Т. 11. №4 2025
https://doi.org/10.33619/2414-2948/113

UDC 582.572; 635.25
AGRIS F40
https://doi.org/10.33619/2414-2948/113/02

DISTRIBUTION AREAS, MORPHOECOLOGY AND PROSPECTS FOR USE OF SOME SPECIES OF THE GENUS *Allium* L. (AZERBAIJAN)

©Gurbanova L., *ORCID: 0009-0003-4572-7123, Ph.D., Azerbaijan State Agricultural University, Ganja, Azerbaijan, lala.qurbanova78@list.ru*

АРЕАЛ РАСПРОСТРАНЕНИЯ, МОРФОЭКОЛОГИЯ И ПЕРСПЕКТИВЫ ИСПОЛЬЗОВАНИЯ НЕКОТОРЫХ ВИДОВ РОДА *Allium* L. (АЗЕРБАЙДЖАН)

©Гурбанова Л. З., *ORCID: 0009-0003-4572-7123, канд. биол. наук, Азербайджанский государственный аграрный университет, г. Гянджа, Азербайджан, lala.qurbanova78@list.ru*

Abstract The article provides information on the geographical distribution of some wild species of the genus *Allium* L. distributed in the flora of Azerbaijan, as well as a detailed morphological analysis of their vegetative and generative organs. As a result of the ecological analysis, it was determined that the studied species are cryptophytes and most of them are distributed in the middle mountainous zone. In addition, considering that the wild species of the genus *Allium* L. we have selected have a great bioresource value, information about perspective of their use is also reflected in the article.

Аннотация. Приводятся сведения о географическом распространении некоторых дикорастущих видов рода *Allium* L., широко распространенных во флоре Азербайджана. Дается подробный морфологический анализ их вегетативных и генеративных органов. В результате экологического анализа установлено, что изученные виды являются криптофитами и большинство из них распространены в среднегорной зоне. Кроме того, дикорастущие виды рода *Allium* L. имеют большую биоресурсную ценность. Отражены сведения о перспективах их использования.

Keywords : *Allium* L., perianth, cryptophyte, wild vegetable.

Ключевые слова: Allium L., околоцветник, криптофит, дикорастущий овощ.

With approximately 780 species, the genus *Allium* L. (*Alliaceae*) is one of the 20 largest genus of flowering plants, one of the five largest genus of monocotyledons, and the third largest genus in terms of species among the Holarctic genus (after *Astragalus* and *Cagex*). The presence of a large number of economically important plants in the genus is the best evidence of the relevance of the study of onion taxonomy. The onion genus — *Allium* L., occupies a central place in the family *Alliaceae* of the order *Liliales* [2].

Onions have a number of useful properties — they are valuable food, vitamin, honey, fodder, medicinal and ornamental plants. Good taste, high content of carotene, ascorbic acid and nutrients, resistance to frost, pests and other valuable properties are inherent in many onion varieties. Since wild onions have been collected and used by local residents since ancient times, this leads to a catastrophic depletion of their natural reserves.

Тип лицензии CC: Attribution 4.0 International (CC BY 4.0)

Т. 11. №4 2025
https://doi.org/10.33619/2414-2948/113

Most species are distributed in the arid temperate regions of the Northern Hemisphere. However, many wild species have not been studied in terms of their economic use and the possibility of their introduction into culture. The existing diversity of wild onion varieties can significantly expand the range of ornamental plants in the future. Many of them can be used to create areas of continuous flowering. The active introduction of perennial wild onions into culture is directly related to the task of preserving the global diversity of the plant gene pool.

Their consumer value as food, medicine and fodder plants is determined by the quantitative composition of chemical substances. In the literature, great attention is paid to the chemical composition of onions as an important vegetable crop. The chemical composition data given in the literature indicate the high nutritional value of onions. The authors note that species of the genus *Allium* L. contain a significant amount of proteins, fats, sugars, carotene, vitamins A, B_1, B_2, PP, C, steroids and flavonoids, glucosides, organic acids, coumarins and phytoncides. The chemical composition of leaves varies within one species. This depends on the place of growth, the stage of development and age of plants, cultivation technology, and number [1, 7].

