

RARE *ALLIUM* L. SPECIES IN STEPPIC HABITAT OF RAMSAR SITE "LOWER PRUT LAKES"

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Abstract: This article presents new data on four rare *Allium* L. species: *A. guttatum* Stev., *A. inaequale* Janka, *A. paniculatum* L. and *A. sphaeropodum* Klokov in the vascular flora of Ramsar Site "Lower Prut Lakes" (Republic of Moldova). The chorological and some populational characteristics are presented. It is suggested that the species *A. sphaeropodum* to be included in the 4th edition of the Red Book of the Republic of Moldova.

Keywords: Ramsar Site, "Lower Prut Lakes", flora, *Allium*, Republic of Moldova.

SPECII RARE DE *ALLIUM* L. ÎN HABITATUL STEPIC DIN SITUL RAMSAR "LACURILE PRUTULUI DE JOS"

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Rezumat: Acest articol prezintă date noi despre patru specii rare din genul *Allium* L.: *A. guttatum* Stev., *A. inaequale* Janka, *A. paniculatum* L. și *A. sphaeropodum* Klokov din flora vasculară a zonei umede Ramsar "Lacurile Prutului de Jos" (Republica Moldova). Sunt prezentate caracteristicile corologice și populationale. Se propune ca specia *A. sphaeropodum* să fie inclusă în a 4-a ediție a Cărții Roșii a Republicii Moldova.

Cuvinte cheie: zona umedă Ramsar, "Lacurile Prutului de Jos", flora, *Allium*, Republica Moldova.

INTRODUCTION

In the last three centuries the plant diversity in the Republic of Moldova has been experiencing increasing anthropogenic pressure, which causes deterioration and loss of habitats and direct destruction of species populations by trampling, grazing, infrastructural development, stone-pitting, etc. It became urgently necessary to update the floristic component and re-evaluate the risk of extinction for the species in the Moldavian flora. Up to now, large steppe areas in Europe have been destroyed almost completely, therefore, the preservation of all the remaining steppe landscapes and communities becomes a priority. Nature reserves of high categories (biosphere reserves, nature and landscape reserves, etc.) are specialized institutions whose purpose is to preserve wildlife.

The steppe habitat of the Ramsar site "Lower Prut Lakes" includes dry to semi-dry grasslands on calcareous to neutral substrates, on deposits of loess and alluvial, cernoziom, castanoziom and feoziom soil. Loess is windblown (eolian) deposit of glaciers. In general, it plays significant role in the determination of soil conditions in Republic of Moldova, but not only in the case of loess steppes. Chernozems are the



Figure 1. Slopes with steppe vegetation

characteristic soil formations, chiefly on the plains and in the dry foothill areas. These soils, developed on loess, can be characterized by well-balanced water conditions (the volume of annual precipitation and evaporation is equal) and the presence of carbonic chalk. Its natural vegetation is steppe. The diffuse root systems of grasses and the deposited organic material results in favorable soil characteristics: advantageous water- and nutrient-household and the crumbly texture of the soil. These dry grassland areas are therefore arid in summer, with a warm microclimate.

The very steep, often nearly vertical, dry, humus lacking loess walls allow only scarce vegetation to establish. The continuous erosion of the wall (Figure 1), the low moisture level and the high insolation creates site conditions similar to semi-deserts. As a consequence, the list of typical plant species of the loess walls also resembles the flora of semi-deserts: annuals, dwarf shrubs and cryptogams play important roles in these habitats [14, 19].

This paper is a continuation of the floristic and chorological studies of the vascular flora of Republic of Moldova, particularly of lower Prut lakes area. The aim of this work was to identify the rare species of the genus within the Ramsar site "Lower Prut Lakes" territory in order to establish the relative risk of extinction, with the main purpose of cataloguing and highlighting those taxa that are facing a higher risk of extinction.

MATERIALS AND METHODS

During the field survey of botanical study of the Biosphere reserve flora, a number of new collections of *Allium* were made. Besides that, checking and revision of herbarium material and numerous literature sources were used to supplement the distribution records. The estimation of the threat status of some of the listed species for the territory of R. Moldova is made according to the IUCN Red List Categories and Criteria, national legislation of Republic of Moldova and finally, by following the *Pre-identified Red List of Vascular Plants of the Flora of Republic of Moldova* [3, 6, 8, 9, 11, 15, 16, 18].

The designation of Habitat type was made according to the Interpretation Manual of EU Habitats, Directive 92/43/EEC on the basis of scientific criteria defined in Annex III of the Directive [7]. Description of the associations was made based on characteristic, self-evident, dominant and differential species, according to the phytosociological

research method of the central European school, based on the traditional ecological-floristic systems developed by Tüxen [20] and J. Braun-Blanquet [2].

