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Rare and endangered shrubs of Georgia (Caucasus) and their regional assessment according to IUCN categories and criteria

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A B S T R A C T

Rare and endangered shrubs of the flora of Georgia have been evinced. Their checklist is provided below, which includes 100 species. Regional (Georgia) assessment was carried out for each species according to IUCN categories and criteria. In particular, 8 species were assessed as critically endangered (CR), 6 as endangered (EN), 11 as vulnerable (VU), and 17 as near threatened (NT). Due to the lack of data, 58 species could not be evaluated and at this stage they were assessed as data definicient (DD). Most of these species are narrow endemics of Georgia and the Caucasus. The basionyms and key synonyms of the species, the reference to taxonomy, assessment argumentation and the reference used in species assessment are given in the checklist; The endemics are marked with conditional signs.

***Key words*:** Shrub, Taxon, Cheklist, IUCN categories and criteria, References to taxsonomy, Assessment argumentation.

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Introduction

The flora of Georgia is rich with shrub species. Aproximately 280 species are distributed. Their composition is diverse. They are distributed from lowlands to alpine belt and are present in almost all ecosystems. They play a major role in maintaining the ecological balance and diversity of habitats.

The use of shrubs is versatile - food, firewood, medicine, various agricultural and household items etc. In addition, a significant part of shrubs is distributed in the grazing zones. Therefore, the shrubs are under strong anthropogenic pressure.

In order to preserve biodiversity, it is necessary to identify rare and endangered species and assess them using international norms and methods, which will allow us to develop ways of their survival and conservation in the future.

Objectives and Methods

The aim of our research was to identify the rare and endangered shrubs of the flora of Georgia and to compile their checklist; their regional assessment based on our own research and literature data according to the IUCN categories and criteria.

In addition to our own research, the second edition of "Flora of Georgia" [1-3] and the "Nomenclatural checklist of flora of Georgia" [4] laid the foundation for the creation of the checklist.

Names and authors of taxa are checked with the international databases: The Plant List (2021), Euro + Med (2006+), IPNI (2021), GBIF.org (2021), POWO (2021), Tropicos.org (2021) [5-10]. As a result, some of the "narrow" species included in the "Flora of Georgia" [1-3] and the "Nomenclatural checklist of flora of Georgia" [4] could not be

found in this checklist. These species are given as subspecies or as synonyms.

Species assessment and categorization were carried out in accordance with IUCN Red List [11] criteria. The assessment of taxa is based on our own research, literary data, results of various concluded and ongoing projects and materials preserved in various herbariums of Georgia (TBI, TGI, BATU). Some taxa are assessed based on the data from the "Red list of the endemic plants of the Caucasus" [12]. The verbal information of various researchers is also used.

Results and Analysis

100 rare and endangered shrubs of the flora of Georgia have been evinced. Their checklist is provided within the article. It is worth noting that the presented list also includes the species of woody plants, which mainly are trees and are rarely found in shrub forms.

Regional (Georgia) assessment was carried out for each species according to IUCN categories and criteria. In particular, 8 species were assessed as critically endangered (CR), 6 as endangered (EN), 11 as vulnerable (VU), and 17 as near threatened (NT). Due to the lack of data, 58 species could not be evaluated and at this stage they were assessed as data definicient (DD). Most of these species are the narrow endemics of Georgia and the Caucasus.

Below is a checklist of rare shrubs of the flora of Georgia. It includes the basionyms and key synonyms of the species, the reference to taxonomy, assessment argumentation and the reference used in species assessment. The endemics of Georgia and the Caucasus, as well as the subendemics of Caucasus are marked with the conditional signs.

Conditional signs

○ – Endemic of Georgia
● – Endemic of Caucasus
● – Subendemic of Caucasus

***AMARANTHACEAE* (*Chenopodiaceae*)**

***Halostachys belangeriana* (Moq.) Botsch.** [*Arthrocnemum belangerianum* Moq.; *Halostachys caspica* (M. Bieb.) C.A. Mey.]

References to taxsonomy: [4-7];

IUCN red list category and criteria: VU D1;

Assessment argumentation: the number of mature individuals – <1000

References used in species assessment: [13-16]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI); the information provided verbally by N. Lachashvili.

***Kalidium caspicum* (L.) Ung.-Sternb.** (*Salicornia caspica* L.)

References to taxsonomy: [4-8];

IUCN red list category and criteria: CR B1ab (iii) + B2ab (iii);

Assessment argumentation: EOO – <100 km²; AOO – <100 km², area – fragmented, number of area fragments – 4, decline in habitat quality caused by grazing;

References used in species assessment: [13-16]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI); the information provided verbally by N. Lachashvili.

