

RARE *SCORZONERA* (ASTERACEAE) SPECIES FOR INCLUSION INTO THE RED BOOK OF REPUBLIC OF MOLDOVA

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Abstract: The article contains the results of the study of the rare species *Scorzonera purpurea* L. and *S. taurica* M.Bieb. in the flora of the Republic of Moldova and presents new data on their chorology and current status of conservation. The populations of the species were researched, the degree of endangerment was assessed and the rarity category was established according to the IUCN requirements, the limiting factors were identified, and as a protection measure, the species *Scorzonera purpurea* L. and *S. taurica* M.Bieb. are proposed for inclusion in the 4th edition of the Red Book of the Republic of Moldova.

Keywords: *Scorzonera purpurea*, *S. taurica*, rare species, Red Book, conservation.

INTRODUCTION

Currently, in the flora of the *Terra*, the genus *Scorzonera* L. (Asteraceae) includes more than 160 species, spread in the extratropical regions of Eurasia and North Africa [6]. In the spontaneous flora of the Republic of Moldova, the genus *Scorzonera* includes nine species: *Scorzonera austriaca* Willd., *S. crispa* M.Bieb., *S. mollis* M.Bieb., *S. purpurea* L., *S. stricta* Hornem., *S. taurica* M.Bieb., *S. ensifolia* M.Bieb., *S. parviflora* Jacq. and *S. hispanica* L., of which the first seven listed are rare [4, 5]. At the same time, four species: *Scorzonera austriaca*, *S. mollis*, *S. purpurea* and *S. stricta* are protected by law in the Republic of Moldova [2], and two of these: *Scorzonera austriaca* and *S. mollis* are included in the Red Book of the Republic of Moldova, 3rd edition (2015) [1]. Over the past few years, extensive field investigations of rare taxa have been carried out, in particular within the project: Assessment of the status of plant, fungi and animal species, elaboration of the list of species with rarity status and the algorithm for presentation in the 4th edition of the Red Book of the Republic of Moldova” (2024-2026). The planned monitoring of rare plant species is an essential step in solving conservation problems and provides update information on the population status of threatened species, contributing both to reducing the subjectivity of data regarding the rarity of taxa and to objectively establishing the conservation status of species. The study presents the results of the conservation status assessment of the endangered species *Scorzonera purpurea* L. and *S. taurica* M.Bieb. and highlights the need to apply effective conservation measures for these valuable steppe components.

MATERIALS AND METHODS

The study was carried out during the years 2023-2026 and is based on the results of field floristic research of rare species of the genus *Scorzonera* L. from the flora of the Republic of Moldova, on an analysis of the specialized literature and on the critical examination of the herbaria collections, carried out according to the classical comparative-morphological method [10]. In order to identify the taxonomic belonging of the botanical material in the scientific herbaria and to specify the bioecological, phytogeographical and chorological characteristics of the species, determination works and basic floristic literature related to the studied territory were used [5, 9, 12, 13]. The assessment of rare species and the establishment of conservation status were carried out in accordance with the criteria adopted by the International Union for Conservation of Nature (IUCN 2001, 2012) [7, 8], taking into account the range, habitat status/quality, population size, as well as reproductive capacity, which is one of the most important particularities determining the survival of the population. The taxonomic nomenclature is presented according to the fundamental works in the field [11-13].

RESULTS AND DISCUSSIONS

As a result of the conservation status assessment activities of the endangered species *Scorzonera purpurea* L. and *S. taurica* M.Bieb. carried out in recent years, up-to-date, complete data were obtained on the chorology of the species, the status and parameters of the populations, the habitat conditions, presented below.

***Scorzonera purpurea* L.** – endangered species, according to the data obtained from the consultation of herbaria, scientific publications and field research, on the territory of the Republic of Moldova was highlighted near commune Camenca, Glodeni district, comm. Fetești, Edinet district, comm. Rudi, Soroca district, comm. Cuizăuca, Rezina district, comm. Cornești, Ungheni district, comm. Recea, Strășeni district, comm. Goian, Dubăsari district, comm. Zolonceni, Criuleni district, comm. Cărbuna, Ialoveni district, communes Lăpușna, Mingir, Cărpineni and Sărata Galbenă, Hîncești district, comm. Șișcani, Nisporeni district, comm. Codreni, Cîmislia district (St. Zloți). In the last 3 years, new places of growth have been identified, in the vicinity of commune Gordinești, Edineț district and near village Țîgîra, Ungheni district. Outside the borders of the Republic of Moldova it is found in Central and Eastern Europe, the Balkans, the Mediterranean region, Asia Minor, Siberia [13].

