root system: the taproot has a pronounced vertical main root; bulbs and tubers perform a similar function; rhizomes (short and long) are characterized by a horizontally located vegetatively mobile main root and and system of branched adventitious roots (Ibadullayeva, 2018). K. K. Raunkier's classification is based on the location of renewal buds and the availability of adaptations for survival in unfavorable seasons (in temperate and Arctic latitudes — in winter, in arid regions — during summer droughts). According to this system, the species are subdivided into phanerophytes — plants with renewal buds located on vertically growing shoots high above the ground (above 30 cm), and hamephytes with renewal buds located close to the soil surface (no higher than 20-30 cm) (Məmmədov, 2002).

Ecological groups were distinguished on the basis of the classical approach proposed by A.P.Shennikov. It is based on data from field collections and geobotanical descriptions of species ' habitats, taking into account the humidity regime (ground water level, soil moisture, climatic conditions), light and soil fertility.

Plant communities were evaluated according to the dominant-determinant principle: in each community, dominant and co-dominant species were determined, after which the community was designated by the names of these species. In our study, this approach was also applied to plant groups typical of the Gusar Chaya basin (Hajiyev, 2004).

The phenological stages of ornamental plants in the region were analyzed on the basis of data collected during the observation period of 2018 and 2024. In different months and decades of the year, the main phenological phases were recorded: the beginning of mass flowering, the peak of flowering, the beginning of mass fruiting, the peak of fruiting and the end of fruiting.

The altitudinal distribution of plants was recorded using GPS- navigation (a Garmin eTrex 10 GPS Navigator. Statistical data processing was performed in Excel (Microsoft Office LTSC Professional Plus 2021).

In the wild ornamental flora of the Gusar region, 172 species belonging to 44 families and 96 genera have been recorded, including the families Rosaceae Juss. (22), Asteraceae Guerke (20), Orchidaceae Juss. (16), Violaceae Batsch (11), Papaveraceae Juss. (11) and Lamiaceae Martinov (8) they predominate in the number of species. Several genera were recorded with the same species (Table 1, Figure 1).

Table 1
Taxonomic structure of ornamental plants of the Gusar Chaya River

Order (Lat.)	Order name (Russian)	Families (Lat.)	The number of families	Genera	Species
Equisetales	Eguisetophyta	Equisetaceae	1	1	1
Ericales	Vereskovaya	Ericaceae	1	2	5
Apiales	Anticipatie	Apiaceae	1	1	2
Sapindales	Sapindaceae	Sapindaceae	1	1	1
Dipsacales	Varankina	Caprifoliaceae	2	2	2
Celastrales	Berestetskaya	Celastraceae	1	1	1
Polypodiales	Mnogonozhkovye	Polypodiaceae	1	1	1
Alismatales	Chastoozerye	Alismataceae	1	1	1
Liliales	Liliaceae	Liliaceae	1	4	4
Asparagales	Targetsite	Asparagaceae	4	18	32
Ranunculales	Luticasone	Ranunculaceae	2	9	18
Saxifragales	Complaciente	Saxifragaceae	1	1	1
Fabales	Obvinenie	Fabaceae	6	5	5
Rosales	Rozotsvetnye	Rosaceae	1	10	22
Malpighiales	Malpighiaceae	Euphorbiaceae	3	3	16
Geraniales	Geraniaceae	Geraniaceae	1	2	6
Malvales	Maldivene	Malvaceae	1	2	2
Brassicales	Capostipite	Brassicaceae	1	2	5
Caryophyllales	Gvozdikotsvetnye	Caryophyllaceae	1	3	5
Gentianales	Garekakheti	Gentianaceae	3	3	4
Boraginales	Brachycerinae	Boraginaceae	2	4	6
Solanales	Planimetrie	Solanaceae	1	1	1
Lamiales	Anadivine	Lamiaceae	5	4	8
Asterales	Astrocity	Asteraceae	2	15	23

Among the rhizomatous monocarpic species, we can distinguish *Glaucium elegans* Fisch. & C.A.Mey., *Papaver arenarium* M.Bieb., growing on well-drained substrates of the Gusar Chaya basin, mainly on open sunny slopes. These species are characterized by short rhizomes, which ensure their fixation in loose soils and allow plants to successfully pass the life cycle in conditions of limited moisture (Biodiversity Journal,regional journals, 2018-2024).

