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Study of Species Belonging to the Genus *Dactylorhiza* Neck. ex Nevski (*Orchidaceae*) Distributed in the Nakhchivan Autonomous Republic

Abstract

In this article, the bioecological characteristics and practical significance of species belonging to the genus *Dactylorhiza* Neck. ex Nevski (Marsh Orchid) distributed across various ecological zones of the Nakhchivan Autonomous Republic were investigated. As research material, the main representatives of this genus — *D. romana*, *D. umbrosa*, *D. incarnata*, *D. salina*, *D. euxina*, and others — were selected. Field observations revealed that these plants are widely distributed in mountainous and foothill areas, riverside landscapes, and wetland ecosystems, where they perform essential ecological functions.

According to the results, species of *Dactylorhiza* play a significant role in maintaining the stability of phytocoenoses, conserving biodiversity, and regulating soil and water regimes. Their ability to adapt to different ecological conditions justifies their inclusion among bioindicator plant groups. While stable populations were observed in humid habitats, the number of individuals decreased in drier zones. Light regime was also identified as an important factor: flowering intensity was higher in open areas, while it remained relatively weak in shaded sites.

Dactylorhiza species are important not only for maintaining ecological balance within ecosystems but also for their economic value. Their ornamental features make them valuable for horticulture and landscape design, whereas biologically active substances derived from their tubers are widely used in folk medicine and for therapeutic purposes.

Keywords: *Dactylorhiza, orchid, flora, bioecology, coenopopulation*

Introduction

The flora of Azerbaijan is distinguished by its rich biological diversity and constitutes an essential component of the country's natural resources. The Nakhchivan Autonomous Republic, with its diverse soil and climatic conditions, varied relief, and unique geographical location, provides a favorable area for the formation of rare plant species (Heydarova & Qaraxani, 2018, pp. 57 –60). In the region's mountainous, foothill, riparian, and wetland areas, distinctive phytocoenoses have developed, allowing for the preservation of both endemic and relict species.

Research

The study of species belonging to the genus *Dactylorhiza* (marsh orchids), which are widely distributed in these areas, is of great significance both from a theoretical perspective — systematics and bioecology — and from a practical standpoint, including ornamental horticulture, traditional medicine, and biodiversity conservation. Representatives of this genus demonstrate a strong capacity for adaptation to various ecological conditions, forming stable populations in both arid meadows and humid wetlands. The data obtained provide a scientific basis for the sustainable management of phytocoenoses as well as for the conservation of rare species.

Materials and Methods

The research material consisted of species of the genus *Dactylorhiza* (marsh orchids) distributed across various ecological zones of the Nakhchivan Autonomous Republic. The study was conducted between 2020 and 2025, and observations covered the entire vegetation period. Specimens were

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mainly collected from mountainous and foothill areas, riparian landscapes, wetlands, and forest edges.

For the classification and assessment of the utilization aspects of the genus, the works of various researchers were employed, including Vakhrameeva et al. (2013, pp. 120–124), Salmanova (2020, No. 9, pp. 62–68), Talibov (2000, No. 1(4), pp. 12–23), Asgarov (2011, pp. 88–92), Heydarova et al. (2017, p. 77), APG IV (2016), and WFO (2020).

Discussion and Results

A systematic analysis of species belonging to the genus Dactylorhiza distributed in the territory of the Nakhchivan Autonomous Republic was carried out, and it was determined that 7 species occur in the area.

Species of the genus Dactylorhiza Neck. ex Nevski distributed in the Nakhchivan Autonomous Republic:

Genus: Dactylorhiza Neck. ex Nevski – Marsh orchids

1(1) Dactylorhiza euxina (Nevski) Czerep. – Black Sea marsh orchid

1(2) D. salina (Turcz. ex Lindl.) Soó – Saline marsh orchid

1(3) D. iberica (Bieb. ex Willd.) Soó – Georgian marsh orchid

1(4) D. romana (Sebast.) Soó – Roman marsh orchid

= D. romana subsp. georgica (Klinge) Soó ex Renz & Taubenheim [= D. flavescens (C. Koch) Holub]

1(5) D. umbrosa (Kar. & Kir.) Nevski (1937) [= D. sanasunitensis (Fleischm.) Soó; D. chuhensis; D. merovensis (Grossh.) Aver.] – Shaded marsh orchid

1(6) D. urvilleana (Stend.) H. Baumann & Künkele [= D. affinis (C. Koch) Aver.; D. amblyoloba (Nevski) Aver.; D. triphylla (C. Koch) Czerep.] – Durville's marsh orchid

1(7) D. osmanica (Kinge) P.F. Hunt & Summerh. – Osman marsh orchid

= D. osmanica (Kinge) P.F. Hunt & Summerh. var. osmanica [= D. cataonica (H. Fleischm.) Holub]

The tuberous roots of the genus *Dactylorhiza* (marsh orchids), unlike those of *Orchis*, which are very similar in their aerial organs, are elongated, segmented, and finger-like. In contrast, the roots of *Traunsteinera* and *Ophrys* are rounded. Typically, there are two tubers: one pale and soft, which the plant uses for nutrition in the current year, and the other young and hard, serving as a reserve for the following year. In temperate flora, the underground tubers of marsh orchids are based on the stem. The renewal bud forms well before the aerial shoot. In spring, as the aerial shoot develops from the maternal renewal bud, the vegetative renewal bud rapidly develops and is located in the young tuber penetrating the soil (Geydarova, Garaxani, & Javadzade, 2017).

