

BİOLOGİYA VƏ TİBB ELMLƏRİ

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NEW AREAL, BIOECOLOGICAL-PHYTOSENOLOGICAL FEATURES AND
ETHNOBIOLOGY OF THE EREMURUS SPECTABILIS BIEB. SPECIES IN
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Phytocenological, ethnobiological, and using one of the rare species of Azerbaijani flora-Eremurus spectabilis Bieb. species (Asphodelaceae Juss.) have been shown in the paper. For the first time, a new habitat for the species was discovered in 3 places in the Lesser Caucasus (from the Caucasus to the Asrik mountains of Tovuz district in 2018, to the Seyfali mountains of Shamkir and Goychay districts in 2021). Six cenopopulations with the prevalence of the species were assessed as young, transitional, and fully mature, and their age, efficacy, and viability indices were determined. Ethnobotanically researched data on the use of the plant for food and technical purposes were collected. The productivity and plant reserves of some populations with Eremurus spectabilis species have been studied.

Keywords: *Eremurus spectabilis*, phytocenology, fertility, ethnobotanical characterization

Introduction

Appropriate measures must be taken on a regular basis to fully meet the basic food needs of each member of society. In order to overcome this problem, at least in part, scientists around the world are studying vegetables and wild food plants in the flora at a modern level, and are developing new proposals for their use. Mass scientific research is carried out in these areas, which is still of interest today [6]. The first inscriptions on ancient monuments discovered in Azerbaijan tell us that plants are used for various purposes. Azerbaijan has created a historical treasure with national ethnobiological features in the field of medicine, food, clothing, paints, and household items, using plants widely in their lifestyles.

The fact related to scientific and cultural progress depends only on the development of intellectual achievements creates a misconception in society. It is well known the way of life created by our great ancestors over the millennia and the laws based on natural factors are correct. The

centuries-old scientific and cultural history of the Azerbaijani people, reflected in ancient manuscripts, covering medical, biological, and other fields, proves that scientific research in our country has a very ancient history. The first inscriptions on ancient monuments discovered in Azerbaijan tell us that plants are used for various purposes. Azerbaijan has created a historical treasure with national ethnobiological features in the field of medicine, food, clothing, paints, and household items, using plants widely in their lifestyles.

Representatives of *Asphodelaceae* Juss. family cover 42 genus and 1500 species common in most countries of the world [13]. 2 genus (*Asphodelus* L. and *Eremurus* Bieb.) and 4 species are known from this family in Azerbaijan. Two species of the *Eremurus* genus are known in the wild. One of them - *E.azerbajdzanicus* Charkev is an endemic plant of Azerbaijan [9] and is found only in the Greater Caucasus, and the other is *E.spectabilis* Bieb, which is widely used as a vegetable. According to the literature,

the last species is found only in the flora of Nakhchivan AR and the Greater Caucasus.

A.A.Grossheim writes about *E.spectabilis*: "Glue is made from the roots of the plant, for which mass collection of plant roots is carried out in many regions. The young leaves of the plant are eaten cooked. In folk medicine, the root powder is used to make an ointment against abscesses and tumors" [5]. Many members of the *Eremurus* genus are highly decorative. The flora is more common in the lower and middle mountain ranges, clayey and sometimes black soils. Although its natural resources are very small, it is used as food, medical prepartate and other species are used for technical purposes. *E.spectabilis* is included in the "Red Book" of Azerbaijan (CR / B1ab (v); B2ab (iv) [12]. Young plants are collected for the food and cannot bloom in early spring. Therefore, its reserves are gradually declining. Taking all this into account, stocks of *Eremurus spectabilis* Bieb in the flora of Azerbaijan are small. So, we have aimed to study the species, their population structure, resource estimates, rarity, and ethnobiological features.

Materials and methods

The research has been carried out in the Lesser Caucasus and the Nakhchivan Autono-

mous Republic (AR) of the Azerbaijan Republic in 2020-2021 years. To describe *Eremurus spectabilis* phytocenose using a measure of A.A. Grossheim [5], up to 30 geobotanical descriptions have been carried out in areas where associations spread. In order to determine the floristic composition, more than 15 herbarium materials were gathered from the investigation zone. Taxonomy was given on the basis of the modern nomenclature [2].

