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THE RED LIST OF BEDSTRAW FAMILY (RUBIACEAE JUSS.) FROM THE FLORA OF REPUBLIC OF MOLDOVA

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Abstract: The paper contains the preliminary Red List of Bedstraw family (Rubiaceae Juss.) plants species from the flora of Republic of Moldova. The list comprises 15 species of various categories of rarity. Each species is provided with the following characteristics: latin name, synonyms, status, local and common distribution (with map of distribution in the region), habitat, quantitative aspect, limitation factors, biological and ecological characteristics, cultivation, protection status and protection measures.

Key words: rare plants, spontaneous flora, conservation, Republic of Moldova.

INTRODUCTION

Due to the large number of species on the edges of geographical areas of distribution and extremely low preservation of natural plant communities, one of the features of the flora of Republic of Moldova is the presence of a significant number of rare and endangered species. Rare species of vascular plants now account for about 30% of the total composition of the flora of different categories of rarity, and the number continues to increase. In accordance with the rarity categories, all these species are vulnerable due to the small number of populations and limited distribution throughout the territory.

This article analyzes rare species of the bedstraw family (Rubiaceae Juss.) in the Republic of Moldova. The family includes 4 genera and 31 species, half of them (15 species) are rare. They are represented by a variety of populations and unequal distribution in the region.

MATERIAL AND METHODS

During our investigation concerning rare species of the Rubiaceae family in the flora of the Republic of Moldova we performed all necessary research on field and laboratory examination. Firstly, we reviewed all published information on the presence of species in the territory, and consulted specimen materials in different scientific herbaria (Herbarium of the National Botanical Garden (Institute), Herbarium of the State University of Moldova, etc.).

Rare species are identified on the basis of their local distribution in the Republic of Moldova. The map of distribution was made using the map of Moldova, compiled by Head of the Laboratory of Geomorphology and Soil Science Ecology of Institute of Ecology and Geography, PhD G. Syrodoev. The following symbols are used to denote the spread: ○ – locality, where the species has grown in the past (before 1980) and ● – locality, where the species grows in the present time (from 1980 to 2018).

The rarity of species was assessed according to the categories and criteria of IUCN. Limiting factors are indicated by the literature data[1] [6].

1 1.1.2.1 – small-scale wood plantations; 1.1.3 – non-timber plantations; 1.1.4.2 –Small-holder; 1.2.2 – change of land management of non-agricultural areas regime; 1.3.3 – wood; 1.3.3.3 – clear-cutting; 1.5 – invasive alien species (directly impacting habitat); 1.8 – other causes; 9.1 – limited dispersal; 9.2 – poor recruitment/ reproduction/regeneration; 9.3 – high juvenile mortality; 10.1 – recreation/tourism; 10.6 – other human disturbance; 10.7 – unknown human disturbance.

The taxonomy of bedstraw family species followed by the recent taxonomical literature. [11-15]

RESULTS AND DISCUSSIONS

In the flora of the Republic of Moldova, the Rubiaceae family is represented by 31 species. Almost half of them (15 species): *Asperula rumelica* Boiss., *A. tenella* Heuff. ex Degen, *Cruciata glabra* (L.) Ehrend., *C. laevipes* Opiz, *C. pedemontana* (Bell.) Ehrend., *Galium boreale* L., *G. physocarpum* Ledeb., *G. rivale* (Sibth. et Smith) Griseb., *G. rubioides* L., *G. ruthenicum* Willd., *G. spurium* L., *G. tinctorium* (L.) Scop., *G. tricornutum* Dandy, *G. volhynicum* Pobed. and *Sherardia arvensis* L. are threatened in the wild. They differ in the number and status of populations, local distribution and along with the of relatively high risk of extinction all these taxa are extremely rare.

In the article rare plants of the Rubiaceae family are given in alphabetical order, each with the indication of the following characteristics: Latin name, synonyms, status, local and common distribution (with map of distribution in the region), habitat, quantitative aspect, limitation factors, biological and ecological characteristics, cultivation, protection status and protection measures**.**

Asperula rumelica Boiss. (=*Asperula montana* Waldst. et Kit., *A. cynanchica* L. var. *graveolens* (M.Bieb. ex Schult. et Schult. fil.) Stojan. et Stef., *A. cynanchica* L. subsp. *rumelica* (Boiss.) Pjatunina, *A. graniticola* Klokov, *A. hypanica* Klokov).