RESULTS AND DISCUSSIONS

The genus *Allium* L. is one of the most diverse and taxonomically difficult groups of the petaloid monocotyledons. Formerly regarded as member of the Liliaceae s.l., in contemporary system of Flowering Plants it is the largest genus of Alliaceae [1], comprising about 750-800 species [13]. Most species occur naturally in the northern hemisphere, with a main centre of diversity in the mountains of Southwest to Central Asia and second centre in western North America. The genus *Allium* in the flora of Republic of Moldova is represented by 15 species [5, 12].

As a result of the study of the steppic vascular flora in the researched area, out of fifteen extant species of *Allium*, there were identified four rare species: *A. guttatum* Stev., *A. inaequale* Janka, *A. paniculatum* L. and *A. sphaeropodum* Klokov.

These four species of *Allium* are registered in the dry grassland habitat which is located within the boundaries of the Ponto-Sarmatic steppes – *62C0 [7], that stretches out from the eastern parts of Romania and incorporates the entire region known as Dobrogea over southern parts of Republic of Moldova, Ukraine, Russia and western Kazakhstan. The grasslands of the *62C0 habitat are among the most species-rich plant communities in terms of the number of plant species they support per unit area. Floristic component of high vascular plants comprises 330 wild spontaneous growing species. The rare floristic component of the vegetal communities is represented by a list of 38 rare species [3, 6, 15, 16, 18].

These xerothermic communities are developed on southern and western exposed slopes with alkaline soils on rocky substrate and on clay-sandy sedimentation layers enriched with gravels. They are partially of natural, partially of anthropogenic origin with grasses such as *Kochia prostrata* (L.) Schrad., *Agropyron pectinatum* (Bieb.) Beauv., *Koeleria cristata* (L.) Pers., *Artemisia austriaca* Jacq., *Bothriochloa ischaemum* (L.) Keng, *Stipa capillata* L., etc.

The field investigations of the selected steppe vegetation site and comparative studies demonstrated the presence of xerothermic species group in the following plant communities: *Stipetum lessingianae*, *Potentillo arenariae* *Agropyretum pectiniformae*, *Bothriochloetum ischaemi*. More specifically, the alliances of *Stipion lessingianae* Soo 1947 (with ass. *Stipetum lessingianae* Soo 1947) and *Festucion rupicolae* Soo 1940 corr. 1964 (with ass. *Potentillo arenariae*-*Stipetum capillatae* (Hueck 1931) Libbert 1933; *Agropyretum pectiniformae* (Prodan 1939) Dihoru 1970 and *Bothriochloetum ischaemi* (Kristiansen 1937) I. Pop 1977), conserve relic vegetation enclaves, characterizing valuable European priority habitats of the steppic grassland group, the „Ponto-Sarmatic steppes” [7], which many European botanists indicate that they probably persist continuously from the Holocene [4, 10].

The local and general distribution, protection status and the populational characteristics of *Allium* species are presented below.

Allium guttatum Stev. – Mottled Onion is a perennial, bulbous, decorative and medicinal plant. (Figure 2.) Blooms in July-August and fructifies in August-September. It is a xerophytic species, propagates by seeds. In the Republic of Moldova species grows

in sunny slopes, steppes, eroded and steep pastures; loessial substrata. Mottled Onion has been met on the outskirts of the commune of Slobozia Mare (Cahul district), village of Ciumai (Taraclia district), the town of Vulcanesti, the commune of Congaz (ATU Gagauzia), the commune of Ghidighici, the municipality of Chisinau. The species is located at the northern limit of its distribution area. Outside the country, it is spread in the eastern countries of the Mediterranean region and in Asia Minor [13, 17].



Figure 2. *Allium guttatum* Stev.



Figure 3. *Allium inaequale* Janka

The isolated specimens or clusters can be met in steppe habitat of Lower Prut Biosphere reserve. The biggest group (near the commune of Slobozia Mare) occupies the area of about 1 ha with the number from 2-3 up to 150 plants/m². The subpopulation is stable, it includes specimens of different ages, the density of plants amounts up to 60 mature (flowering) specimens per one square meter.

Protection status. The species has been included in the Red Book of the Republic of Moldova (ed. III) as a critically endangered species (CR) and in Operational checklist of threatened and extinct species. It is territorially protected in the area of multifunctional management – the representative site with steppe vegetation in the south of Bugeac steppe (the village of Ciumai).