According to scientists, vegetation of *E.spectabilis* starts begins to germinate at +80C, +110C temperature, and finishes + 50C - + 60C. Vegetation period continues 160-180 days.

During geobotanical researches in populations of the modern situation in some populations of species and assessment of cenopopulations-spelling method of phytocenosis by B.A.Yurseva [4; 15] and nomenclature of phytocenotical complex were based on classical methods [1; 11]. Plant stocks have been specified [7; 8; 10;14].

Route and sub-stationary investigations were carried out, the population structure of the studied species, and associations, abundance, and a number of individuals included in all phases of the ontogenesis were studied (Table1).

Table 1

General accepted evaluation measure in the ontogenesis

Age cycles	Age conditions	Indices	Age (mi)	Efficiency(ei)
I. Latentperiod	Seeds	Se	0.025	0.0099
II. Pre-generativeperiod	Sprouting	P	0.0067	0.0266
	Juvenile	J	0.0180	0.0707
	Immature	Im	0.0474	0.1807
	Virginal	V	0.1192	0.4200
III. Generativeperiod	Young generative	g1	0.2700	0.7864
	Middle-agedgenerative	g2	0.5	1.0
	Oldgenerative	g3	0.7310	0.7864
IV. Post-generativeperiod	Subsenil	Ss	0.8808	0.4200
	Senile`	S	0.9529	0.1807

Ontogenetical descriptions of *Eremurus spectabilis* species have been shown according to the form. Registration of immature (im), virginal (v) young generative (g1), middle-aged period (g2), old generative (g3), subsenile (ss) and senile (s) periods has been carried out. Results have been analyzed by χ^2 comparison criteria. The following indicators as the integral description of the demographic structure have been used:

Age index $\Delta = \sum k_i \cdot n_i / N$ (i-ontogenetic condition k_i - "mark", n_i -number of individuals, N - total number of individuals in the population).

Efficiency index $\omega = \sum n_i \cdot e_i / \sum N_i$ (n_i -number of plants, i -condition, e_i -plant efficiency).

Assessment of the viability of the plant according to the degree of damage was carried out by the following method:

$$L_n = \frac{100_{n1} + 70_{n2} + 40_{n3} + 5_{n4}}{N}$$

Here: L_n - life potential; N - the total number of *Eremurus spectabilis* Bieb. in the experimental field; n_1 - number of healthy trees; n_2 - number of weakened trees; n_3 - number of severely weakened trees; n_4 - number of dried trees.

If L_n is from 100% to 80%, the crops are considered healthy and in good condition, 79-50% - weakened, 49-20% - sharply weakened, 19% and below - out of order.

Results and discussion

The leaves of the *Eremurus* Bieb. species are rosette-forming plants. The inflorescence is bell-shaped, united at the base, with 6-15 petals. The stamens are 6, uneven, columnar, sessile, and small-mouthed. The box is spherical and partition. They are perennial plants. The roots are thickened to a stalk, up to 25 cm long, the root collar of the plant is surrounded by fibrous remnants of old leaves and curly hairs. The number of leaves is 6-15, linear, uneven along the edges. They are slo-

ping, naked, shorter than the trunk, 1-4 cm wide. The body is 120 cm high. Straight, branched, up to 1 cm thick. The inflorescence is dense, multi-flowered brush, strongly elongated, and relatively sparse when the fruit is formed, the flower stalks are articulated, the tendon is curved when the fruit is formed, the boxes are compressed towards the axis of the flower. The inflorescence is funnel-shaped, oblong-linear, yellowish, 9-10 mm long. The stems of the stamens are dark red, with pollen, twice as long as the inflorescence. The column is bent downwards. The box is spherical, 2-3 times shorter than the fruit stalk, with transverse wrinkles. The seeds are triangular, transversely wrinkled, slightly winged. Flowering and fruiting occur in the IV-VI months.

E. spectabilis was collected from the Lesser Caucasus for the first time on the Asrik mountains of Tovuz district in 2018, and on the Seyfali mountains of Shamkir and Goychay districts in 2021. The presence of the plant in the flora of the Lesser Caucasus has not been reported in any literature source. Species from Nakhchivan AR flora are mainly distributed in Havush, Ardiy mountain, Garagush plateau, Ganli lake, Batabat massif, Khazinadare, Nurgut areas.