Since ancient times, edible onions have played an important role in human nutrition due to their special pungent taste, smell and medicinal properties. Edible species of *Allium* L. formed an important part of the daily diet of the ancient Egyptians, who were engaged in hard labor in building the pyramids. In ancient Greece, onions and garlic occupied an important place in the diet of warriors. The Romans believed that onions, included in the diet of soldiers and sailors, increased strength and endurance. In the Middle Ages, knowledge of the medicinal properties of onions was preserved mainly in monasteries, where their cultivation continued. In ancient Chinese civilization, various types of onions were part of the daily diet, especially with raw meat, and were often used as medicine. The sharpness and taste of onions depend on the amount of essential oils, sugars, organic acids, and sulfur compounds in their composition.

People eat more than 40 wild species of onions, some of which are used to create new varieties and hybrid forms [9].

Material and Methodology

The object of the study was nine wild species of the genus *Allium* L.: *A. rotundum* L., *A. ursinum* L., *A. rubelum* M. Bieb., *A. fuscoviolaceum* Fomin, *A. paradoxum* M. Bieb., *A. szovitsii* Regel, *A. albidum, A. atroviolaceum* Boiss., *A. schoenoprasum* L. Due to the wide range of biologically active compounds, these types of onions can be the basis for both food supplements and pharmaceutical preparations.

The nomenclature of wild species of the genus *Allium* L. is presented according to the fundamental floras of Azerbaijan, the International Plant Names Index (IPNI) database, or the standards adopted in The Plant List [4, 5]. Collection of herbarium material and field observations were carried out using the route stationary method.

The work used morphology (observation, biomorphological description, comparative ontogenetic and comparative ecological methods), population biology (route method, research area method, phenological observations, population ontogenetic experience, etc.), and statistical methods [6, 8, 10].

During the study of development, generally accepted phenological observation methods were used [3]. Life forms of plants were classified according to Serebryakov and Raunkier, and ecological groups according to Shennikov [13-15] The distribution areas of species were determined by the point map method based on the results of our own collections, literary data and information obtained from herbarium collections [11, 12].

Тип лицензии CC: Attribution 4.0 International (CC BY 4.0)

T. 11. №4 2025
https://doi.org/10.33619/2414-2948/113

Results and discussion

Recently, the importance of using wild plants for prophylactic purposes, such as medicinal raw materials and food additives, has been increasing. Species of the genus *Allium* L. rightfully occupy one of the leading places among widely used edible plants. Most wild species of the genus *Allium* L. are still poorly studied. The purpose of the research work is to determine the regularity of the distribution of wild species of the genus *Allium* L. in different regions of Azerbaijan and to substantiate the possibilities of using the obtained data in solving a number of urgent theoretical and practical problems. The main goal was to assess the diversity of species of the genus *Allium* L., their natural habitat, biological activity, traditional methods of use for food and the prospects for their use(Figure 1).

Figure 1. 1 – *A. atroviolaceum* Boiss., 2 – *A. rotundum* L., 3 – *A. rubelum* M. Bieb., 4 – *A. paradoxum* M. Bieb., 5 – *A. fuscoviolaceum* Fomin, 6 – *A. szovitsii* Regel, 7 – *A. ursinum* L., 8 – *A. albidum* L., 9 – *A. schoenoprasum* L.

Тип лицензии CC: Attribution 4.0 International (CC BY 4.0)

Т. 11. №4 2025
https://doi.org/10.33619/2414-2948/113

In this regard, certain herbarium materials were collected from various areas of Azerbaijan and notes were compiled.The vegetative and generative organs of wild species of the genus *Allium* L. were analyzed. (Table 1). Morphological characters of important taxonomic importance in the taxonomy of the genus *Allium* L. include the following: bulb shape, presence or absence, rhizomes, leaf structure, location of the leaf base, presence or absence of the remaining or falling sheath, its size, length of the flower stalk, characteristics of the flower stalk (shape and color of the petals, length of the male stalks, etc.).

Table 1

BIOMORPHOLOGICAL CHARACTERISTICS OF WILD ONION SPECIES OF THE GENUS *Allium* L.