Allium inaequale Janka – Unequal Onion is a perennial, bulbous, decorative, edible and medicinal plant. (Figure 3.) Blooms in August-September and fructifies in September-October. It is a xerophytic species, propagates by seeds. In the Republic of Moldova species grows in steppes, cliffy hills, as well as steppe sectors with loessial soils. Unequal Onion can be met near the commune of Slobozia Mare (Cahul district), the towns of Camenca and Grigoriopol, in the communes of Goian and Tashlac (tansdnestrian region), the communes of

Bugeac and Dezghingea (ATU Gagauzia) and the commune of Topala (Cimislia district). The species is located at the western limit of its distribution area. Outside the country, it is spread in Romania, Ukraine, the northern Caucasus and Middle Asia [13, 17].

In primary steppes of the Biosphere reserve (vill. Valeni, Slobozia Mare, Giurgiulești) the species grows solitarily or in groups of 2-3 specimens. It forms clusters of 1-2 m² in diameter. The subpopulations are stable.

Protection status. The species is protected by Law and has been included in the Red Book of the Republic of Moldova (ed. III) as a vulnerable species (VU) and in Operational checklist of threatened and extinct species. It is territorially protected in the State Scientific Reserve “Iagorlac” and in the areas with steppe vegetation in the north of Bugeac – “Bugeac” and “Dezghingea”.

Allium paniculatum L. – Panicle Onion is a perennial, bulbous, decorative and medicinal plant. (Figure 4.) Blooms in June-July and fructifies in July-August. It is a xerophytic species, propagates by seeds. In the Republic of Moldova, the Panicle Onion grows in sunny slopes and steppes with domination of *Festuca valesiaca*, *Bothriochloa ischaemum* and *Stipa* species. The Panicle Onion seldom can be met throughout the republic. Outside the country, it is spread in the southern and eastern countries of the Mediterranean region, Minor and Middle Asia [13, 17]. The isolated groups of 5-15 plants can be met in the Ponto-Sarmatic steppes within the boundaries of the Biosphere reserve. The subpopulations are stable, it includes specimens of different ages.



Figure 4. *Allium paniculatum* L.

Protection status. The species has been included in the Operational checklist of threatened and extinct species. It is territorially protected in the National Park “Orhei”, in the State Scientific Reserve “Iagorlac”, in the representative sectors with steppe vegetation – “Andriasevca Noua”, “Bugeac” and “Dezghingea”.

Allium sphaeropodum Klokov – Yellow Onion is a perennial, bulbous, decorative, edible and medicinal plant. (Figure 5.) Blooms in June-July and fructifies in July-August. It is a xerophytic species, propagates by seeds. In the Republic of Moldova species grows in sunny slopes and steppes along Pruth and Dniester rivers. The Yellow



Figure 5. *Allium sphaeropodum* Klokov

Onion very rarely can be met in the southern and eastern parts of the republic. Outside the country it is spread in the south-eastern countries of Europe [13, 17]. The isolated plants or groups of 3-7 plants can be met in the grasslands near village Valeni. The total surface of subpopulation is circa 1 ha.

Protection status. The species has been included in the Operational checklist of threatened and extinct species. It is territorially protected in the National Park “Orhei”, in the State Scientific Reserve “Iagorlac”, in the representative sectors with steppe vegetation – “Andriasevca Noua”, “Bugeac” and “Dezghingea”. It has been included in the Red Data Book of the Ukraine [15].

Taking into account that the species is extremely rare in the territory of the Republic of Moldova, and the subpopulations of the species is very small, we suggest that this species be included in the 4th edition of the Red Book of the Republic of Moldova.

CONCLUSIONS

Comprehensive management plan needs to be prepared for the sustainable development of the site. This should include care and development plans, as well as grazing concepts, because the preservation of the habitats is closely coupled to the development of an agricultural use compatible with the environment. The following suggestions for monitoring and research on the site are proposed:

- development of the site’s management plan based on the current situation;
- promoting the conservation and increase of the number of characteristic species in primary steppes – *Stipa ucrainica* and *S. lessingiana*;
- the regulations development of economic use of the site to preserve the steppic vegetal communities, taking into account the optimal timing of haying and grazing;
- securing the sides of ravines by planting shrubs of native flora (species of *Caragana*, *Amygdalus* and *Chamaecytisus* genera);
- establishing of a long-term monitoring of flora and vegetation of steppe communities;
- the allocation of special areas for organized recreation;
- laying of trails for eco-tourism routs;
- removal of the dried trees and shrubs to prevent the occurrence of fire hazards;
- reconstruction of the steep walls of the quarry for sand and clay mining, consolidation of wall sides by plantations of native trees and shrubs.

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