# *ALLIUM FUSCUM* WALDST. ET KIT. AND *A. SPHAEROPODUM* KLOKOV (ALLIACEAE) – RARE SPECIES PROPOSED FOR PROTECTION IN THE REPUBLIC OF MOLDOVA

## *ALLIUM FUSCUM* WALDST. ET KIT. ȘI A. *SPHAEROPODUM* KLOKOV (ALLIACEAE) – SPECIE RARĂ PROPUSĂ PENTRU PROTECȚIE ÎN REPUBLICA MOLDOVA

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**Veaceslav GHENDOV,**
ORCID: 0000-0001-6405-3935
e-mail: v_ghendov@mail.ru
”Alexandru Ciubotaru” National Botanical Garden (Institute),
Moldova State University
**Tatiana IZVERSCAIA,**
ORCID: 0009-0003-8530-0140
e-mail: t_izverskaya@mail.ru
”Alexandru Ciubotaru” National Botanical Garden (Institute),
Moldova State University

***Summary.*** *The article presents data on distribution of two rare species of vascular plants – Allium fuscum Waldst. et Kit. and Allium sphaeropodum Klokov (Alliaceae Juss. family) in the spontaneous flora, proposed for protection and inclusion in the Red Book of the Republic of Moldova, 4th edition. The following data for these taxa are indicated: Latin, Romanian and Russian names, synonymy, category and criteria of rarity, general and local distribution, habitat, limiting factors, biological and ecological characteristics, aspects of cultivation and use, status and conservation measures protection in the republic.*

***Keywords:*** *Allium fuscum, Allium sphaeropodum, flora, rare species, Republic of Moldova.*

***Rezumat.*** *Articolul prezintă date privind distribuția a două specii rare de plante vasculare – Allium fuscum Waldst. et Kit. și Allium sphaeropodum Klokov (familia Alliaceae Juss.) în flora spontană, propuse pentru protecție și includere în Cartea Roșie a Republicii Moldova, ediția a IV-a. Pentru acești taxoni sunt indicate următoarele date: denumirea în limba latină, română și rusă, sinonimia, categoria și criteriile de raritate, răspândirea generală și locală, habitatul, factorii limitativi, caracteristicile biologice și ecologice, aspecte de cultivare și utilizare, starea și măsurile de conservare în republică.*

***Cuvinte-cheie:*** *Allium fuscum, Allium sphaeropodum, floră, specii rare, Republica Moldova.*

## INTRODUCTION

In the last three decades plant diversity in the Republic of Moldova has been facing increasing anthropogenic pressure, which causes deterioration and loss of habitats and direct destruction of specie's populations by trampling, grazing, infrastructural development, stone-pitting, etc. It became urgently necessary to update and re-evaluate the risk of extinction for the species in the Moldavian flora.

The spontaneous flora of the Republic of Moldova comprises over 1820 species [1] inhabiting one of the most fragmented landscape in Eastern Europe with only a tiny fraction of its land surface that can be considered as wilderness.

The genus *Allium* L. is probably 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 (Angiosperm Phylogeny Group, 2003), comprising about 750-800 species [2]. 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 [1, 3].

This paper is a continuation of the intensive floristic and chorological studies of the vascular flora of the Republic of Moldova undertaken during the last two decades. Besides the field survey, checking and revision of herbarium material and numerous literature sources were used to supplement the distribution records. During the field survey of botanical study of Alliaceae species of the local flora, a number of new collections of *Allium* were made. The aim of this work was to identify the rare species of the genus 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.

## MATERIAL AND METHODS

In order to investigate the state of rare species, a considerable amount of herbarium exsiccatae was collected. These samples were critically processed in laboratory conditions using specific regional floras and herbarium specimens [1, 3-8]. The correctness of the designation was verified in the Herbarium of the National Botanical Garden (Institute) of the Moldova State University. The nomenclature of the species is given in accordance with the modern literature [1, 7, 9]. The general distribution area is indicated according to the literature data [5, 9, 10]. Distribution in the Republic of Moldova is given on the basis of label data on herbarium specimens stored in the National Botanical Garden of the Republic of Moldova and literature data. The rarity category applied at regional level in the Republic of Moldova has been assessed according to the IUCN criteria [11, 12]. The following symbols are used to denote the species occurrence: ○ – locality, where the species has grown in the past (before 1970) and ● – locality, where the species grows in the present (from 1970 to 2023).

