

MORPHOLOGICAL, ANATOMICAL AND MYCOLOGICAL STUDIES OF *ORCHIS PURPUREA* HUDS. IN GUSAR, AZERBAIJAN

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Annotation. The article studies the distribution coordinates, morphological and phenological characteristics, anatomical structure of the leaves and mycological composition of the rhizosphere of the plant species *Orchis purpurea* Huds., which is naturally distributed in the territory of the Gusar region (Azerbaijan). The studies were conducted in April-June 2024 during the flowering and seeding period of the plant. During the studies, the following parameters were studied from the morphological characteristics of the plant: plant height, inflorescence length, number of flowers, leaf width and length, tuber size. It was determined that the distribution area of the orchids is in open glades and sometimes on forest edges.

Keywords: orchis, morphological, phenological characteristics and mycobiota

Аннотация. В статье изучены координаты распространения, морфологические и фенологические характеристики, анатомическое строение листьев и микологический состав ризосферы растения вида *Orchis purpurea* Huds., естественно распространенного на территории Гусарского района (Азербайджан). Исследования проводились в апреле-июне 2024 года в период цветения и семенения растения. В ходе исследований из морфологических характеристик растения изучались следующие параметры: высота растения, длина соцветия, количество цветков, ширина и длина листа, размеры клубней. Определено, что ареал распространения орхидей находится на открытых полянах и иногда на лесных опушках.

Ключевые слова: ятрышник, морфологические, фенологические характеристики и микобиота.

The Orchidaceae family is one of the most widespread and species-rich groups of plants on Earth. However, unlike decorative orchids, there are also orchid species with smaller flowers that live in the soil. They are called "terrestrial". There are a number of species of terrestrial orchids (*Orchis* L.) that are naturally distributed in the flora of Azerbaijan. Some of these species are popularly known as "salep" and have been used since ancient times for food, medicine and various household purposes. Orchids, from which salep is obtained, constitute one of the most important groups of the orchid family in terms of biological diversity, ethnobotanical value and economic importance [1.]. Orchids are characterized by the fact that they form a new tuber every year, and they have two tubers. Thus, the low rate of formation of these tubers in many orchid species and even spontaneous collection leads to a decrease in the number of some orchid

species and even to their disappearance[4.]. Orchid seeds, which have a tiny, reduced embryo, cannot germinate without mycorrhizal fungi. Therefore, most orchid species maintain relationships with symbionts throughout their ontogenesis [6]. One of the main features of the orchis is that they have been used for thousands of years as a medicine to treat various ailments including tuberculosis, paralysis, stomach upset, chest pain, arthritis, syphilis, jaundice, cholera, hyperacidity, eczema, tumors and others. Recently, new compounds and preparations have been developed based on orchids, which have both phytochemical and pharmacological properties [7].

In this regard, the study of the morphophysiological characteristics of orchids is of great importance.

MATERIAL AND METOD:

In our research, the object of study was the relationship between some morphological indicators of a rare and endangered orchid species *Orchis purpurea* Huds. naturally distributed in nature in the territory of Azerbaijan, and the number and species composition of micromycetes living in its rhizosphere.

The object of the study was the village of Galajig in the Gusar district (Azerbaijan), located in the north-east of the Greater Caucasus (453 m a.s.l.). The studies were conducted using classical and modern methods (route reconnaissance, geobotanical, population-ontogenetic and mathematical-computer). The climate of the Gusar district is moderately warm, with an approximately uniform distribution of precipitation [5]. (Fig.2)



Fig. 1. *Orchis purpurea* Huds.

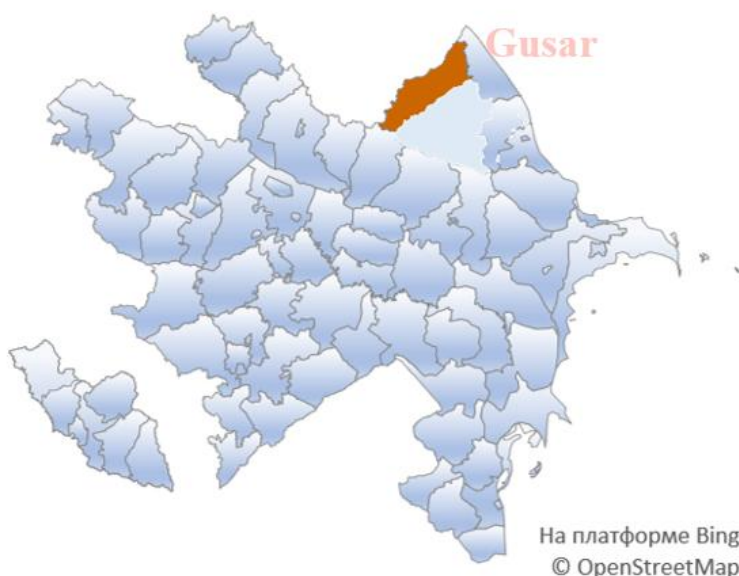


Figure 2. Location of the studied region on the map

RESULTS AND DISCUSSION. During the field studies, GPS coordinates of the area were determined, air temperature ($t-20^{\circ}\text{C}$), carbon dioxide content (CO_2-319 ppm) and soil pH (7.3) isolated from the plant rhizosphere were measured.

