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Bioecological characteristics of plant species belonging to the genus Tulipa H. distributed in the territory of Sharur district, Nakhchivan MR

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Abstract: The bioecological characteristics of some plant species of the genus Tulipa H.—Humped Black Grouse Tulip, Florensky's Tulip, Julia's Tulip, and Two-flowered Tulip—distributed in the territory of Sharur district, Nakhchivan AR, have been studied. Extensive information is provided on the habitat and distribution area, as well as the form and method of reproduction of these species. The lifespan of the stem, leaves, flower, petals, and stamens of these species is also described. Additionally, information is presented on the inclusion of these plants in the "Red Book" for conservation purposes.

Keywords: *plant, species, genus, season, family, seeds, perianth, stamen, "Red Book"*

INTRODUCTION

Biodiversity is essential for sustaining ecological equilibrium, but it is increasingly jeopardized by fast population expansion, urban development, industrial activities, and climate change. The interplay of these variables and anthropogenic environmental degradation has resulted in substantial modifications to natural landscapes. A significant consequence of these changes is the alteration of ecosystems, which jeopardizes the existence of plant and animal species. This problem is especially pronounced in areas with vulnerable natural systems, like as the Nakhchivan Autonomous Republic.

Nakhchivan, a crucial component of Azerbaijan, is situated in the Caucasus ecoregion, a worldwide acknowledged biodiversity hotspot. This region functions as a migration corridor for numerous species and hosts a rich array of endemic, uncommon, and relict flora. Nevertheless, owing to escalating human activity and environmental problems, numerous species are currently designated as vulnerable or endangered. The plant genus most impacted by these changes is Tulipa, encompassing species of considerable ecological and decorative significance.

The Tulipa genus, referred to as tulips, is found in Southern Europe, Central and Western Asia, and North Africa, with various varieties adapted to the distinct climatic and geological circumstances of Nakhchivan. These plants are especially vulnerable to habitat degradation, alterations in land use, and overexploitation, rendering their protection imperative. This study investigates the bioecological traits of various tulip species in the Sharur district of Nakhchivan, emphasizing their habitat, reproductive biology, and conservation status.

This article seeks to elucidate the survival issues faced by these tulips by examining their ecological requirements and distribution, so underscoring the necessity of conservation efforts. Due to the restricted populations and escalating threats to these species, prompt intervention is essential for their enduring conservation.

THE IMPACT OF POPULATION GROWTH AND ENVIRONMENTAL CHANGES ON FLORA IN THE NAKHCHIVAN AUTONOMOUS REPUBLIC

The rapid increase in the world's population and the resulting technogenic impact on the Earth have significantly altered natural landscapes, steering them away from their evolutionary course. These landscapes are increasingly being modified or transformed, placing their biological inhabitants in critical conditions. In transformed landscapes, the natural way of life for many species is disrupted, often forcing them to migrate elsewhere. When additional factors such as wars and the escalating production of toxic and radioactive substances are considered, the overall ecological situation for living organisms appears increasingly unfavorable.

The combined effects of natural and anthropogenic factors have led to serious changes in ecosystems, which serve as the primary habitats for plants. These changes have resulted in modifications to the plant kingdom, leading to the extinction of certain species, the classification of others as rare, and the transformation of plant phytocenoses in undesirable ways.

As an integral part of the Republic of Azerbaijan, the Nakhchivan Autonomous Republic is located along the migration corridor of species within the Caucasus ecoregion. This region is recognized for its rich biodiversity and is home to numerous rare, relict, and endemic plant species. Among the genera that include rare species in this region is the *Tulipa* genus.

FRITILLARIA GIBBEROSA BOISS. (HUMPED BLACK GROUSE TULIP)

Among the five species of this genus found in the Middle and Central Asian regions, only one species is present in Azerbaijan, specifically in the Nakhchivan Autonomous Republic. In Azerbaijan, it is distributed solely in the plains and foothill regions of Nakhchivan. It is a xerophytic plant that thrives on dry, rocky, clayey-gravelly slopes. Due to its limited distribution, its natural population is small. It reproduces both through seeds and bulbs.

This perennial bulbous plant has a globular bulb covered with loose scales. The stem reaches a height of 8-15 (20) cm, with glabrous leaves. The lower leaves are arranged in pairs, while the upper ones are alternately arranged, linear, and pointed. The flowers are located at the top of a raceme, with perianth segments that are purple, have dark violet veins, and feature a dark-colored base. These segments are ovate-oval in shape, measuring 12-18 mm in length and 7-9 mm in width, and they have small hairs. The anthers are purple-blue. The capsule is short-styled. Flowering occurs in April, and seed formation takes place in May. It is a geophytic ornamental plant belonging to the Iranian geographic range.

Due to its limited population and sensitivity to environmental changes, it faces significant threats, particularly from restrictive ecological factors in arid regions.

TULIPA FLORENSKYI WORONOW (FLORENSKY'S TULIP)

Out of 120 species of the *Tulipa* genus that are distributed in Southern Europe, Western and Eastern Asia, and North Africa, 12 species are found in the Caucasus, with 7 species present in Azerbaijan. In the flora of Azerbaijan, the Nakhchivan Autonomous Republic was initially recorded as having three species, but new findings have increased this number to seven. In Nakhchivan, this species is found around the Arpachay River and in the Karakush Mountain area, growing on rocky, gravelly slopes. Due to its restricted distribution, its natural population is limited. It reproduces through both seeds and bulbs.

