Т. 12. №11 2026
https://doi.org/10.33619/2414-2948/132

UDC 582.681.81
AGRIS F70
https://doi.org/10.33619/2414-2948/132/08

SPECIES OF THE FAMILY Salicaceae Mirb. IN THE LANDSCAPING OF THE NAKHCHIVAN AUTONOMOUS REPUBLIC

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ВИДЫ СЕМЕЙСТВА Salicaceae Mirb. В ОЗЕЛЕНЕНИИ НАХЧЫВАНСКОЙ АВТОНОМНОЙ РЕСПУБЛИКИ

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Abstract. In the modern period, special attention is paid not only to the decorative characteristics of plants used in the landscaping of cities and settlements, but also to their ecological suitability, biodiversity conservation, and contribution to ecosystem sustainability. In this regard, representatives of the family Salicaceae Mirb., comprising trees and shrubs, are considered one of the plant groups with diverse ecological and economic significance. The aim of this study was to summarize the ecological characteristics of Salicaceae species occurring in the flora of the Nakhchivan Autonomous Republic and to assess their potential for use in ecological landscaping. Based on literature data, the results of previous floristic studies, and field observations conducted in 2023–2024, 17 species belonging to two genera, *Salix* L. and *Populus* L., were analyzed. The predominantly mesophytic characteristics of the studied species, their distribution across different altitudinal belts, and their occurrence particularly in river valleys, moist habitats, and forest-shrub vegetation were considered key indicators determining their importance for ecological landscaping. The potential use of willow and poplar species for stabilizing riverbanks, reducing erosion processes, landscaping settlements, and enhancing the ecological stability of landscapes was identified. The results of the study demonstrate that the incorporation of tree and shrub species native to the local flora into ecological landscaping systems is important for biodiversity conservation and the development of sustainable landscapes.

Аннотация. В современный период при озеленении городов и населённых пунктов особое внимание уделяется не только декоративным свойствам растений, но и их экологической пригодности, сохранению биоразнообразия и обеспечению устойчивости экосистем. В этом отношении представители семейства *Salicaceae* Mirb., включающего древесные и кустарниковые растения, рассматриваются как одна из групп растений, имеющих разнообразное экологическое и хозяйственное значение. Целью исследования является обобщение экологических особенностей видов семейства *Salicaceae*, произрастающих во флоре Нахчыванской Автономной Республики, и оценка возможностей их использования в экологическом озеленении. На основе литературных данных, результатов предыдущих флористических исследований и материалов полевых наблюдений, проведённых в 2023–2024 гг., проанализированы 17 видов, относящихся к 2 родам – *Salix* L. и *Populus* L. Преимущественно мезофитный характер исследованных видов, их распространение в

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Т. 12. №11 2026
https://doi.org/10.33619/2414-2948/132

различных высотных поясах, а также участие в растительности речных долин, увлажнённых местообитаний и лесо-кустарниковых сообществ рассматривались как основные показатели, определяющие их значение для экологического озеленения. Установлен потенциал использования видов ив и тополей для укрепления прибрежных территорий, снижения эрозионных процессов, озеленения населённых пунктов и повышения экологической устойчивости ландшафтов. Результаты исследования показывают, что включение древесных и кустарниковых видов местной флоры в системы экологического озеленения имеет важное значение для сохранения биоразнообразия и формирования устойчивых ландшафтов.

Keywords: Salicaceae, Salix, Populus, ecological landscaping, biodiversity, ecological sustainability.

Ключевые слова: *Salicaceae*, *Salix*, *Populus*, экологическое озеленение, биоразнообразие, экологическая устойчивость.