Species	*Shape, parameters (width) of the bulb, sm*	*Generative force parameters (height), sm*	*Leaf structure (width), sm*	*The shape of the stamens*	*Perianth parameters, mm*
Allium ursinum L.	oblong, narrow, 1	15-20	2.0-4.0	whole, long	8-10
A.rotundum	egg-like, 1.0-2.0	20-50	0.2-0.5	short	5
A.rubellum	egg-like, 1.0-1.5	40-50	0.1-0.2	lanset, whole	4-5
A.albidum	conical	10-20	1.0-2.0	lanset	4-5
A.fuscoviolaceum	egg-like, 0.75-2.0	50-80	0.2-0.3	long	4-5
A.paradoxum	egg-like, 1	10-25	0.5-1.5	lanset	10
A.szovitsii	Cylindrical, 1.0-1.5	15-25	0.2-0.3	long	5-6
A.atroviolaceum	egg-like, 1.5-2.5	40-60	0.2-1.0	long	3-4
A.schoenoprasum	oblong, 1.0	20-40	0.2-0.4	whole, naked	8-12

Analysis of the characteristics of the bulb structure of Allium L. species showed that three groups can be distinguished among them:

-Rhizome species: have poorly developed, narrow, cylindrical-conical or ovoid-conical, elongated bulbs, usually collected in several places and seated on a common rhizome.

-Rhizome-bulbous species: have well-developed oval-spherical bulbs located on a thin, poorly expressed rhizome.

-Bulbous species: have well-developed spherical, ovoid or oblong-ovate single bulbs without rhizomes.

Important morphological characteristics of *Allium* L. species relate to the structure of the inflorescence: the shape and color of the inflorescence leaves, and the length of the male stamens. For most species of *Allium*, the length and shape of the male stamens are important systematic characteristics.

Studies of the ecology of wild species of the genus *Allium* L. have shown that all of them are mesophytes, xeromesophytes, and most of them are geophytes, therefore they prefer southern slopes, as well as open sunny areas with moderate humidity. Exceptions include: *A. ursinum, A. paradoxum* are inhabitants of forest communities. *Allium* L. is a steppe plant that lives on a gravel substrate in mixed grassy and, less often, shrubby steppes.

Ecological and morphological analysis of the life form of *Allium* L. species showed that, according to I. G. Serebryakov, they are perennial herbaceous plants. According to the classification of life forms by C. Raunkier, representatives of the genus *Allium* L. belong to geophytes and cryptophytes.

During the expeditions, the distribution and bioecology of representatives of the onion family *Alliaceae* by zones were studied. Wild onion species in the area are found in various zones from the

Тип лицензии CC: Attribution 4.0 International (CC BY 4.0)

Т. 11. №4 2025
https://doi.org/10.33619/2414-2948/113

middle to the high mountains. The vegetation of the high mountain zone is represented by a change in forest elements. According to Shennikov, the ecological types of the studied species are given in the table (Table 2).

Table 2

ECOBIOLOGICAL ANALYSIS OF WILD SPECIES OF THE GENUS *Allium* L.

Species name	*Flowering*	*Lifeform*		*Ecological types*	*Generational spread*
		According to Raunkier	*According to Serebryakov*		
Allium szovitsii	VII-VIII	cryptophyte	perennial herb	xeromesophyte	MM-HM
A. albidum	VII-VIII	cryptophyte	perennial herb	xeromesophyte	MM-HM
A. fuscoviolaceum	VI-VII	cryptophyte	perennial herb	xerophyte	F-MM
A. paradoxum	IV-V	cryptophyte	perennial herb	xeromesophyte	MM
A. ursinum	V-VI	cryptophyte	perennial herb	xerophyte	MM
A. schoenoprasum	VI-VIII	cryptophyte	perennial herb	mesophyte	HM
A. rotundum	VI-VII	cryptophyte	perennial herb	mesophyte	MM
A. atroviolaceum	VI-VIII	cryptophyte	perennial herb	xerophyte	F-MM
A. rubellum	V	cryptophyte	perennial herb	xerophyte	F- MM

MM - middle mountain; HM - high mountain; F - foothills

The practical importance of wild edible onions lies in the fact that they grow quickly in the spring, at which time their leaves are rich in vitamins, sugars, and valuable microelements, and while cut, their leaves remain until late autumn, quickly renewing; therefore, they can be used in 2-3 periods.The introduction of wild ornamental onions into culture allows you to expand and improve the range of plants for landscaping. Onions can be used both in single and group plantings, in combination with other ornamental plant species. The possibilities of using onions are expanded by their use in lowland oils for winter bouquets.