Status. Data Deficient species (category **DD**).

Distribution. In the Republic of Moldova can be met in the districts of Rezina, Sangerei, Rabnita, Orhei, Criuleni, Anenii Noi, Hancesti, Cahul; mun. Chisinau; Comrat and Vulcanesti (ATU Gagauzia), Grigoriopol and Slobozia (Transdniestrian region). (Fig. 1) Outside the country is spread in the Balkans (Romania, Bulgaria), southern part of eastern Europe, Asia Minor (Turkey). [2-4, 11, 15]

Habitat. Steppe and calcareous slopes.

Quantitative aspect. In the places of growth there are solitary individuals or groups of 2-3(10) plants.

Limitation factors. 1.1.2.1; 1.1.4.2; 9.1; 10.7.

Biological and ecological characteristics. A semi-shrub, microphanerophitic plant. Blooms in April-September and fructifies from May. The species propagates by seeds. A xerophylous typicaly steppic species. The plant was used one time in traditional medicine to treat peritonsillar abscess, also known as a quinsy [7]. A red dye is obtained from the root [5].

Cultivation. No information.

Protection status. No measures have been taken.

Protection measures. Monitoring the status of extant populations; identification of new places of the growth; conservation of the species in *ex-situ* conditions.

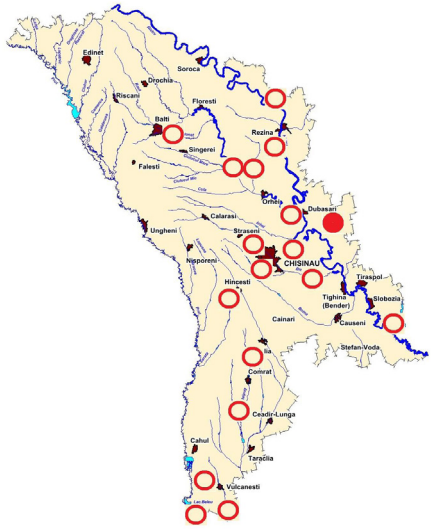

Fig. 1. Distribution of *Asperula rumelica* Boiss. in the region.

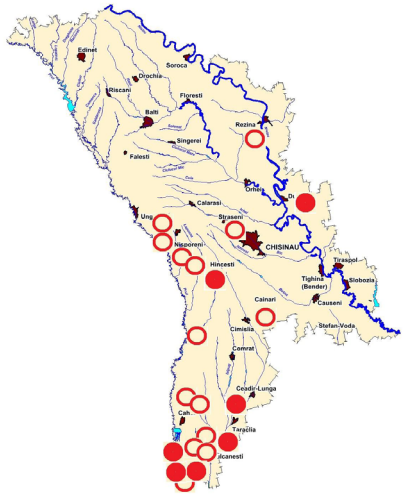

Fig. 2. Distribution of *Asperula tenella* Heuff. ex Degen in R. Moldova.

Asperula tenella Heuff. ex Degen (=*A. cynanchica* L. var. *elongata* Stev., *A. longiflora* C.Koch, *A. stevenii* V.Krecz., *A. maeotica* M.Pop. et Chrshan., *A. bidentata* Klokov, *A. hypanica* Klokov, *A. attenuata* Klokov).

Status. Vulnerable species (category **VU:** A2ce+4ce; B2ab(i,ii,iii,iv); D2).

Distribution. In the Republic of Moldova can be met in the districts of Rezina, Nisporeni, Hancesti, Cimislia, Leova, Cahul; in the vicinity of Chisinau sity; Comrat, Taraclia and Vulcanesti (ATU Gagauzia); Grigoriopol (Transdniestrian region). (Fig. 2) Outside the country is spread in the central and southern parts of eastern Europe, Crimea, the Mediterranean region, Asia Minor (Turkey). [2-4, 11, 15]

Habitat. Steppe and calcareous slopes.

Quantitative aspect. In the places of growth there are solitary plants or groups of 2-3(5) individuals.

Limitation factors. 1.1.2.1; 1.1.4.2; 9.1; 10.7.

Biological and ecological characteristics. A semi-shrub, microphanerophitic plant. Blooms in April-August and fructifies in May-September. The species propagates by seeds. A xerophylous, typicaly steppic species.

Cultivation. No information.