In the modern urban environment, green spaces are regarded not only as aesthetic and decorative elements but also as natural components that play an important role in maintaining ecological balance. The expansion of cities and settlements, increasing anthropogenic pressure, soil erosion, changes in water resources, and the influence of climatic factors make it necessary to establish landscaping systems based on ecological principles. In this regard, when selecting plant species, it is important to consider not only their decorative characteristics but also their adaptability to natural environmental conditions and their functional roles within ecosystems. One of the main objectives of ecological landscaping is the selection of ecologically suitable plant species for a particular area and the efficient use of their natural characteristics. Within this approach, the study of plant species that occur naturally in the regional flora is of particular importance. Since such species have developed under natural conditions, they may possess adaptations to the climatic, soil, and water regimes of the region. The family Salicaceae Mirb. mainly comprises trees and shrubs. The genera Salix L. and Populus L. are distinguished by their wide distribution, rapid growth, adaptability to various ecological conditions, and economic importance. Representatives of these genera occupy an important position particularly along riverbanks and in valleys, moist habitats, forest-shrub vegetation, and other ecosystems. According to the results of previous floristic studies, the family Salicaceae is represented in the flora of the Nakhchivan Autonomous Republic by 17 species belonging to two genera. Of these, 9 species belong to the genus Salix L., while 8 species belong to the genus Populus L. The distribution of these species across different altitudinal belts and their ecological characteristics provide a basis for separately assessing their potential use in landscaping systems in the region. In this context, the aim of the study is to summarize the ecological characteristics of species belonging to the family Salicaceae Mirb. and to assess their potential for use in ecological landscaping, particularly in water bodies, river-valley systems, and green spaces within settlements.

Material and research methods

The study material consisted of species of the family Salicaceae Mirb. occurring in the flora of the Nakhchivan Autonomous Republic. The study was based on the results of field observations conducted in 2023–2024, herbarium specimens, and available literature data.

The taxonomic identity of the species was determined using A. M. Asgarov's Plant World of Azerbaijan, Flora of Azerbaijan, and other floristic sources. Current nomenclatural information was verified using the World Flora Online database (https://about.worldfloraonline.org/) [1, 7].

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Т. 12. №11 2026
https://doi.org/10.33619/2414-2948/132

In assessing the ecological characteristics of the species, their moisture requirements, altitudinal distribution, habitats, association with rivers and water bodies, as well as their characteristics relevant to landscaping were taken into consideration [8].

Discussion and conclusions of the study

Seventeen species of the family *Salicaceae* Mirb., belonging to two genera, have been identified in the flora of the Nakhchivan Autonomous Republic. The genus *Salix* L. is represented by 9 species, while *Populus* L. is represented by 8 species [6].

Analysis of the study materials showed that the majority of the representatives of the family are associated with humid and relatively moist ecological conditions. The distribution of most species in the middle-mountain belt, as well as the occurrence of some representatives in areas extending from the lower-mountain belt to the subalpine belt, indicates their potential for use under different landscape conditions. In particular, the occurrence of representatives of the genera *Salix* and *Populus* in vegetation associated with river valleys and water bodies increases their importance in maintaining the ecological stability of riparian areas (Table).

Table

POTENTIAL APPLICATIONS OF REPRESENTATIVES OF THE FAMILY *Salicaceae* IN ECOLOGICAL LANDSCAPING

Genus	*Ecological characteristics*	*Potential applications*
Salix L.	Associated with moist and water-adjacent habitats	Landscaping of river and valley banks; bank stabilization
Salix L.	Dense root system	Protective landscaping for erosion control
Populus L.	Develops as a tree	Landscaping of settlements and open landscapes
Populus L.	Associated with water bodies and river valleys	Landscaping of river valleys and areas adjacent to water bodies
Salix + *Populus*	Participates in maintaining biodiversity	Development of ecologically sustainable green spaces

Species of *Salix* L. and *Populus* L. frequently form complex phytocenoses in riparian and tugai ecosystems together with other tree, shrub, and herbaceous species. Recent studies conducted in Azerbaijan have identified *Populus alba*, *P. nigra*, species of *Salix*, and *Ulmus minor* Mill. as major components of riparian forest communities. In such *Populus–Salix–Ulmus* communities, willow and poplar species constitute the principal elements of the upper canopy layer, while *Ulmus* contributes, together with them, to the formation of multilayered forest cover in river valleys. Communities of the *Saliceta–Alnueta–Populeta* type, formed with the participation of the genera *Salix*, *Populus*, and *Alnus*, have also been recorded. In these phytocenoses, *Populus alba*, *P. nigra*, *Alnus barbata*, and *Salix triandra* act as the principal tree components [3-5].

The floristic composition of willow communities is not limited to tree and shrub species. In riparian communities associated with *Salix alba*, *S. fragilis*, *S. purpurea*, and *S. triandra*, *Populus alba*, *P. nigra*, *Alnus glutinosa*, as well as shrub and herbaceous species belonging to various families, have been observed. For example, *Crataegus monogyna* of the family *Rosaceae* and various herbaceous species of the family *Fabaceae* may also occur as components of such riparian vegetation; *Rubus caesius*, another representative of *Rosaceae*, has been reported as one of the characteristic accompanying species in some *Salix* communities. These data demonstrate that *Salix* species participate not as isolated species but together with plants belonging to different families in the formation of structurally and ecologically complex riparian phytocenoses [2, 8-11].