The surface parts of the plants are very rich in mucous substances. People use the root as a vegetable. The root is collected in March-April, when the leaves are 6-15 cm long, and in late February of the same year when the weather is mild. It is cut from a depth of 3-4 cm from the soil near the root collar. Fresh leaves are rich in mucous glue. Surveys show that the leaves of the plant are stewed in salted water to obtain bitter water and then fried in oil with onions. In addition, cakes and "gutab" (national cuisine) are made from it. To make cakes and "gutabs", onions, coriander, and lamb are added to the root and chopped. Before cooking, a little salt was added to the chopped mixture. The plant is col-

lected from the area and sold as a vegetable in the market. The refore, the area is gradually shrinking. In addition, the dried powder of the surface of the plant is boiled with honey and taken close to thickening. Then a special ointment is made from it. This ointment is used in the treatment of cuts, fractures, boils-wounds [3]. Glue is made from the root of the plant. Shoemakers use it widely. Because, this glue is durable for shoes.

Bioecological and phytocenological features of *E.spectabilis* species were studied during the research period. At the same time, an action plan was developed for its protection as a rare species. For this purpose, cenopopulations (CP) were first selected in the areas where the plant is spread: CP I- Nakhchivan AR, Nurgut village, surrounding mountains, CP II-Nakhchivan AR Khaznadera, CP III-Nakhchivan AR, Batabat massif, CP IV-To-vuz district, Asrik mountain, CP V-Surround-

ing mountains of Goychay district, CP IV-Seyfali mountain of Shamkir district.

Materials collected from different phases of ontogenesis were studied according to the generally accepted research method of population. The size of the experimental areas was 50x50m, the number was from 10 to 40. Individuals of the studied species were counted from the fields and the spectrum of ontogenetic conditions was compiled (Figure 1).

The number of individuals belonging to the g1 and g2 phases of the ontogenesis of the populations in Nakhchivan AR varies between 16-20, and in the Lesser Caucasus populations was 9-19, but in the s and ss phases, the number of individuals was less, ranging from 4-8, as shown from the diagram. This indicates that populations are struggling to recover and fight to age. The age and efficiency of the populations were determined based on the obtained results and reflected in Table 2.