Protection status. No measures have been taken. Territorially protected in area with multifunctional management – sector with steppe vegetation in the south of Bugeac (Ciumai village) and natural forest rezervation ”Sărata Galbenă”.

Protection measures. Inclusion in the list of the species protected by law; monitoring the existent populations; identification of new places of growth; conservation of the species in *ex-situ* conditions.

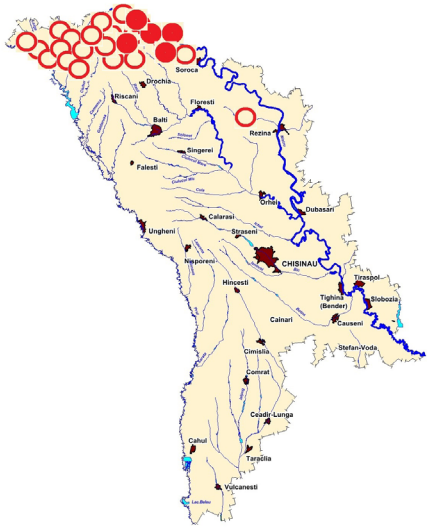

Fig. 3. Distribution of *Cruciata glabra* (L.) Ehrend.

Cruciata glabra (L.) Ehrend. (=*Valantia glabra* L., *Galium vernum* Scop.).

Status. Near Threatened species (category **NT**).

Distribution. In the Republic of Moldova it is currently sporadically met in the northern areas of the forested districts: Briceni, Dondușeni, Edineț, Ocnița, Soroca and Șoldănești. (Fig. 3) Outside the country is spread in the Scandinavian peninsula (Finland), Atlantic, Central and eastern Europe, the Mediterranean region, Asia Minor, Caucasus, Western Siberia (Altai); introduced in North America. [2, 13]

Habitat. Usually wet and shady places on limestone slopes – under the canopy, glades and edges of oak forests, cuts, shruberies, sunny glades.

Quantitative aspect. It grows solitary or forms small groups of several mature and juvenile specimens.

Limitation factors. 1.1.2.1; 1.1.4.2; 1.3.3; 1.5; 10.6; 10.7.

Biological and ecological characteristics. A perennial, hemicryptophytic plant. Blooms in (April)May-July and fructifies from May. The species propagates by seeds. A mesophylous plant, typically forest plant. The plant is medicinal, tinctorial and ornamental. It has diuretic and haemostatic activity. The aerial part of the plant is a good remedy in digestive and cardiovascular problems, tumours, skin desorders. It treats liver diseases,

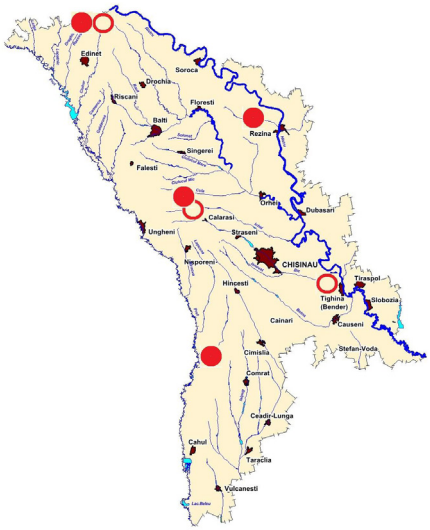

Fig. 4. Distribution of *Cruciata laevipes* Opiz

hemorrhoids, dyspepsia, ascites, hypertension, wounds [10].

Cultivation. No information.

Protection status. No measures have been taken. Territorially protected only in the wetland of international importance "Unguri-Holoşnita" (No. 1500 on the Ramsar List). [9]

Protection measures. Monitoring the status of extant populations; identification of new places of growth.

Cruciata laevipes Opiz (=*Valantia cruciata* L., *Galium cruciata* (L.) Scop.).

Status. Endangered species (category **EN**: A2ce+4cc; B2ab(i,ii,iii,iv).

Distribution. In the Republic of Moldova it is rarely met in the forested districts: in the commune of Dângeni, Clocuşna, distr. Ocniţa; in the vicinity of the town Şoldăneşti; commune Bahmut, Sipoteni, distr. Călăraşi; commune Hârbovăţ, distr. Anenii Noi; commune Pleşeni, distr. Cantemir. (Fig. 4) Outside the country is spread in Scandinavia (Finland), Atlantic, Central and southern parts of Eastern Europe, Crimea, Mediterranean region, Asia Minor, Iran, Caucasus; introduced in North America. [2, 13]

Habitat. Brushwood on steppe limestone hills, glades and edges of oak forests with cherries, roadsides.