***Suaeda dendroides* (C.A. Mey.) Moq.** (*Schoberia dendroides* C.A. Mey.)

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [13-17]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

***Suaeda microphylla* Pall.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: EN B1ab (iii) + B2ab (iii);

Assessment argumentation: EOO – 412.108 km², AOO – 16 km², area – fragmented, number of area fragments – 4, decline in habitat quality caused by grazing;

References used in species assessment: [14-16, 18]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI); the information provided verbally by N. Lachashvili.

ARALIACEAE

***Hedera pastuchovii* Woronow**

References to taxsonomy: [4-8];

IUCN red list category and criteria: NT;

Assessment argumentation: the species assessment data are approximate to VU category parameters and/or likely to be close to it in the

future;

References used in species assessment: [15, 19-23]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

BUXACEAE

***Buxus sempervirens* L.** (*B. colchica* Pojark.)

References to taxsonomy: [5-8];

IUCN red list category and criteria: CR A2acde;

Assessment argumentation: Population reduction – 95%;

References used in species assessment: [22-30]; B. Berdzenishvili's field data was used to assess the species (2018-2020).

CAPRIFOLIACEAE

● ***Sambucus tigranii* Troitzky**

References to taxsonomy: [4-8];

IUCN red list category and criteria: CR D;

Assessment argumentation: AOO – 12 km², area – fragmented, number of area fragments – 2,

References used in species assessment: [31, 32]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

CISTACEAE

***Cistus creticus* L.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [33]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

***Cistus salviifolius* L.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [33]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

CORYLACEAE

***Corylus avellana* L.**

var. *pontica* (K.Koch) H.J.P.Winkl. (*C. pontica* K. Koch; *C. imeretica* Kem.-Nath.)

References to taxsonomy: [5, 7-9, 34];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [26, 35].

○ ***Corylus colchica* Albov**

References to taxsonomy: [4-8];

IUCN red list category and criteria: VU B2ab (iii)

Assessment argumentation: EOO – <20000 km², AOO – <2000 km²; the species is assessed based on Solomon & al., 2013 [12];

References used in species assessment: [12, 35].

ERICACEAE

***Arbutus andrachne* L.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: CR B2 ab (iii, v);

Assessment argumentation: area – fragmented, number of area fragments – 2, decline in number of mature individuals and habitat quality caused by cutting;

References used in species assessment: [36-39].

Note: the authors of the article (N. Lachashvili, K. Kereselidze and M. Kikvidze) categorically distances from mentioning the integral part of Georgia - Abkhazia - as an independent state in the certified article (Aliev & al., 2020) and protest against the mentioned scientific journal.

● ***Epigaea gaultherioides* (Boiss. & Balansa) Takht. (*Orphanidesia gaultherioides* Boiss. & Balansa)**

References to taxsonomy: [4-8];

IUCN red list category and criteria: VU D1;

Assessment argumentation: EOO - 4000 km², number of area fragments – 1,

References used in species assessment: [40]; the information provided verbally by Z. Manvelidze.

***Erica arborea* L.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency

of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [41].

● ***Rhododendron smirnowii* Trautv.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: VU D;

Assessment argumentation: AOO – <20 km², number of area fragments – 1;

References used in species assessment: [38, 42].

● ***Rhododendron x sochadzeae* Kharadze & Davlian.**

References to taxsonomy: [4, 5, 7, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [42].

● ***Rhododendron ungernii* Trautv.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: VU D2;

Assessment argumentation: number of area fragments – 3;

References used in species assessment: [21, 38, 42, 43].

***FABACEAE* (*Leguminosae*)**

○ ***Astracantha atenica* (Ivan.) Podlech** (*Astragalus atenicus* Ivan.)