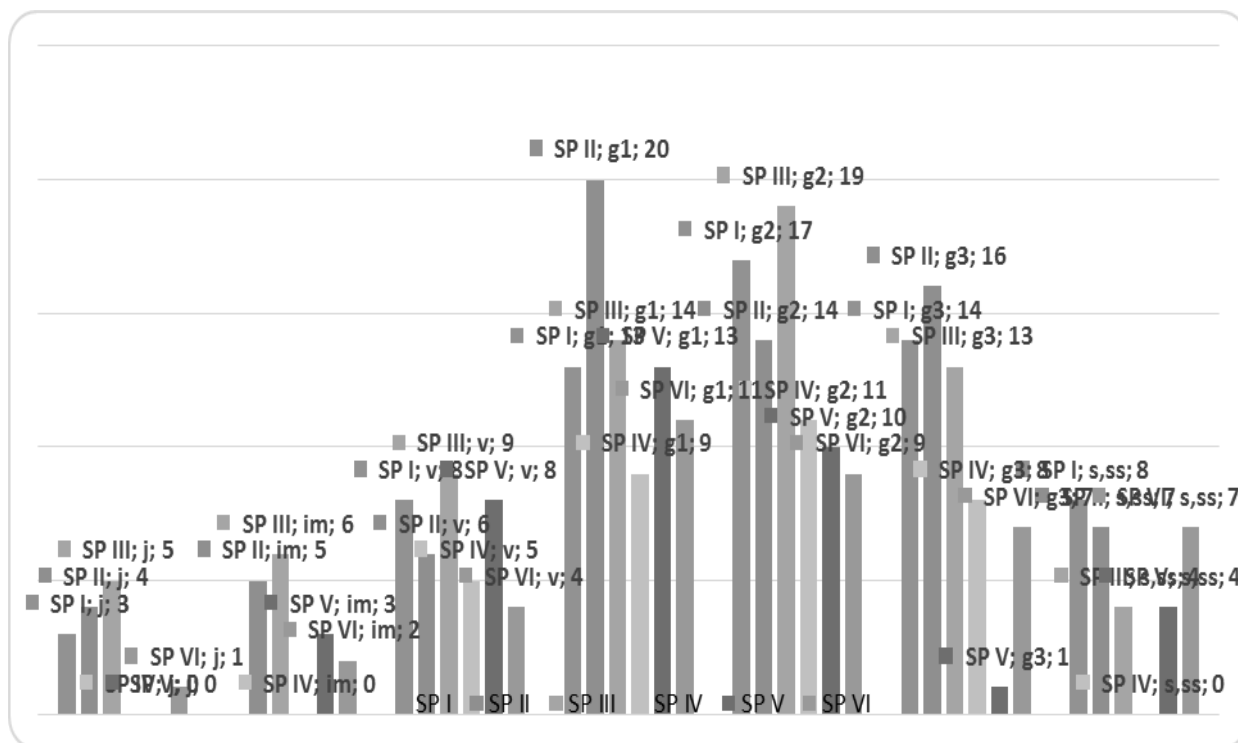


Fig. 1. Ontogenetic status of the *Eremurus spectabilis* Bieb. species in cenopopulations in 2019-2021

Table 2

Age (growth) structure of the *Eremurus spectabilis* Bieb. species cenopopulation

CP №	CP type	Phases of ontogeny (in%)							Index	
		J	Im	v	g1	g2	g3	ss, s	Δ	ω
1	transition	8.40	60	6.70	27.2	33.1	25.8	11.4	0.41	0.70
2	fully ripe	18.9	24.6	20.17	4.61	7.8	3.2	1.56	0.09	0.22
3	mature	26.34	21.7	12.15	21.23	21.9	33.3	9.4	0.43	0.71
4	fully ripe	63.8	13.7	6.91	8.63	7.81	3.65	0	0.09	0.22
5	young	6.2	10.4	16.71	12.71	13.6	6.2	25	0.44	0.54
6	transition	50.2	20.5	11.63	16.72	18.8	31.8	18.2	0.58	0.77

The efficiency of populations 1, 3 and 6 ($\omega = 0.70-0.77$) was high in population assessments as can be seen from the table. This is due to the fact that in all 3 populations there is a large number of all individuals of ontogeny. In contrast, populations 2 and 4 were less effective ($\omega = 0.22$), mainly due to the fact that these populations were fully mature.

The viability of each individual of the *Eremurus spectabilis* Bieb. Species characterized by an increase in ontogenesis has been identified in the study. Many individuals of this species at the same age have different vitality in the same cenopopulation. As a result, seeds of different qualities can be formed, which are also resistant to germination time and competition. The cenopopulation of the species is dominated by individuals with a medium life expectancy. One group of them under goes complete ontogeny, while the other does not undergo a certain part of the age condition. As a result, when they reach the level of extinction, they have low viability. Plants with low levels of viability quickly become senile in ontogeny.

The process of extinction in *Eremurus spectabilis* accelerated with the beginning of the second dormant period – *Achillea millefolium* + *Astragalus regelii* + *Conyza canadensis* + *Tulipa confusa* + *Erigeron venustus* + *Prongos ferulaceae* + *Muscari caucasicum* association.

In general, environmental conditions increase the ontogenetic adaptation of the species, and its ecological sustainability. The develop-

ment of individuals of the *Eremurus spectabilis* species was low in CP IV and CP VI and was assessed for life in crisis.

The reason for the extinction of the species is the rapid aging of the population during drought years was presented in the results of the study. It should also be noted that the wide range of negative fluctuations can lead to the species not being able to hold a strong position among other populations in the future. Therefore, constant control and monitoring of *Eremurus spectabilis* is important to carry out. During the study, cenopopulations of *Eremurus spectabilis* were evaluated and their productivity was studied.

Thus, the productivity of cenopopulations of *Eremurus spectabilis* species in the mountainous part of the Batabat massif (III CP), and also in *Stipa capillata* + *Festuca valesiaca* + *Salvia macrantha* + *Stachys atherocalyx* + *Kochia prostrata* + *Thymus caucasicus* + *Astragalus euoplus* + *Gladiolus kotschyianus* formation in the mountain meadows and steppes of the Goychay district (V CP) and in Seyfali mount of Shamkir district, in the middle mountain belt (VI CP).