Quantitative aspect. Forms small groups of several plants.

Limitation factors. 1.1.2.1; 1.1.4.2; 1.3.3; 1.5; 10.6; 10.7.

Biological and ecological characteristics. A perennial, hemicryptophytic plant. Blooms in May-July and fructifies in June-August. The species propagates by seeds. A mesophylous, typically meadow plant.

The plant is medicinal and forage. It has diuretic, haemostatic and wound healing activity. It is used in the treatment of digestive, nervous and cardiovascular problems, tumours, skin desorders. The aerial part of the plant is a good remedy in liver cirrhosis, ascites, wounds, metrorrhagia, hypertention, epilepsy [10].

Cultivation. No information.

Protection status. No measures have been taken.

Protection measures. The taxon inclusion in the list of the species protected by law; identification of new growing sites of the species and organization of its protection; *ex-situ* conservation, propagation and its repatriation to the natural habitats.

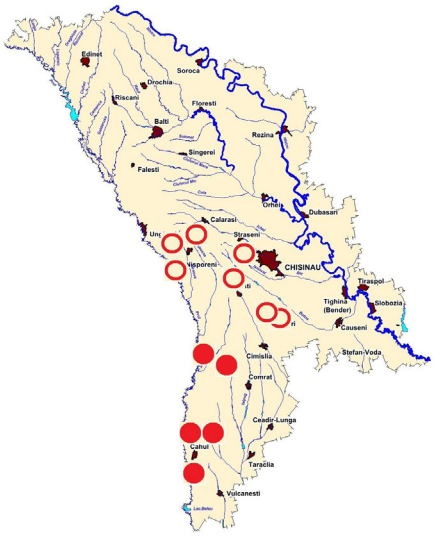

Fig. 5. Distribution of *Cruciata pedemontana* (Bell.) Ehrend.

Fig. 6. Distribution of *Galium boreale* L.

Cruciata pedemontana (Bell.) Ehrend. (=*Valantia pedemontana* Bell., *Galium pedemontanum* (Bell.) All.).

Status. Data Deficient species (category **DD**).

Distribution. In the Republic of Moldova, it can be is currently sporadically met in central and southern districts: in the districts of Nisporeni, Străşeni, Ialoveni, Hânceşti, Cimişlia, Cantemir, Cahul. (Fig. 5) Outside the country is growing in the Atlantic, Central and south-western parts of Eastern Europe, Crimea, the Mediterranean region, Asia Minor and Middle East, Iran, Caucasus. [2, 13]

Habitat. Steppe hills, glades and edges of arid forests with *Quercus robur* and *Quercus pubescens*.

Quantitative aspect. Forms small groups of several plants with abundance 1-2.

Limitation factors. 1.1.2.1; 1.1.4.2; 1.3.3; 1.5; 10.6; 10.7.

Biological and ecological characteristics. An annual plant, therophyte. Blooms in April-June and fructifies in May-July. The species propagates by seeds only. A xeromezophylous typicaly steppe species.

Cultivation. No information.

Protection status. No measures have been taken.

Protection measures. Monitoring the status of extant populations; identification of new places of growth; conservation of the species in *ex-situ* conditions in botanical gardens.

Galium boreale L.

Status. Regionally Extinct species (category **RE**).

Distribution. In the Republic of Moldova it had been rarely met in the northern area – near the commune of Balasinești, Briceni distr. (date of collection 1953) and southern area – near the Cahul town (Zelenetzkii herbarium, no collection date). (Fig. 6) Recently it ha snot been met and we consider it as regionally extinct species. Outside the country, the area of distribution streaches from the Arctic, Scandinavian peninsula, Atlantic, Central and Eastern Europe, the Caucasus, Iran, Middle Asia (northwest), Siberia and Mongolia. [4, 14]

Habitat. Wet places in the glades and edges of oak forests, meadows.

Limitation factors. 10.7.

Biological and ecological characteristics. A perennial, hemicryptophytic plant. Blooms in June-July and fructifies in July-August. The species propagates by seeds. A mesophylous plant, typical for meadows.