Flowering in marsh orchids occurs either after leaf formation, before it, or simultaneously with it (Salmanova, 2018, No. 8(64), pp. 38–41). Flowers are located at the apex of the spike or in the axils of the main stem leaves. The primary type of flowering characteristic of marsh orchids is a raceme with flowers in the leaf axils, which often transform inconspicuously into ovaries.

Representatives of the tuberoid life form possess a one- or two-year underground stolon-like storage organ — a renewal bud — with a stem-root tuberoid covered with hairs. The tuberoid develops from the lower buds of annual monocarpic shoots in a horizontal direction due to apical growth.

Most tuberoid marsh orchids are heliophytes, preferring bright light conditions. Some species are found only in open habitats such as meadows, rocky slopes, gravelly soils, and mountainous xerophytic steppes. In the Nakhchivan Autonomous Republic, tuberoid marsh orchids are represented by several taxa and are widely distributed in the mountainous regions. These include representatives of the genera *Orchis*, *Ophrys*, *Anacamptis*, *Platanthera*, and *Dactylorhiza*.

Marsh orchids of the tuberoid type are widely distributed in various forests, mountainous xerophytic steppes, and alpine meadows in the region. They occur from the lower mountain belt to high-altitude natural meadows, either as small groups or solitary individuals. The widespread distribution of the genus *Dactylorhiza* is associated with their tolerance to low temperatures and a

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broad ecological amplitude regarding moisture (National Strategy for the Protection and Sustainable Use of Biological Diversity in the Republic of Azerbaijan for 2017–2020, 2016).

We analyzed the ecological and phytosociological development features of the most commonly encountered *Dactylorhiza* species in the habitats of the Nakhchivan Autonomous Republic, focusing on *Dactylorhiza urvilleana*, *D. romana*, and *D. umbrosa*. In most habitats, several synpopulations of the studied life form species were identified [Table 1]. The highest numbers were observed in the Batabat massif of the Shahbuz district (7), Bilev village in the Ordubad district (6), and the Khazinedere area in Arafsa village, Julfa district (4). In most districts (Sharur, Kangarli), 1–2 species of the genus *Dactylorhiza* belonging to tuberoid marsh orchids were recorded. Of the seven species identified in our study, six were found in the Bilev village area of the Ordubad district, where the number of synpopulations was 55 and 52, respectively.

Table 1. Habitats, species, and the number of synpopulations of the genus *Dactylorhiza.*

District	Number of studied habitats	Number of species	Number of synpopulations	Number of synpopulations in the habitat
Shahbuz	11	7	55	5,0
Ordubad	20	6	52	2,6
Julfa	8	5	45	5,6
Sharur	3	2	6	2,0
Kangarli	2	2	8	4,0
Sadarak	1	1	1	1,0
Total	45	23	167	1,93

The conducted observations and analyses demonstrate that the distribution range of *Dactylorhiza* species extends primarily from foothill zones to subalpine and alpine meadows. Soil moisture regimes are a key determining factor for their populations. In humid and wetland areas (*D. umbrosa*), more stable communities are formed, whereas in dry meadows (*D. romana*), the number of individuals decreases. Light availability is also an important ecological factor. Although vegetation develops poorly in shaded forest edges, flowering and productivity are higher in open habitats. Anthropogenic pressures — intensive grazing, soil cultivation, and construction activities — disrupt population structures (News Journal [Natural and Technical Sciences Series], 2018).

These findings indicate that while *Dactylorhiza* species exhibit ecological plasticity, their long-term persistence is sensitive to human impact. Species of *Dactylorhiza* Neck. ex Nevski function as dominant or accompanying components in various phytocoenoses. In wetlands and aquatic areas, they form dominant groups together with some species of the families *Cyperaceae* and *Juncaceae*. In subalpine meadows, they are associated with *Carex tristis* Bieb., *Carex divulsa* subsp. *leersii* (Kneuck.) W. Koch, *Poa nemoralis* L., *P. pratensis* L., *Leopoldia caucasica* (Griseb.) Losinsk., and *Allium cardiostemon* Fisch. & C.A. Mey. In dry meadows and rocky slopes, they occur as accompanying elements. Phytosociological analysis shows that *Dactylorhiza* species are bioindicator plants that contribute to ecosystem stability, and their presence indicates ecological balance.