Scorzonera purpurea grows solitary, also given in small groups, of 2-3 (5) phytointividuals, on steppe hills, forest sparse, glades and edges, bushes, grassy rocks. Perennial plant. Eurasian hemicryptophyte [5]. It blooms in May-June. It is pollinated by insects. The fruits ripen in July. Anemochorus. Decorative plant during the flowering period (Figure 1).



Figure 1. *Scorzonera purpurea*, floriferous anthodium and general aspects of the natural habitat from the „Fetești” Landscape Reserve

Although in the past the species has been sporadically reported at numerous distribution points as a result of floristic research over the past decade, in many places it has not been found. In most of the distribution points, the species is represented by small populations, with a small number of specimens. The largest and most numerous population of the *Scorzonera purpurea* species is the one reported in the clearings with steppe vegetation on the territory of the “Fetești” Landscape Reserve, where over 200 specimens have been attested, which vegetate diffusely, on an area of about 1 ha. These steppe glades are unique to the north of the country and offer optimal conditions for many species characteristic of these habitats, including rare plant species of high conservative interest. Thus, in this sector, together with *Scorzonera purpurea*, there are species such as: *Aconitum eulophum* Rchb., *Adonis vernalis* L., *Asparagus officinalis* L., *Campanula persicifolia* L., *C. sibirica* L., *Cotoneaster melanocarpus* (Bunge) Fisch. ex Loudon, *Dictamnus gymnostylis* Steven, *Euphorbia cyparissias* L., *E. stepposa* Zoz ex Prokh., *Festuca valesiaca* Gaudin, *Filipendula ulmaria* Maxim., *Fragaria vesca* L., *Fritillaria montana* Hoppe from W.D.J.Koch, *Galium verum* L., *Pilosella cymosa* (L.) F.W.Schultz & Sch.Bip., *P. flagellaris* (Willd.) Arv.-Touv., *Plantago urvillei* Opiz., *Poa pratensis* L., *P. versicolor* Bess., *Pontechium maculatum* (L.) Böhle & Hilger, *Potentilla alba* L., *Primula veris* L., *Pulmonaria officinalis* L., *Pulsatilla montana* (Hoppe) Rchb., *Pyrethrum corymbosum* (L.) Scop., *Stipa pennata* L.,

S. pulcherrima K.Koch., *Salvia pratensis* L., *Serratula lycopifolia* (Vill.) A.Kern., *S. radiata* (Waldst. et Kit.) M.Bieb., *Silene nutans* L., *Taraxacum officinale* F.H.Wigg., *Thalictrum minus* L., *Trifolium montanum* L., *T. pannonicum* Jacq, *Veratrum nigrum* L., etc.

Status. Endangered [EN: B2ab(iii,iv); C2a(i)]

Limitation factors. Deforestation, mowing of clearings and forest edges before seed dissemination, overcrowded grazing, recreational activities, reduction of the areas of specific habitats, poor populations with a small number of individuals.

Protection status. *Scorzonera purpurea* is included in the List of protected plant species by law. Territorially, in *situ* conditions it is protected in the Landscape Reserves "La Castel", "Fetești", "Cărbuna", in the "Iagorlik" Scientific Reserve, within the "Zolonceni" Forest Nature Reserve. *Ex situ* the species is preserved in the "Al. Ciubotaru" National Botanical Garden of the University of Moldova, both through the collection of living plants in the experimental plot of rare species and by preserving a batch of seeds in the institution's seed collection.

Protection measures. Protecting the breeding sites, rigorously observing the reserve regime, monitoring the populations, identifying new distribution points.

***Scorzonera taurica* M.Bieb.** (= *Scorzonera hispanica* subsp. *asphodeloides* (Wallr.) Arcang.) it is a rare species, highlighted for the first time in the flora of the Republic of Moldova in 2010 [3]. As a result of the critical analysis of the specimens preserved in the Herbarium of the "Al. Ciubotaru" National Botanical Garden (Institute), corroborated with the data obtained during field research, the chorology of the species was established. Thus, on the researched territory, *Scorzonera taurica* vegetates near communes Cărpineni and Mirești, Hincești district, village Bugeac, district Cimișlia, comm. Congaz, UTAG, village Ciumai, Taraclia district, as well as in communes Șerpeni and Telița, Anenii-Noi district, which represent recently identified growth points. Beyond the country's borders it is spread in South-Eastern Europe, the Mediterranean region, the Crimea, the Caucasus, Asia Minor, South-Eastern Siberia, Central Asia [7].