The plant is medicinal, tinctorial, ornamental and forage. The plant possesses contraceptive, diaphoretic [7], diuretic, haemostatic, sedative, cardio tonic, wound healing activities [10]. It is a good remedy in digestive, ophthalmic and respiratory problems, skin disorders, and diseases of reproductive and cardiovascular systems, in the treatment of rheumatic pain [10]. In traditional medicine has been used in hot poultices to stop bleeding and reduce swelling. The plant juice was applied to heal sunburn, rashes, cuts, insect bites, eczema, ringworm and other skin problems.

It is also an edible plant. Young leaves are used raw and cooked [7]. As ornamental plant this it makes great ground cover.

Cultivation. No information.

Protection status. No measures have been taken.

Protection measures. Inclusion in the list of the species protected by law; identification of new places of the growth.

Galium physocarpum Ledeb. (=*Galium salicifolium* Klokov, *G. rubioides* auct. non L.).

Status. Data Deficient species (category **DD**).

Distribution. In the Republic of Moldova is rare in the northern zone: in the distr. Briceni, Ocnița, Camenca (Transdniestrian region); central: Ungheni, Calarasi, Straseni, Nisporeni, Hincesti and southern: in the distr. Leova and Cahul. (Fig. 7) Outside the country, is growing in Central (Romania) and eastern Europe, Middle Asia, Western Siberia. [4, 14]

Habitat. Floodplain forests, meadows.

Quantitative aspect. In the places of growth there are solitary individuals or groups of 2-3 (5) plants. [17]

Limitation factors. 10.7.

Fig. 7. Distribution of *Galium physocarpum* Ledeb.

Biological and ecological characteristics. A perennial, hemicryptophytic plant. Blooms in June-September and fructifies in July-September. The species propagates by seeds and vegetative. A mesophylous plant, typical for forests. It is a tinctorial and forage species.

Cultivation. No information.

Protection status. No measures have been taken. Territorially protected in the Scientific Reservation "Codru" and natural forest rezervation "Sărata-Răzeşi".

Protection measures. Monitoring the extant populations; identification of new growing places.

Galium rivale (Sibth. et Smith) Griseb., (=*Asperula rivalis* Sibth. et Smith).

Status. Critically Endangered species (category **CR**: A4ce; B2ab(iii,iv).

Distribution. In the Republic of Moldova can be met only in the central part of the territory in the scientific reservation"Codru". (Fig. 8) Outside the republic is growing in Central and Eastern Europe, the Mediterranean region, Asia Minor and Middle East, Iran, Western Siberia. [4, 14]

Habitat. Marshy grassy meadows with Poaceae and Cyperaceae. [8]

Quantitative aspect. Grows singly or in small groups with abundance 1(2).

Limitation factors. 1.1.2.1; 1.3.3.3; 9.1; 9.2; 9.3; 10.7.

Biological and ecological characteristics. A perennial, hemicryptophytic plant. Blooms in May-July(August) and fructifies in July-August. The species propagates by seeds. A mesophylous plant, typical for meadows. The plant is ruderal.

Cultivation. No information.

Protection status. No measures have been taken. Territorially protected in the Scientific Reservation "Codru". [8]

Fig. 8. Distribution of *Galium rivale* (Sibth. et Smith) Griseb.

Protection measures. Monitoring the extant populations; identification of new places of growth.

Galium rubioides L. (=*Galium articulatum* Lam., *G. dasypodum* Klokov).

Status. Data Deficient species (category **DD**).

Distribution. In the Republic of Moldova it is sporadically met all over the teritory in distr. Râşcani, Glodeni, Fălești, Ungheni, Călărași, Nisporeni, Hâncești, Leova, Cantemir and Cahul, as well as in Slobozia (Transdniestrian region). (Fig. 9) Is spread in eastern Europe, Crimea, Caucasus. [4, 14]

Habitat. Wet glades in the forests, meadows, shrubs.

Quantitative aspect. Grows singly or in small groups with abundance 1(2).

Limitation factors. 1.3.3.3; 9.1; 10.7.