References to taxsonomy: [5, 6];

IUCN red list category and criteria: VU D2;

Assessment argumentation: AOO – <20 km²; the species is assessed based on Solomon & al., 2013 [12];

References used in species assessment: [12, 44]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

***Astracantha aurea* (Willd.) Podlech** (*Astragalus aureus* Willd.)

References to taxsonomy: [5, 6];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [45]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

***Astragalus cornutus* Pall.**

References to taxsonomy: [4-6];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [46, 47]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

***Astragalus lagopoides* Lam.** (A. *lagurus* Willd.)

References to taxsonomy: [5-8, 34];

IUCN red list category and criteria: VU D2;

Assessment argumentation: EOO – <20000 km², AOO – <20 km², number of area fragments – 1;

References used in species assessment: [32, 46]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

● ***Astragalus sommieri* Freyn**

References to taxsonomy: [4-5, 34];

IUCN red list category and criteria: VU D2;

Assessment argumentation: AOO – <20 km², number of area fragments – 1;

References used in species assessment: [44]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

● ***Astragalus tanae* Sosn.**

References to taxsonomy: [4-6, 22, 23];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [22, 23, 46]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

***Colutea cilicica* Boiss. & Balansa**

References to taxsonomy: [4-8];

IUCN red list category and criteria: NT;

Assessment argumentation: the species assessment data are approximate to VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [14, 15, 48]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

***Eversmannia subspinosa* (DC.) B. Fedtsch.** [*Hedysarum subspinosum* DC.; *Ewersmannia subspinosa* (DC.) B. Fedtsch.]

References to taxsonomy: [5-8];

IUCN red list category and criteria: CR B2ab (iii);

Assessment argumentation: EOO – <100 km², AOO – 4 km², number of area fragments – 1, decline in habitat quality caused by grazing;

References used in species assessment: [14, 15, 49].

***Halimodendron halodendron* (Pall.) Voss** (*Robinis halodendron* Pall.)

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: VU D2;

Assessment argumentation: area – fragmented, number of area fragments – 2, decline in habitat quality caused by grazing;

References used in species assessment: [17, 50-52].

FAGACEAE

● ***Quercus pontica* K. Koch**

References to taxsonomy: [4-8];

IUCN red list category and criteria: VU B2ab (iii);

Assessment argumentation: extent of occurrence – <20000 km², area of occupancy – <2000 km², the species is assessed based on Solomon & al., 2013 [12];

References used in species assessment: [12, 27, 53, 54].

NITRARIACEAE

***Nitraria schoberi* L.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: EN B2ab (i, ii, iii);

Assessment argumentation: EOO – 8672 km², AOO – 40 km², area – fragmented, decline in habitat quality caused by grazing;

References used in species assessment: [14-17, 55].

PLUMBAGINACEAE

***Acantholimon armenum* Boiss. & A. Huet**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [32, 56]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

***Acantholimon fominii* Kusn.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [14, 15, 56]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

● ***Acantholimon glumaceum* (Jaub. & Spach) Boiss. (***Statice glumacea* **Jaub. & Spach)**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [32, 56];

● ***Acantholimon lepturoides* (Jaub. & Spach) Boiss.** (*Statice lepturoides* Jaub. & Spach)

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [22, 23, 56].

RHAMNACEAE

○ ***Rhamnus cordata* Medw.**

References to taxsonomy: [4-7];

IUCN red list category and criteria: NT;

Assessment argumentation: the species is assessed based on Solomon & al., 2013 [12];

References used in species assessment: [12, 26, 57].

● ***Rhamnus depressa*** **Grubov**

References to taxsonomy: [4-7];

IUCN red list category and criteria: NT;

Assessment argumentation: the species assessment data are approximate to VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [32, 57-59].

Rhamnus microcarpa **Boiss.**

References to taxsonomy: [4-7];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [24, 26, 32, 57, 58];

ROSACEAE

Cotoneaster melanocarpus **Fisch. ex Blytt**

References to taxsonomy: [4, 5, 15, 22, 23];

IUCN red list category and criteria: EN B1ab (iii);

Assessment argumentation: EOO < 5000 km², AOO – <500 km², number of area fragments – 1, decline in habitat quality caused by grazing;

References used in species assessment: [15, 60].

● ***Cotoneaster soczavianus*** **Pojark.**

References to taxsonomy: [4, 5, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [26, 60].

Cotoneaster suavis **Pojark.**

References to taxsonomy: [4, 5, 7, 8, 23];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [60];

● ***Crataegus caucasica*** **K. Koch**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [15, 22, 23, 32, 61].

Crataegus pseudoheterophylla **Pojark.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [22, 23, 32, 61].

Cydonia oblonga **Mill.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [15, 22, 23, 26, 62, 63].

Dasiphora fruticosa **(L.) Rydb** (*Potentilla fruticosa* L.)