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Population analyses reveal that the abundance of young vegetative individuals indicates a high reproductive potential, although the number of reproductive individuals in some local populations has sharply declined, likely due to anthropogenic pressures and reduced precipitation. Some synpopulations exhibited stability (optimal developmental stage), whereas others showed signs of regression. The most stable populations are found in humid and protected natural areas, such as the Batabat massif, Ordubad district, and the Araz River wetland zones. This demonstrates that the persistence of *Dactylorhiza* species is maintained not only by natural conditions but also through conservation measures (Salmanova, 2018a, pp. 122–125).

Many *Dactylorhiza* species are widely used in traditional medicine, enhancing their economic significance. However, illegal collection has led to declines in some populations. Therefore, a balanced approach to both nutritional and medicinal use is essential. For conservation purposes, artificial propagation methods, including *in vitro* cultivation, are recommended.

The study confirms that *Dactylorhiza* species act as important bioindicators in the flora of Nakhchivan. To maintain population stability, monitoring in specially protected areas should be strengthened. Rare and endangered species, listed in the *Red Book*, require expanded conservation measures. Artificial introduction efforts can also facilitate their broader use in ornamental horticulture and agriculture.

The research findings indicate that while *Dactylorhiza* species in the Nakhchivan Autonomous Republic exhibit adaptability to ecological conditions, the stability of some populations has been disrupted by anthropogenic effects. For their future conservation, it is necessary to monitor natural habitats, protect rare species, apply artificial propagation technologies, and develop policies for balanced utilization (Salmanova, 2018b, pp. 38–45).

Conclusion

The study demonstrates that *Dactylorhiza* species in the Nakhchivan Autonomous Republic exhibit significant ecological plasticity, allowing them to thrive from foothill zones to alpine meadows. Soil moisture and light availability were identified as the primary factors influencing population stability and reproductive success. Populations in humid and protected habitats were more stable, while dry and anthropogenically disturbed areas showed decreased abundance and reproductive individuals. Many species have economic and medicinal value, but illegal collection poses a threat, highlighting the need for conservation and sustainable use.

Overall, monitoring, habitat protection, and artificial propagation are essential to ensure the long-term persistence and ecological role of *Dactylorhiza* species in the region.

References

1. An online flora of all known plants (WFO). (2020, July 5). *World Flora Online*. Retrieved from http://www.worldfloraonline.org
2. APG IV: An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants. (2016). Byng, J. W., Chase, M. W., Christenhusz, M. J. M., et al. *Botanical Journal of the Linnean Society*, *181*(1), 1–20. https://doi.org/10.1111/boj.12385
3. Askerov, A. M. (2011). *Synopsis of the flora of Azerbaijan (with additions and changes, 1961–2009)*. Elm.
4. Geydarova, R. T., Garaxani, P. Kh., & Javadzade, T. Yu. (2017). Molecular and phylogenetic analysis of orchids (Orchidaceae Juss.). *Achievements of Modern Science*, (2), 75–79.
5. Heydarova, R. T., & Karakhani, P. X. (2018). Taxonomy of Dactylorhiza Neck. ex Nevsky species distributed in the Greater Caucasus. *In New Challenges in Botanical Research*, 57–60.
6. National Strategy for the Protection and Sustainable Use of Biological Diversity in the Republic of Azerbaijan for 2017–2020. (2016). *Qanun*.
   Retrieved from http://www.e-qanun.az/framework/33817
7. News Journal (Natural and Technical Sciences Series). (2018). *14*(2), 187–191.

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e-ISSN: 2709-4189

8. Salmanova, R. K. (2018a, May 4–5). Biomorphological characteristics of Orchis species in Nakhchivan Autonomous Republic. In *Current problems of modern natural and economic sciences.* Part II. 122-125.
9. Salmanova, R. K. (2018b). Orchids of the Batabat massif of Shahbuz region. *Scientific Works of Nakhchivan State University*, *8*(64), 38–41.
10. Salmanova, R. K. (2018c). Use of Orchis species in folk medicine in Nakhchivan Autonomous Republic. In *Bulletin of Modern Research, Orka Scientific Center.* №10-3, 86–87.
11. Salmanova, R. K. (2020). Distribution of Orchidaceae Juss. species in shrub and forest areas of Nakhchivan. *Nizhnevartovsk Vegetation: Bulletin of Science and Practice*, *6*(9), 62–68.
12. Vakhrameeva, M. G., Tatarenko, I. V., & Varlygina, T. I. (2013). Biological diversity of orchids in Russia. *Bulletin of Tver State University: Biology and Ecology*, *32*(31), 117–136.

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