The article contains the following data for each species: Latin, Romanian and Russian names, the plant family, biological and ecological characteristics, distribution, habitats, the rarity category with criteria, protection status in the republic, as well as the presence in the Red Book of vascular plants of Ukraine [14] and protection measures.

## RESULTS AND DISCUSSIONS

### *Allium fuscum* Waldst. et Kit. – **Ceapă brună – Лук бурый**

**Status**. Critically Endangered species [CR]. A4ce; B2ab(i,ii,iii,iv); D2

**Distribution**. In the spontaneous flora of Republic of Modova species is met in the vicinity of Vadul lui Isac (Cahul district) and Zloți (Cimișlia distr.) villages (Fig. 1a). The native distributional range of this species is Central Europe (Romania), Balkan peninsula (Bulgaria), Asia Minor (Turkey, Cyprus) and Africa north-west (Algeria, Morocco) (Fig. 1b) [5, 9, 10].

**Habitat**. Sunny slopes; the steppe grasslands, eroded and steep; in the glades of downy oak forests (Fig. 2b).

**Quantitative aspect**. Small populations of the species represent isolated specimens or in groups are found. The largest population occupies an area of about 0.5 ha, with an abundance of 1-2. Stable population, represented by individuals of different ages, plant density reaching up to 2-5 mature plants per 1 m$^2$.

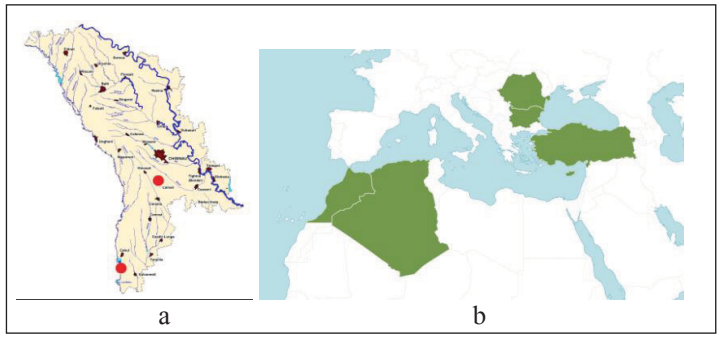



**Figure 1.** *Allium fuscum* Waldst. et Kit.:
a – distribution in the Republic of Moldova, b – distribution worldwide.

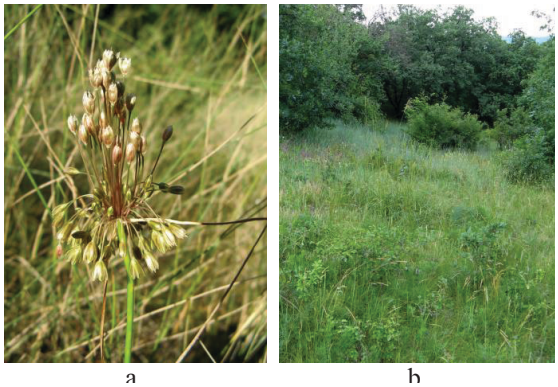



**Figure 2.** *Allium fuscum* Waldst. et Kit.:
a – inflorescence, b – habitat.

**Limitation factors**. Extreme conditions at the edge of the distributional range; intensive grazing; ruderalization of the steppes and downy oak forests.

**Biological and ecological characteristics**. A perennial, bulbous plant, geophyte (Fig. 2a). Blooms in July and fructifies in August. Propagates by seeds. A xerophilous steppic species.

**Cultivation**. Specimens are cultivated in the experimental plot of rare species in the ”Al. Ciubotaru” National Botanical Garden (Institute).