The study of the productivity of cenopopulations was carried out in the post-generative age period when the reserve of the plant eaten in the formation (cents/ha in wet and dry mass), the productivity of the formation (cents/ha) and the productivity of *E. spectabilis* was determined in gr/m² (Table 3).

Table 3

Productivity of the cenopopulation with distribution of *Eremurus spectabilis*

Cenopopulations	Years	Stock of plants eaten by animals in the formation		Productivity of the formation (cents/ha)			Productivity of the <i>E.spectabilis</i> species (not eaten by animals)	
		Fresh mass cents/ha	Dry mass cents/ha	Cereals	Legumes	Various grasses	Fresh mass	Dry mass
							gr/m2	gr/m2
III CP	2019	21	11.1	9.7	5.7	5.6	7.8	3.5
	2020	20.1	9.8	8.9	5.2	6	7.7	3.4
	2021	18	8.4	7.5	4.5	6	4.5	2.1
V CP	2019	16	7.2	8.4	3.7	3.9	6.5	3.2
	2020	12.7	5.6	6.5	2.9	3.3	5.4	2.6
	2021	10.8	4.8	4.8	2.5	3.5	5.1	2.4
VI SP	2019	14.3	6.8	5.7	2.7	5.9	5.9	2.7
	2020	12.1	5.5	6	2.5	3.6	4.8	2.2
	2021	11.1	5	5.4	2.1	3.6	4.2	2.1

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AZƏRBAYCAN FLORASINDA *EREMURUS SPECTABILIS* BIEB. NÖVÜNÜN YENİ AREALI, BİOEKOLOJİ- FİTOSENOLOJİ XÜSUSİYYƏTLƏRİ VƏ ETNOBİOLOGİYASI**S.C. İbadullayeva, H.Z. Qasimov, L.Z. Qurbanova, V.N. Abbasova**

Məqalə Azərbaycan florasının nadir növlərindən olan *Eremurus spectabilis* Bieb. (*Asphodelaceae* Juss.) növünün fitosenoloji, etnobioloji və istifadəsi məsələlərinin öyrənilməsinə həsr edilmişdir. Növ üçün ilk dəfə olaraq Kiçik Qafqazda 3 yerdə (Qafqazdan Tovuz rayonunun Əsrik dağlarından, 2021-ci ildə Şəmkir rayonunun Seyfəli dağlarından və Göyçaydan) yeni areal aşkar edilmişdir. Növün yayıldığı 6 senopopulyasiya qiymətləndirilmiş və onların yaş, effektivlik indeksləri müəyyən edilmişdir. *E.spectabilis* növünün yayıldığı bəzi populyasiyaların məhsuldarlığı və bitkinin ehtiyatı öyrənilmişdir.

Açar sözlər: *Eremurus spectabilis* (çiriş), fitosenologiya, məhsuldarlıq, etnobotanik səciyyələndirmə

НОВЫЙ АРЕАЛ, БИОЭКОЛОГО-ФИТОЦЕНОЛОГИЧЕСКИЕ ОСОБЕННОСТИ И ЭТНОБИОЛОГИЯ ВИДА *EREMURUS SPECTABILIS* BIEB. ФЛОРЫ АЗЕРБАЙДЖАНА**С.Дж. Ибадуллаева, Х.З. Гасымов, Л.З. Гурбанова, В.Н. Аббасова**

Данные по фитоценологии, этнобиологии, а также пути использования одного из редких видов флоры Азербайджана - вида *Eremurus spectabilis* Bieb (*Asphodelaceae* Juss.) представлены в статье. Впервые обнаружено новое местообитание вида в 3 локациях на Малом Кавказе (от Кавказских до Асрикских гор Товузского района в 2018 г., в горах Сейфали Шамкирского и Гейчайского районов в 2021 г.). 6 ценопопуляций, с преобладанием данного вида, оценены как молодые, переходные и полностью зрелые, определены их возрастные показатели, показатели продуктивности и жизнеспособность. Изучены продуктивность и запасы растений в некоторых популяциях с преобладанием вида *E.spectabilis*.

Ключевые слова: *Eremurus spectabilis*, фитоценология, продуктивность, этнobotаническая характеристика