Biological and ecological characteristics. A perennial, hemicryptophytic plant. Blooms in June-August and fructifies from July. It propagates by seeds and vegetative by rooted stems. A mesophylous plant, typical for meadows. The plant is medicinal,

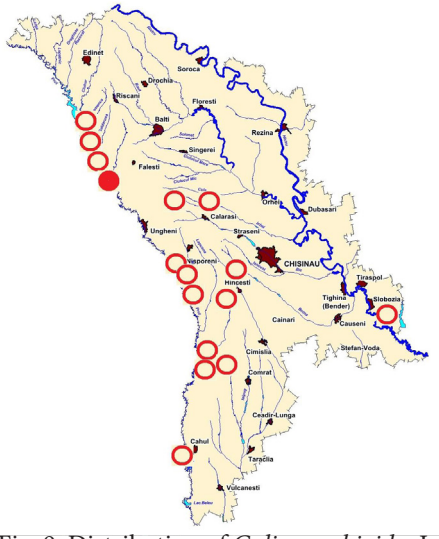

Fig. 9. Distribution of *Galium rubioides* L.

ornamental, forage. It possesses diuretic, haemostatic, sedative, wound healing, analgezic, antibacterial effects.

The plant is used in the treatment of digestive, cardiovascular, skin desorders, diseases of reproductive system, tumours. The aerial part of the plant is a good remedy in gastric ulcer, eczema, metrorrhagia, heart diseases, toothache, ascites. [10]

Cultivation. No information.

Protection status. No measures have been taken. Territorially protected in the Scientific Reservation "Padurea Domneasca".

Protection measures. Monitoring the existent populations; identification of new places of the growth.

Galium ruthenicum Willd. (=*Galium tomentellum* Klokov, *G. verum* auct. non L.).

Status. Critically Endangered species (category **CR**: A2cde+4ce; B2ab(i,ii,iii,iv).

Distribution. In the Republic of Moldova rarely met in the central and southern area: Fălești, Telenești, Ialoveni, Hâncești, Cantemir, Cahul, Comrat and Vulcanesti (ATU Gagauzia), Dubăsari (Transdniestrian region). (Fig. 10) Outside the republic is growing in eastern Europe, Caucasus, Middle Asia, Western Siberia (southern part). [4, 14]

Habitat. Steppe slopes, limestone hills, shrubs, glades of arid forests with *Quercus robur* and *Quercus pubescens*.

Quantitative aspect. Grows solitary or forms small groups of several mature and juvenile plants.

Limitation factors. 1.1.2.1; 1.1.4.2; 1.3.3; 1.5; 10.6; 10.7.

Biological and ecological characteristics. A perennial, hemicryptophytic plant. Blooms in June-August and fructifies in July-September. The species propagates by seeds and vegetative. A xerophylous, typically steppic plant.

The plant is medicinal, tinctorial, ornamental and melliferous. It has antispasmodic, astringent, haemostatic, sedative, analgezic, diaphoretic, tonic wound healing, diuretic and restorative effects. [10] A powder made from the fresh plant is used to soothe reddened skin and reduce inflammation. It is also used as a poultice on cuts, skin infections, and slow-healing wounds. A red dye is obtained from the root and a yellow dye from the flowering tops. The young leaves are edible. A yellow dye from the flowering stems is used as a food coloring. The roasted seed is a coffee substitute [7].

Cultivation. It is cultivated in the collection of medicinal plants of the National Botanical Garden (Institute) from Republic of Moldova.

Protection status. No measures have been taken.

Protection measures. Inclusion in the list of the species protected by law; identification of new growing sites of the species and organization of its protection; monitoring the extant populations; *ex-situ conservation of the species.*

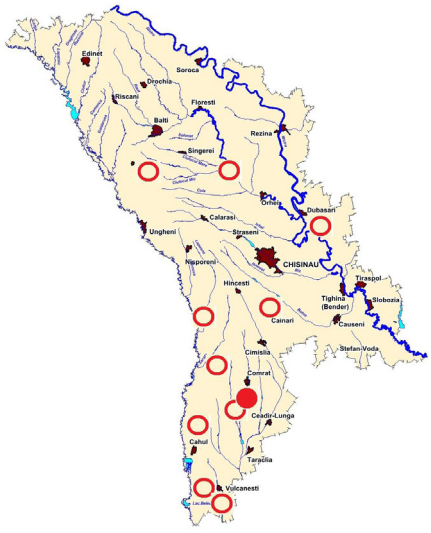

Fig. 11. Distribution of *Galium spurium* L.

Fig. 10. Distribution of *Galium ruthenicum* Willd.