**Protection status**. Territorially protected in the landscape reserve ”Carbuna”.

**Protection measures**. Inclusion in the State Protected Species List and to the Red Book of the Republic of Moldova, 4th edition as Critically Endangered (category CR). Monitoring of the status of extant populations and identification of new growing sites of the species; species propagation in *ex situ* conditions and its repatriation to the natural habitats.

**Economic importance.** It is an ornamental plant.

### *Allium sphaeropodum* Klokov – **Ceapă sferopodă – Лук круглоногий**

**Status**. Endangered species [**EN**]. A4cde; B2ab(i,ii,iii,iv)

**Distribution**. In the spontaneous flora of Republic of Modova species is met in the vicinity of villages Slobozia Mare (Cahul district), Chirsova and Ferapontievca (Gagauzia region), Goian (Transdniestrian region) (Fig. 3a). Outside the boundaries of the republic it is met in Romania and Ukraine (Fig. 3b) [5, 9, 10].

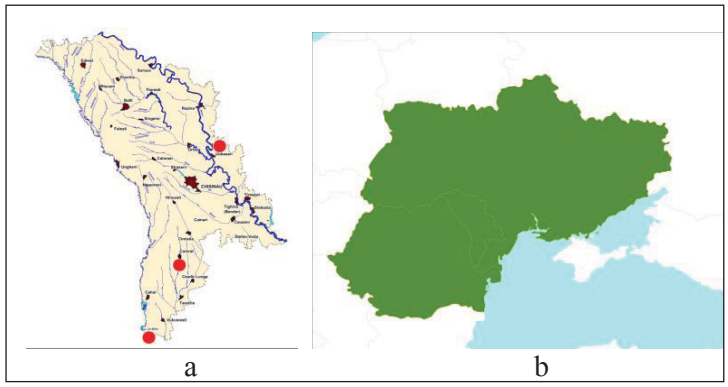



**Figure 3.** *Allium sphaeropodum* Klokov:
a – distribution in the Republic of Moldova, b – distribution worldwide.

**Habitat**. The rocky steppe hills, the steppe sectors with loessoid soils in the Bugeac steppe (Fig. 4b).

**Quantitative aspect**.

In primary steppes in the south of the country it grows in separate clusters of 5-10 mature individuals. Forms dispersed groups of 1-2 m$^2$, with an abundance of 1. Populations represented by individuals of different ages, plant density reaching up to 2-5 mature plants per 1 m$^2$.



a b

**Figure 4.** *Allium sphaeropodum* Klokov:
a – inflorescence, b – habitat.

**Limitation factors**. Extreme conditions on the limits of natural area of occurence, limited number of specific habitats, intensive grazing, destruction of growth sites following recreation and afforestation activities with non-native species; ruderalization of the steppes.

**Biological and ecological characteristics**. A perennial, bulbous plant, geophyte, up to 20-40 cm high (Fig.

4a). Blooms in June and fructifies in August. Propagates by seeds. A xerophilous steppic species.

**Cultivation**. Specimens are cultivated in the experimental plot of rare species in the ”Al. Ciubotaru” National Botanical Garden (Institute).

**Protection status**. Territorially protected in the scientific reserve ”Iagorlic”. The species is included in the Red Book of Ukraine as Vulnerable [14].

**Protection measures**. The species should be included in the State Protected Species List and to the 4th edition of the Red Book of the Republic of Moldova as Endangered (category EN); monitoring and control over extant populations, conservation of populations on surfaces outside protected areas, undertaking *ex-situ* conservation measures.

**Economic importance**. It is an ornamental and medicinal plant.

## CONCLUSIONS AND RECOMMENDATIONS

As the result of the vascular flora of the Republic of Moldova new locations of rare species of vascular plants from Alliaceae family were identified – *Allium fuscum* Waldst. et Kit. (in the vicinity of Vadul lui Isac (Cahul district) and Zloți (Cimișlia district) villages) and *Allium sphaeropodum* Klokov (in the vicinity of villages Slobozia Mare (Cahul district), Chirsova and Ferapontievca (Gagauzia region), Goian (Transdniestrian region).

For the effective protection of these species in the Republic of Moldova we recommend both species to be included in the State Protected Species List and to the 4th edition of the Red Book of the Republic of Moldova.

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