Taproot multi-fruited plants make up 5.3% of the flora. This type of root system provides deep penetration into the soil, which allows plants to use the moisture of the lower horizons. Examples of such species are *Campanula tridentata* Schreb., *Onobrychis iberica* Grossh., and *Jurinea corymbosa* Bieb. Most of them are distributed in stony and semi-serophytic areas along the banks of the Gusar Chai River, where the soils are rich in skeletal material (Gurbanov, 2025).

Single-fruited plants with a tap root are represented in 11.6% of the species. They are found mainly in more open and disturbed biotopes — near roadsides, on pastures and in places of anthropogenic impact. These include such species as *Lactuca orientalis* (Boiss.) Boiss., *Psephellus dealbatus* (Willd.) K.. Koch and *Eremurus spectabilis* Bieb., which are characterized by the ability to quickly develop free areas (Gurbanov, 2017).

Bulbous and tuberous multi-fruited plants constitute a special category, accounting for 11.6% and 11.1%, respectively. These plants are well adapted to seasonal contrasts of humidity and temperature, as their underground organs serve as storehouses of moisture and nutrients. Bulbous species such as

Gagea villosa (M.Bieb.) are ubiquitous in the Gusar Chaya basin. M. Bieb Sweet., *Allium paradoxum* (M.Bieb.) G. Don *Ornithogalum orthophyllum* Ten. Tuberous species include *Anacamptis coriophora* (L.) R.M.Bateman and *Cyclamen hederifolium* Aiton, which grow mainly in shady and moderately moist forest communities (Asadov, 2021).

Fibrous roots, single-fruited fibrous roots plants, making up 12.8%, occupy a prominent position among ephemera and small grasses. They develop quickly in the spring, use a short period of moisture, and then complete the growing season. Typical representatives are *Poa bulbosa* L., *Bromus tectorum* L. and *Alyssum desertorum* Stapf.

Shrub and tree forms are represented by smaller proportions — 5.8% are shrubs, 2.9% are tall shrubs or low-growing trees, 2.4% are shrub lianas. These life forms are mainly concentrated in the lower mountain and foothill belts of the Gusarchai basin, where there is more stable humidity and moderate shading. Typical shrubs include *Rosa orientalis* Dupont ex Ser., *Lonicera caprifolium* L. and *Berberis iberica* Steven, while lianas are represented by species such as *Clematis orientalis* L.and *Hedera helix* L.. (Aliyeva, 2022).

As objects of research,plants of the Gusar Chai River basin were collected, among which there are species of these genera Echium L., Ranunculus L., Scilla L, Primula L., Bellis L., Teucrium L., Tussilago L., Achillea L., Senecio L.

It was found that in March and April, during the spring vegetation development period, bulbous perennial herbaceous species, such as *Scilla siberica* L, predominate. And * Ornithogalum sintenisii* L. In addition, the presence of *Primula woronowii* L. was noted, along with the germination of individual representatives of the Asteraceae family, including *Tussilago farfara* L. And * Bellis perennis* L.

In June-July, there is a significant increase in the species diversity of vegetation, including shrubby, herbaceous forms, as well as tree species. Among the identified plants are * Rosa canina* L., * Rubus caucasicus* L., *Salvia pratensis* L., *Salix herbacea* L., *Trifolium pratense* L., *Trifolium repens* L., *Poa pratensis* L., *Taraxacum officinale* L. and *Berberis vulgaris* L.
The studied species include perennial and biennial herbaceous plants, shrubs, and trees. Mesophytic species predominate in ecological terms, but the presence of xero-mesophytes is also noted.

Conclusion

Thus, the results of the analysis of the biomorphological structure of the flora of the Gusar Chaya River basin indicate a pronounced dominance of herbaceous life forms, among which rhizomatous perennial plants predominate. Such a structure indicates a high level of adaptation potential of the floristic complex to various soil and climatic conditions of the studied region.

The revealed regularities confirm the determining role of ecological gradients — the humidification regime, the degree of illumination and edaphic characteristics - in the formation of the spectrum of life forms of wild ornamental flora of the north-eastern macroslope of the Greater Caucasus. Consequently, the biomorphological organization of the flora of the territory under consideration reflects its ecological confinement and functional adaptation to environmental conditions.

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