Galium spurium L. (=*Galium vaillantii* DC., *G. aparine* L. γ. *spurium* (L.) Koch).

Status. Critically Endangered species (category **CR**: A2c+4c; B2ab(i, iii).

Distribution. In the Republic of Moldova it is a very rare in the forest district in the central area: near commune of Rădenii Vechi, distr. Ungheni; Căpriana and Lozova, distr. Straseni. (Fig. 11) Outside the country grows in Eurasia, North America. [4, 14]

Habitat. Shrubs, meadows, cultivated places.

Quantitative aspect. Forms small groups 1-2 m^2.

Limitation factors. 10.7

Biological and ecological characteristics. An annual plant, therophyte. Blooms in May-September and fructifies from June. The species propagates by seeds only. A xeromezophylous weed. Medicinal, technical, oil, food, fodder, ornamental, ruderal plant.

The plant has diuretic activity. It is a good remedy in the treatment of liver diseases, tumours, hypovitaminosis, toothache, rheumatism, goiter. [10] As other *Galium* L. species, *G. spurium* contains asperuloside that can be converted into prostaglandins (hormone-like compounds that stimulate the uterus and affect blood vessels), making the genus of great interest to the pharmaceutical industry. It had been used as edible in famine years. The leaves are used raw or cooked. A red dye is obtained from the roots. [7]

Cultivation. No information.

Protection status. No measures have been taken. Grows in landscape rezervation "Căpriana-Scoreni".

Protection measures. Identification of new places of the growth.

Fig. 12. Distribution of *Galium tinctorium* (L.) Scop.

Galium tinctorium (L.) Scop. (=*Asperula tinctoria* L., *Galium triandrum* (L.) Hyl.).

Status. Critically Endangered species (category **CR**: A2ce+4ce; B2ab(i, iii).

Distribution. In the Republic of Moldova is vary rare in the northern area: around the town Briceni (Rosoșeni Forest), distr. Briceni and commune Fetești, distr. Edinet. In the region grows at the southern limit of the distribution area. (Fig. 12) Outside the country is spread in the Scandinavian peninsula, the Atlantic, Central and Eastern Europe, Western Siberia. [4, 14]

Habitat. Limestone hills, steppe slopes, forest edges.

Quantitative aspect. The total number of plants has not been established.

Limitation factors. 1.1.2.1; 1.1.4.2; 1.2.2; 1.5; 1.8; 9.1; 9.2; 9.5.

Biological and ecological characteristics. A perennial, hemicryptophytic plant. Blooms in May-June, fructifies in June-August. The species propagates by seeds. A mesophylous plant, typical for forests.

The plant is medicinal and tinctorial. It is used in the treatment of skin disorders. [10] An infusion of the whole plant

Fig. 13. Distribution of *Galium tinctorium* (L.) Scop.

has been used for its beneficial effects on the respiratory system. A red dye is obtained from the roots [7].

Cultivation. No information.

Protection status. No measures have been taken. Protected only territorially in natural geological and paleontological monument "Defileul Fetești".

Protection measures. Inclusion in the list of the species protected by law; monitoring the extant populations; identification of new growing places.

Galium tricornutum Dandy (=*Galium tricorne* Stokes).

Status. Regionaly Extinct species (category **RE**).

Distribution. In the Republic of Moldova in the past (1948-1954) rarely met in the central area: Orhei distr., municipality Chisinau, the south-eastern area: Anenii Noi distr. and the southern area: Leova, Taraclia, Cahul distr. At present we consider it as regionaly extinct species. (Fig. 13) Outside the country the area of distribution covers the Atlantic, Central and eastern Europe (southwest), Crimea, the Mediterranean region, Asia Minor and Middle Asia, Iran, Caucasus, Africa (north); introduced in North America. [4, 14]

Habitat. As a weed in ruderal places and agricultural fields, along road, sometimes on argillaceous and sandy slopes, meadows, along the watercourses.

Quantitative aspect. The total number of plants has not been established.

Limitation factors. 10.7.

Biological and ecological characteristics. An annual plant, therophyte. Blooms in May-July and fructifies in June-July. The species propagates by seeds. A mezoxerophylous weed. Medicinal and ruderal plant. The aerial part of the plant contains saponins, alkaloids, flavonoids, tannins, steroids, coumarins, glycosides, etc. The plant extracts possesses diuretic, antimicrobial, wound healing activity. It is a good remedy for wounds, skin ulcers, scurvy. [10]

Cultivation. No information.