Landscaping around rivers and water bodies. One of the important characteristics of willow and poplar species is their ability to develop in areas close to water. This characteristic makes them one

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Т. 12. №11 2026
https://doi.org/10.33619/2414-2948/132

of the important plant groups for landscaping along the banks of rivers, canals, and other water bodies. In particular, the dense root system of representatives of the genus *Salix* may contribute to the stabilization of bank soils and the reduction of erosion processes. Therefore, these species can be considered not only as decorative elements but also as components of protective landscaping within river-valley systems. Ecological landscaping for erosion control. In mountainous and foothill areas, surface runoff can accelerate soil loss and erosion. In such areas, the preservation of vegetation cover is an important factor in stabilizing the soil surface. The use of species of the genera *Salix* and *Populus* in suitable habitats may contribute to the restoration of vegetation cover, reinforcement of soils by root systems, and stabilization of riverbanks and slopes. Thus, the use of *Salicaceae* representatives can be considered not only within the framework of decorative landscaping but also as an approach to ecological and protective landscaping.

Landscaping of cities and settlements. When selecting tree species for settlements, their suitability to local ecological conditions is one of the key considerations. The tree growth form of willows and poplars, the rapid growth of some species, and their ability to form a noticeable canopy in the landscape increase their potential for use in green spaces. However, when these species are used in urban environments, water availability, soil characteristics, root-system development, and the functional purpose of the site should be taken into consideration. Therefore, rather than assuming that all species of *Salicaceae* are equally suitable for every urban environment, it is more appropriate to select species according to the specific ecological conditions of each site. Importance for biodiversity conservation. The use of plants native to the regional flora in ecological landscaping can contribute not only to increasing the area of green spaces but also to the conservation of the local gene pool and biodiversity. The conservation of naturally occurring *Salix* and *Populus* species in the flora of Nakhchivan and their scientifically based assessment for use in landscaping projects may contribute to maintaining the characteristics of natural vegetation.

Thus, species belonging to the family *Salicaceae* can be considered a promising plant group not only in terms of their floristic and economic importance, but also for ecological landscaping, the conservation of riparian ecosystems, and the development of ecologically sustainable landscapes.

Conclusions

It was established that the flora of the Nakhchivan Autonomous Republic includes 17 species of the family Salicaceae Mirb., belonging to the genera Salix L. and Populus L. The predominantly mesophytic characteristics of the studied species and their distribution in the middle-mountain belt, as well as in moist ecotopes associated with rivers, valleys, and water bodies, indicate their suitability for ecological landscaping in such habitats. The main application areas of Salix and Populus species in ecological landscaping were identified. These species can be used for stabilizing riverbanks and valley slopes, reducing erosion processes, landscaping areas adjacent to water bodies and settlements, and establishing sustainable green spaces. At the same time, when selecting species for urban and other anthropogenic areas, water availability, soil characteristics, and root-system development should be taken into consideration. It was established that Salix and Populus species form complex phytocenoses in riparian and tugai ecosystems together with Ulmus, Alnus, and various herbaceous and shrub species, including representatives of the families Rosaceae and Fabaceae. Since such multi-component plant communities play an important role in maintaining structural diversity and ecological stability in river valleys, the use of Salicaceae species together with other native plant groups in ecological landscaping may contribute to the development of more functional and sustainable landscapes.

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Financing: The research it is financed and supported on the basis of the "Herbari Fund of Biology Department of Nakhchivan State University" project.

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Поступила в редакцию
28.09.2026 г.

Принята к публикации
07.10.2026 г.

Ссылка для цитирования:

Babayeva S., Jalalli U. Species of the Family Salicaceae Mirb. in the Landscaping of the Nakhchivan Autonomous Republic // Бюллетень науки и практики. 2026. Т. 12. №11. С. 72-77. https://doi.org/10.33619/2414-2948/132/08

Cite as (APA):

Babayeva, S., & Jalalli, U. (2026). Species of the Family Salicaceae Mirb. in the Landscaping of the Nakhchivan Autonomous Republic. *Bulletin of Science and Practice, 12*(11), 72-77. https://doi.org/10.33619/2414-2948/132/08

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