References to taxsonomy: [4-7];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [32, 34];

○ ***Prunus georgica*** **(Desf.) Eisenman** (*Amygdalus georgica* Desf.; *Prunus tenella* Batsch)

References to taxsonomy: [5, 7, 65];

IUCN red list category and criteria: NT;

Assessment argumentation: the species assessment data are approximate to VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [17, 24, 66-69].

***Prunus microcarpa* C.A. Mey.** [*Cerasus microcarpa* (C.A. Mey.) Boiss.]

References to taxsonomy: [5-8];

IUCN red list category and criteria: NT;

Assessment argumentation: the species assessment data are approximate to VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [14, 15, 17, 50, 70, 71].

● ***Pyrus eldarica* Grossh.**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [72];

● ***Pyrus fedorovii* Kuth.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: EN B1ab (iii, v);

Assessment argumentation: extent of occurrence – 529 km², area of occupancy – < 500 km², area – fragmented, number of area fragments – 4, decline in habitat quality caused by land use and grazing;

References used in species assessment: [22, 23, 72, 73].

● ***Pyrus georgica* Kuth.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [15, 22, 23, 32, 73, 72].

● ***Pyrus ketzkhovelii* Kuth.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: CR B2ab (iii);

Assessment argumentation: extent of occurrence – <100 km², area of occupancy – <10km², number of area fragments – 1, decline in habitat quality caused by land use and grazing;

References used in species assessment: [22, 23, 72, 74, 75].

● ***Rosa buschiana* Chrshan.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: NT;

Assessment argumentation: EOO – 1912 km², AOO – 32 km², area – fragmented, number of area fragments – 8; the species assessment data are approximate to VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [58, 59, 75-77].

● ***Rosa didoensis* Boiss.**

References to taxsonomy: [4, 5];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [58, 59, 76, 77].

○ ***Rosa doluchanovii* Manden.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: NT;

Assessment argumentation: AOO – < 20 km², the species assessment data are approximate to

VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [54, 75-77].

○ ***Rosa ermanica* Manden.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [76, 77];

Endemism: endemic of Georgia.

● ***Rosa galushkoi* Demurova**

References to taxsonomy: [4-8];

IUCN red list category and criteria: EN D;

Assessment argumentation: EOO – 0,355 km²,

number of area fragments – 1;

References used in species assessment: [58, 59, 76, 77].

○ ***Rosa irysthonica* Manden.**

References to taxsonomy: [4-7];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [76, 77].

***Rosa majalis* Herrm.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [77].

● ***Rosa marschalliana* Sosn.**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: NT;

Assessment argumentation: the species assessment data are approximate to VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [58, 76, 77].

● ***Rosa ossethica* Manden.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [26, 76, 77].

● ***Rosa prilipkoana* Sosn.**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: NT;

Assessment argumentation: the species assessment data are approximate to VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [76, 77].

***Rosa rapinii* Boiss. & Balansa**

References to taxsonomy: [4, 5, 7, 8];

IUCN red list category and criteria: VU D2;

Assessment argumentation: AOO – 8 km², area – fragmented, number of area fragments – 2, decline in habitat quality, caused by land use and grazing;

References used in species assessment: [32, 75-77].

● ***Rosa sosnovskyana* Tamamsch.**

References to taxsonomy: [4, 5];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [77]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

○ ***Rosa transcaucasica* Manden.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: NT;

Assessment argumentation: the species assessment data are approximate to VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [32, 75-77].

● ***Rosa tuschetica* Boiss.**

References to taxsonomy: [4, 5, 8, 12];

IUCN red list category and criteria: NT;

Assessment argumentation: EOO – 2672 km², AOO – 40 km², area – fragmented, number of area fragments – 4, the species assessment data are approximate to VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [59, 75-77].

● ***Rosa uniflora* Galushko**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [77].

○ ***Rubus abchaziensis*** **Sudre**

References to taxsonomy: [4, 5, 7];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus adscharicus*** **Sanadze**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [27, 78].

Rubus canescens **DC.**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78];

● ***Rubus cartalinicus*** **Juz.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78];

● ***Rubus caucasigenus*** **(Sudre) Juz.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus charadzeae*** **Sanadze**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus cyri*** **Juz.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus discernendus*** **Sudre**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

● ***Rubus dolichocarpus*** **Juz.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

● ***Rubus georgicus*** **Focke**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

● ***Rubus ibericus*** **Juz.**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient

(unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [22, 23, 78].