A. ursinum L. — The higher the altitude at which *A.ursinum* grows, the more vitamin C it contains. In terms of the amount of vitamin C it contains, bear's onion surpasses citrus fruits. In addition, all parts of the plant contain protein, fructose, mineral salts, and carotene. *A.ursinum* is not suitable for feed, because the meat of the animal that eats it gives an unpleasant taste, and its milk turns red. The plant is a valuable honey-producing plant. Its bark, leaves, and bulb are used in cooking. It is added to salads and soups. Its leaves are salted. Drying is not recommended because it loses its quality when dried. *A.ursinum* is also considered an ancient medicinal plant. It increases appetite, improves intestinal function, and improves digestion. In addition, this plant has anthelmintic properties. This onion prevents the accumulation of cholesterol in the blood, improves heart function, regulates metabolism, and lowers blood pressure.

A. rotundum L. — In folk medicine, the plant is used as a wound-healing medicine for gastrointestinal diseases. This onion protects people from various epidemics, malignant tumors and influenza. The phytoncidal properties of the plant are used in inflammatory diseases of the upper respiratory tract, avitaminosis, angina and purulent wounds of the skin. At the same time, onion peel extract is used in the "cleansing" of the body, strengthening the walls of the blood-vascular system, and treating influenza.

A. atroviolaceum Boiss. — The plant's useful parts are the underground and aboveground parts. Young leaves are used fresh as food and added to pickles. Young plants are salted. It is used to make stuffing for stews, and added to meat, fish, and vegetable dishes. They are preserved in salt or vinegar and dried for the winter. It is a honey-producing plant. Its leaves are eaten fresh and added to salads.

Тип лицензии CC: Attribution 4.0 International (CC BY 4.0)

Т. 11. №4 2025
https://doi.org/10.33619/2414-2948/113

A. schoenoprasum L. — is used as a vegetable. They are mixed with dough and cheese. The population collects it in the wild and plants it in gardens. In the market, it is one of the most sold species because it is easy to collect and is abundant.

A. szovitsii — regel is consumed as a vegetable. People plant them in their gardens from the wild and consume fresh leaves in spring as a daily vegetable. Sold in the bazaar.

A. paradoxum M. Bieb — the plant's distinguishing feature is that it produces bulbils. Its smell is similar to that of garlic. The edible parts are the leaves, flowers and bulbils. The plant has a light garlic flavor and is used as a salad. The plant is harvested in early spring. Its leaves are available from late autumn to spring. Its leaves have a milder and more delicate flavor than onions. The plant contains sulfur compounds and, when added to food, lowers blood cholesterol levels. Improves the digestive system.

Thus, skillfully using the reserves of wild greens, we can make our usual daily diet more varied, tasty, useful, and most importantly — healthy.

References:

1. Agafonov, A. F., Logunova, V. V., & Gurkina, L. K. (2018). The interspecific hybrids of onion with high degree of resistance to a peronosporoz and high content of nonvolatile solid. *Vegetable crops of Russia*, (4), 3-5.

2. Askerov, A. M. (2016). Flora Azerbaidzhana. Baku. (in Azerbaijani).

3. Beideman, I. N. (1974). Metodika izucheniya fenologii rastenii i rastitel'nykh soobshchestv. Novosibirsk. (in Russian).

4. Menitskii, Yu. L., & Popova, T. N. (2003). Konspekt flory Kavkaza. I.. St. Petersberg. (in Russian).

5. Flora Azerbaidzhana (1952). 1-2, 8, Baku. (in Russian).

6. Gadzhiev, V. D. (1971). Analiz flory vysokogorii Malogo Kavkaza. Baku. (in Russian).

7. Gins, M. S., & Romanova, E. V. (2017). Funktsional'nye produkty pitaniya iz rastitel'nogo syr'ya. Moscow. (in Russian).