Scorzonera taurica grows solitary or in groups, through steppes, bright glades, steppe hills, places with calcareous substrate and through bushes. Perennial plant. Eurasian (Mediterranean) hemicryptophyte [5]. Xeromesophilic species. It blooms in May-June. The fruits ripen in June-July. It multiplies by seeds. It is pollinated by insects. Decorative during the flowering period (Figure 2).



Figure 2. *Scorzonera taurica*, habitus and general aspects of the sector with steppe vegetation „Bugeac”

The populations of the *Scorzonera taurica* identified, vary a lot, both in area and in number of individuals, the smallest being made up of 6-10 specimens, mainly solitary or spread in small groups of 2-3 phytoindividuals, and the extended ones occupy areas of 400-600m², with a numerical herd of over 50 mature specimens. The largest population of the species *Scorzonera taurica* has been reported and studied in the representative sector with steppe vegetation “Bugeac”, which vegetates on a slope with an inclination of 5-10°, western exposure and consists of about 80 phytoindividuals, located on an area of about 600m². In the vegetal cover predominate species of the Poaceae family such as: *Stipa lessingiana* Trin. et Rupr., *S. capillata* L. and *Bromus riparius* Rehmman. Among the accompanying species vegetate: *Adonis wolgensis* Stev., *Amygdalus nana* L., *Allium paczoskianum* Tuzs., *Artemisia austriaca* Jacq., *Asparagus officinalis* L., *Astragalus austriacus* Jacq., *Astragalus exscapus* L., *Bellevallia sarmatica* (Georgi) Woronow, *Centaurea trinervia* Steph., *Crambe tataria* Sebeok, *Clematis integrifolia* L., *Dianthus campestris* M.Bieb., *Euphorbia stepposa* Zoz, *Festuca valesiaca* Gaudin, *Filipendula ulmaria* Maxim., *Galatella villosa* (L.) Rchb.f., *Galium verum* L., *Inula britannica* L., *Limonium gmelinii* (Willd.) O.Kuntze, *Linaria genistifolia* (L.) Mill., *Linum austriacum* L., *Medicago sativa* L., *Nigella arvensis* L., *Odontites vulgaris* Moench, *Phlomoides tuberosa* (L.) Moench, *Poa bulbosa* L., *Pontechium maculatum* (L.) Böhle & Hilger, *Potentilla pedata* Nestl., *Pulsatilla*

montana (Hoppe) Rchb., *Salvia nemorosa* L., *S. nutans* L., *Scabiosa ochroleuca* L., *Serratula radiata* (Waldst. and Kit.) M.Bieb., *Tanacetum odessanum* (Klokov) Tzvelev, *Teucrium polium* L., *Verbascum ovalifolium* Donn from Sims, *Veronica spicata* L. etc.

Status. Endangered [EN: B2ab(iii,iv)]

Limitation factors. Reduction of the number of specific habitats, use of steppe sectors for agricultural crops, planting steppe slopes with alien species, highly fragmented habitats, poor populations, limited distribution of the species.

Protection status. *Scorzonera taurica* is territorially protected in the “Telița” Landscape Reserve, as well as in the multifunctional management areas, in the representative sectors with steppe vegetation in the north of Bugeac (village Bugeac) and in the south of Bugeac (village Ciurnai).

As **protection measures**, we propose the inclusion of the species *Scorzonera taurica* in the List of plant species protected by law, the observance of the protection regime of the protected natural areas in which the taxon vegetates, the monitoring of populations, the highlighting of new breeding seasons, the conservation of the species in *ex-situ* conditions.

CONCLUSIONS

Based on the floristic and chorological researches carried out on the genus *Scorzonera* L., in the flora of the Republic of Moldova, it is found that seven of the nine species of the genus are rare taxa, threatened with extinction, four being protected by law and only two species included in the 3rd edition of the Red Book of the Republic of Moldova. Most species of the genus *Scorzonera* are valuable components of steppe vegetation, whose surfaces are almost entirely destroyed, and fragments of true steppe remain only in reserves and on hard-to-reach lands, unfavorable for agriculture. The study of rare species and the objective reassessment of their rarity status provide plausible arguments regarding the need to include in the 4th edition of the Red Book of the Republic of Moldova two species at high risk of endangerment of the genus *Scorzonera*: *Scorzonera purpurea* L. and *S. taurica* M.Bieb., with the attribution of the status of endangered species [EN], thus contributing substantially to the efficiency of the conservation measures of these important floristic species.

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