Protection status. No measures have been taken.

Protection measures. Identification of new growing sites of t

Galium volhynicum Pobed. (=*Asperula tyraica* Bess., *A. glauca* (L.) Bess. f. *hirsuta* (Wallr.) Borza).

Status. Vulnerable species (category **VU**: A2c+4c; B2b(i, iii,iv).

Distribution. In the Republic of Moldova it occurs sporadically in the following districts: Drochia, Orhei, mun. Chișinău, Hâncești, Anenii Noi, Cimișlia, Cahul, Taraclia; Camenca, Râbnița, Dubăsari (Transdniestrian region); Comrat, Vulcănești (ATU Găgăuzia). (Fig. 14) Outside the country is spread in the southwestern part of eastern Europe. Endemic. [4, 14]

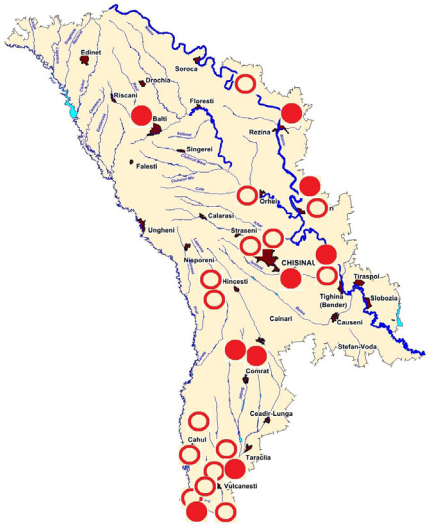

Fig. 14. Distribution of *Galium volhynicum* Pobed.

Habitat. Steppe hills, limestone slopes, shrubs, glades of arid forests.

Quantitative aspect. In the places of growth there are solitary individuals or groups of 2-3 (5) plants.

Limitation factors. 1.1.4.2; 1.5; 9.1; 9.2; 9.5; 10.1.

Biological and ecological characteristics. A perennial, hemicryptophytic plant. Blooms in June-July, fructifies in July-August. The species propagates by seeds and vegetative through the stolons. A mesoxerophylous plant, typical for steppe. The plant is ornamental.

Cultivation. No information.

Protection status. No measures have been taken. Territorially protected in the Scientific Reservation "Iagorlâc" and in areas with multifunctional management – sectors with steppe vegetation in the north of Bugeac (Bugeac and Dezghingea communes), and in the south of Bugeac (Ciumai village).

Protection measures. Monitoring the extant populations; identification of new places of growth.

Sherardia arvensis L.

Status. Critically Endangered species (category **CR**: A4ce; B2ab(iii).

Distribution. In the Republic of Moldova it is very rare, only in the central area, on the territory of the "Codru" scientific reserve, distr. Strășeni. [8] (Fig. 15) Outside the country it is spread in Atlantic, Central and eastern Europe (center and south), Crimea, the Mediterranean region, Asia Minor, Caucasus, Iran; introduced in northern part of eastern Europe and North America. [1, 12]

Habitat. Wet grassland in the park, cultivated with roses. [8]

Quantitative aspect. Grows dispersed in small groups on the surface of about 2 m^2. [8]

Limitation factors. 10.7

Biological and ecological characteristics. An annual plant, therophyte. Blooms in May-September and fructifies from June. The species propagates by seeds. A xeromezophylous weed. The plant is medicinal and tinctorial. A red or rose dye can be obtained from the plant. [7]

Cultivation. No information.

Protection status. No measures have been taken. It grows only in the scientific reservation "Codru". [8]

Protection measures. Monitoring the extant populations.

Fig. 15. Distribution of *Sherardia arvensis* L. in the region

RECOMMENDATIONS. We propose to include in the list of species protected by law and in the 4th edition of the Red Data Book of the Republic of Moldova the following 7 species from bedstraw family: Critically Endangered species (category **CR**) – *Galium rivale* (Sibth. et Smith) Griseb., *Galium ruthenicum* Willd., *Galium tinctorium* (L.) Scop., Endangered species (category **EN**) – *Cruciata laevipes* Opiz, Vulnerable species (category **VU**) – *Asperula tenella* Heuff. ex Degen, *Galium volhynicum* Pobed. and regionaly extinct species (category **RE**) – *Galium boreale* L.

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