8. Grossgeim, A. A. (1946). Rastitel'nye resursy Kavkaza. Baku. (in Russian).

9. Ipat'ev, A. N. (1966). Ovoshchnye rasteniya zemnogo shara. Minsk. (in Russian).

10. Lapina, P. I. (1975). Metodika fenologicheskikh nablyudenii v botanicheskikh sadakh SSSR. Moscow. (in Russian).

11. Ekeeva, E. V. (2010). Metody geograficheskikh issledovanii. Gorno-Altaisk. (in Russian).

12. Portenier, N. N. (2000). Metodicheskie voprosy vydeleniya geograficheskikh elementov flory Kavkaza. *Botanicheskii zhurnal, 85*(6), 76-84. (in Russian).

13. Raunkiaer, C. (1934). The life forms of plants and statistical plant geography; being the collected papers of C. Raunkiær.

14. Serebryakov, I. G. (1964). Zhiznennye formy vysshikh rastenii i ikh izuchenie. In *Polevaya geobotanika, 3,* Moscow. (in Russian).

15. Shennikov, A. P. (1964). Vvedenie v geobotaniku. Leningrad. (in Russian).

Список литературы:

1. Agafonov A. F., Logunova V. V., Gurkina L. K. The interspecific hybrids of onion with high degree of resistance to a peronosporoz and high content of nonvolatile solid // Vegetable crops of Russia. 2018. №4. P. 3-5.

2. Аскеров А. М. Флора Азербайджана. Баку, 2016. 443 с.

3. Бейдеман И. Н. Методика изучения фенологии растений и растительных сообществ. Новосибирск: Наука, 1974. 153 с.

Тип лицензии CC: Attribution 4.0 International (CC BY 4.0)

4. Меницкий Ю. Л., Попова Т. Н. Конспект флоры Кавказа Т. I.. СПб.: Изд-во С.-Петерб. ун-та, 2003. 204 с.

5. Флора Азербайджана: В 8 т. Т. 1-2, 8, Баку: Изд-во АН Азербайджана. СССР, 1952.

6. Гаджиев В. Д. Анализ флоры высокогорий Малого Кавказа. Баку: Вяз, 1971.

7. Гинс М. С., Романова Е. В. Функциональные продукты питания из растительного сырья. М.: РУДН, 2017. 118 с.

8. Гроссгейм А. А. Растительные ресурсы Кавказа. Баку: Изд-во АН Азербайджанской ССР, 1946. 671 с.

9. Ипатьев А. Н. Овощные растения земного шара. Минск: Высшая школа, 1966. 383 с.

10. Лапина П. И. Методика фенологических наблюдений в ботанических садах СССР. М., 1975. 27 с.

11. Екеева Э. В. Методы географических исследований. Горно-Алтайск: РИО ГАГУ, 2010. 48 с.

12. Портениер Н. Н. Методические вопросы выделения географических элементов флоры Кавказа // Ботанический журнал. 2000. Т. 85. №6. С. 76-84.

13. Raunkiaer C. The life forms of plants and statistical plant geography; being the collected papers of C. Raunkiær. 1934.

14. Серебряков И. Г. Жизненные формы высших растений и их изучение // Полевая геоботаника. М.: АН СССР. Т. 3. 1964. 530 с.

15. Шенников А. П. Введение в геоботанику. Л., 1964. 447 с.

Работа поступила
в редакцию 20.02.2025 г.

Принята к публикации
29.02.2025 г.

Ссылка для цитирования:

Gurbanova L. Distribution Areas, Morphoecology and Prospects for use of some Species of the Genus *Allium* L. (Azerbaijan) // Бюллетень науки и практики. 2025. Т. 11. №4. С. 19-25. https://doi.org/10.33619/2414-2948/113/02

Cite as (APA):

Gurbanova, L. (2025). Distribution Areas, Morphoecology and Prospects for Use of Some Species of the Genus *Allium* L. (Azerbaijan). *Bulletin of Science and Practice*, *11*(4), 19-25. https://doi.org/10.33619/2414-2948/113/02

Тип лицензии CC: Attribution 4.0 International (CC BY 4.0)