The bulb is ovoid-elongated, with a diameter of 2 cm, covered with a gray sheath, and densely hairy inside. The stem reaches 10-15 cm in height, with 3-4 leaves. The solitary flower measures 2.5-4 cm in length, with petals that are flame-red (turning copper-red when dried). The inner base of the petal is dark-colored or black with a yellow border. The stamens are smaller than the perianth, with black filaments and yellow anthers that are shorter than the filament. The capsule is 3-4 cm long. Flowering occurs in April-May, followed by seed production. This species is found in the lower and middle mountain belts and was originally described in Sultanabad, Iran. It is a geophytic ornamental plant belonging to the Atropatene geographical range.

As a sensitive species with a limited population, it is exposed to negative environmental impacts. The areas where it is found, including the Arpachay State Nature Reserve and the Karakush Mountain region, require special conservation efforts to protect its natural populations.

TULIPA JULIA C. KOCH (JULIA'S TULIP)

This species is endemic to the Nakhchivan Autonomous Republic and is found exclusively in the Karakush Mountain region of the Sharur district. It grows on dry, rocky, and limestone-rich slopes, occasionally near forest edges. Due to its restricted habitat and small population, its natural resources are limited. It reproduces through both seeds and bulbs.

The bulb is ovoid, with a diameter of 3 cm, and covered with a thin gray sheath. The stem reaches 15-35 cm in height and is glabrous. The plant has 3-4 leaves, each 3 cm wide. The solitary flower measures 4 cm in length, with petals that are flame-crimson-red, and the base is marked with a yellow-bordered dark spot. The filaments are black and glabrous. The capsule grows up to 3 cm in length. Flowering occurs in April-May, while seed maturation happens in May-June. It is a geophytic ornamental plant and a mesoxerophyte, classified within the Atropatene geographical range.

Due to its limited population and its value as an ornamental and food plant, it is affected by anthropogenic and zoogenic pressures. For its sustainable conservation, it has been included in Azerbaijan's "Red Book."

TULIPA BIFLORA PALL. (TWO-FLOWERED TULIP)

In Nakhchivan, this species is found in the Kur-Araz Lowland and the Kura Plain. Within the region, it occurs in the foothills and middle mountain belts, particularly in the Karakush Mountain foothills. It grows in dry grassy, clayey, gravelly, and rocky slopes. Due to its restricted distribution and small population, its natural resources are limited. It reproduces through seeds and bulbs.

The bulb is small, with a diameter of 1-1.5 cm, covered with a light-gray, membranous sheath, and internally lined with soft hairs. The stem is 7-17 cm tall, slender, and glabrous. The plant has two leaves, and the flowers are usually solitary, though sometimes two are present. The perianth measures 1.5-2.5 cm in length, with equal-sized, elliptical-lanceolate petals that taper to a point. The outer petals are pale violet or pale greenish-blue, while the inner ones are white or pale red, sometimes with fringed or bearded bases. The stamens are shorter than the perianth, with yellow filaments that are 2-2.5 times longer than the anthers. The capsule is 1-1.5 cm long. Flowering occurs in April, with seed maturation in May.

Due to its limited population, ornamental value, and the harvesting of its bulbs for consumption by local populations, it is exposed to significant environmental threats. Consequently, it has been included in the "Red Book" of the Nakhchivan Autonomous Republic.

CONCLUSION

The swift alteration of natural landscapes resulting from human expansion, industrialization, and environmental shifts has significantly affected global biodiversity. The Nakhchivan Autonomous Republic, as a distinctive natural zone, is not immune to these concerns. The region, which hosts many endemic and endangered plant species, is experiencing heightened pressure from natural and anthropogenic forces, resulting in habitat degradation, species alteration, and population decrease.

Tulipa is one of the most impacted plant genera in this region, encompassing species of considerable ecological, decorative, and genetic significance. The research emphasizes multiple tulip species—Fritillaria gibberosa, Tulipa florenskyi, Tulipa julia, and Tulipa biflora—that are significantly at risk owing to their restricted natural populations and susceptibility to environmental fluctuations. These species serve as indicators of the region's botanical richness and are essential for sustaining ecological equilibrium. Nonetheless, their survival is progressively jeopardized by alterations in land use, habitat degradation, overexploitation by humans, and climate-induced stressors.

The incorporation of these species in the "Red Book" of Azerbaijan and Nakhchivan underscores the immediacy of conservation initiatives. Nonetheless, simply categorizing species as endangered is inadequate. Conservation tactics must encompass proactive initiatives such as habitat restoration, the creation of protected areas, seed banking, and regulated cultivation in botanical gardens. Public awareness campaigns and educational initiatives must be undertaken to mitigate anthropogenic pressures, especially the harvesting of bulbs for ornamental and culinary uses.

Furthermore, scientific study and monitoring initiatives must be augmented to enhance comprehension of the ecological necessities and adaptive capacities of these species. Cooperation among municipal authorities, environmental organizations, and research institutes can promote the formulation of sustainable conservation policies. Establishing legislative frameworks to govern land use and avert additional degradation of vulnerable ecosystems will be essential for the long-term preservation of these tulip species.

The conservation of Tulipa species in Nakhchivan is both a botanical imperative and an ecological requirement. Preserving these plants entails maintaining a complete ecosystem that sustains diverse flora and wildlife. Without prompt intervention, the region jeopardizes not only its distinctive tulip species but also the diverse biodiversity that has characterized its natural heritage for ages. Effective conservation initiatives, supported by empirical research and community engagement, are crucial for reversing biodiversity decline and guaranteeing that future generations can appreciate the beauty and ecological importance of Nakhchivan's floral diversity.

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