Area of distribution	Percentage of vegetative and generative individuals		Plant height Average value (cm)	Leaf width Average value (cm)	Leaf width Average value (cm)	Number of flowers Average price (pieces)	inflorescence length Average value (cm)	Number of boxes Average price (pcs)	Tuber dimensions Average price (cm)	
	V %	G %							width	length
Gusar d.	58.23	41.77	29.6±2.416 min-27.5 max-33.0	4.43±0.158 Min-3.9 Max- 5.1	7.23±0.282 Min-6.7 Max- 8.3	32±4.472 Min-27 Max- 27	7.18±1.295 Min-6.9 Max- 7.6	2.2±0.837 Min-1 Max- 3	1.46±0.181 Min-1.3 Max- 1.7	3.64±0.631 Min-2.7 Max- 4.3

Table 1. Some morphometric indicators of the studied cenopopulation of the plant species *Orchis purpurea* Huds in the territory of the Gusar region

In the field experiments, vegetative individuals were found in small groups, and generative individuals were singly. Morphometric analysis was carried out on 5 generative individuals, the results are presented in the table (Table 1).

In general, it was noted that the proportion of vegetative individuals (58.23%) exceeds the proportion of generative individuals (41.77%), which indicates that the coenopopulation is maturing.

A cross-section of a leaf of the studied plant species *Orchis purpurea* was also studied (Figure 3). It should be noted that the leaf surface of the object of study is hairless. The stomatal cells are of the anisocytic type and are located abaxially [2.].

During the research, mycological analyses of soil samples taken from the plant's rhizosphere were also conducted, and the following results were obtained. Thus, as a result of the analyses of soil samples taken from the plant's rhizosphere in the Gusarsky District, 10 species

(*Alternaria alternata*, *Aspergillus niger*, *Cladosporium cladosporoides*, *Fusarium oxysporum*, *Mucor mucedo*, *Penicillium chrysogenum*, *P. luteum*, *Trichoderma hamatum*, *T. viride* and *Verticillium album*) of fungi were identified. The analysis results show that the number of fungi in the soil is 4.9×10^3 CFU/g.

The results of the conducted studies show that the determined morphometric parameters do not differ significantly from the literature data, which allows us to assume the existence of a direct proportional relationship between the morphometric characteristics of the plant and its mycological composition. A richer mycobiota in the rhizosphere of plants with high morphological parameters indicates the possibility of using fungi as a tool for introducing orchids in the future.



Fig. 3: Transverse section of *O. purpurea* leaf; chl= Chlorenchyma, ue= Upper epidermis, le = Lower epidermis, p = Parenchyma, xyl = Xylem, phl = Phloem

REFERENCES

1. Anonim, 2011. CITES (The Convention on International Trade in Endangered Species of Wild Fauna and Flora) <http://www.cites.org/eng/resources/species.html>. Erişim: 10.08.2014.
2. Aybeke, M., E. Sezik and G. Olgun: Vegetative anatomy of some Ophrys, Orchis and Dactylorhiza (Orchidaceae) taxa in Thrace region of Turkey. *Flora*, 205, 73-89 (2010).
3. F.E. Alaskarova, A.H.Gadimov, S.N.Rahimov, Z.I.Abbasova Coenopopulation and micrielelment composition of the plant Orchis purpurea, common in different ecological conditions of Azerbaijan *Advanced Studies in Biology*, Vol. 15, 2023, no. 1, 119-128 doi: 10.12988/asb.2023.91685
4. Gönülşen, N., 1983. Salep Bitkilerinden *Orchis anatolica* Boiss.’in Doku Kültürü ile Üretimi. Ege Bölgesi Araştırma Enstitüsü Yayınları, İzmir.
5. G.Sh. Mamedov, M.Yu. Khalilov, S.Z. Mamedova *Ecological Atlas* / edited by – Baku: Baku Cartographic Factory, – 2010.
6. Hanne N. Rasmussen “Recent developments in the study of orchid mycorrhiza” *Plant and Soil* 244: 149–163, 2002. © 2002 Kluwer Academic Publishers. Printed in the Netherlands
7. Mohammad Musharof Hossain “Therapeutic orchids: traditional uses and recent advances — An overview” *Fitoterapia* 82 (2011) 102–140 <https://doi.org/10.1016/j.fitote.2010.09.007>