○ ***Rubus juzepczukii*** **Sanadze**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus kacheticus*** **Sanadze**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus ketzkhovelii*** **Sanadze**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus kudagorensis*** **Sanadze**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus lepidulus*** **(Sudre) Juz.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

● ***Rubus leptostemon*** **Juz.**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus longipetiolatus*** **Sanadze**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus miszczenkoi*** **Juz.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus moschus*** **Juz.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus nakeralicus*** **Sanadze**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in

quality of habitat etc.);

References used in species assessment: [26, 78].

○ ***Rubus ochthodes* Juz.**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus ossicus* Juz.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

● ***Rubus piceetorum* Juz.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

○ ***Rubus platyphylloides* Sanadze**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [26, 78].

● ***Rubus platyphyllos* K. Koch**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [26, 58, 78].

○ ***Rubus woronowii* (Sudre) Sudre** (*Rubus apiculatus* **var.** *woronowii* **Sudre)**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [78].

● ***Sorbus buschiana* Zinserl.**

References to taxsonomy: [4-5];

IUCN red list category and criteria: NT;

Assessment argumentation: the species assessment data are approximate to VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [58, 59, 79]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

● ***Sorbus caucasica* Zinserl.**

References to taxsonomy: [4, 5, 34];

IUCN red list category and criteria: CR B2 ab (iv);

Assessment argumentation: extent of occurrence – <100 km², area of occupancy – <10 km², number of area fragments – 1;

References used in species assessment: [26, 32, 54, 58, 75, 79].

○ ***Sorbus fedorovii* Zaik.**

References to taxsonomy: [4, 5];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [27, 54, 63, 79].

● ***Sorbus hajastana* Gabrieljan**

References to taxsonomy: [4-8];

IUCN red list category and criteria: CR B1ab(iii)+2ab(iii); CR D;

Assessment argumentation: extent of occurrence – <100 km², area of occupancy – 4 km², number of area fragments – 1, decline in habitat quality, caused by cutting and grazing;

References used in species assessment: [59]; the herbarium specimens preserved in the National Herbarium of Georgia (TBI).

***Sorbus turcica* Zinserl.** [*Aria umbellata* (Desf.) Sennikov & Kurtto]

References to taxsonomy: [4-6, 10, 23, 34, 65];

IUCN red list category and criteria: DD;

Assessment argumentation: data deficient (unknown extent of occurrence, area of occupancy, the number of mature individuals and the tendency of their decline in numbers, continuing decline in quality of habitat etc.);

References used in species assessment: [79].

● ***Sorbus velutina* (Albov) Schneid.** (*Sorbus aria* var. *velutina* Albov)

References to taxsonomy: [4, 5];

IUCN red list category and criteria: NT;

Assessment argumentation: the species assessment data are approximate to VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [79].

SALICACEAE

○ ***Salix kikodseae* Goerz**

References to taxsonomy: [4-6, 8];

IUCN red list category and criteria: EN B1ab (iii) + 2ab (iii);

Assessment argumentation: EOO – <5000 km², AOO – <500 km²; the species is assessed based on Solomon & al., 2013 [12];

References used in species assessment: [12, 80].

● ***Salix kuznetzowii* Laksch. ex Goerz**

References to taxsonomy: [4-8];

IUCN red list category and criteria: NT;

Assessment argumentation: the species is assessed based on Solomon & al., 2013 [12];

References used in species assessment: [12, 58, 59, 80].

● ***Salix wilhelmsiana* M. Bieb.**

References to taxsonomy: [4-8];

IUCN red list category and criteria: NT;

Assessment argumentation: the species assessment data are approximate to VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [14, 15, 22, 23, 26, 80].

VITACEAE

***Vitis sylvestris* C.C.Gmell.** [*Vitis vinifera* subsp. *sylvestris* (C.C.Gmel.) Hegi]

References to taxsonomy: [22, 23, 4];

IUCN red list category and criteria: NT;

Assessment argumentation: the species assessment data are approximate to VU category parameters and/or likely to be close to it in the future;

References used in species assessment: [14, 15, 22, 23, 32, 81].

Conclusion

Rare and endangered shrubs of the flora of Georgia have been evinced. Their checklist, provided in the article, includes 100 species. Regional (Georgia) assessment was carried out for each species according to IUCN categories and criteria. In particular, 8 species were assessed as critically endangered (CR), 6 as endangered (EN), 11 as vulnerable (VU), and 17 as near threatened (NT). Due to the lack of data, 58 species could not be evaluated and at this stage they were assessed as data definicient (DD). Most of these species are narrow endemics of Georgia and the Caucasus.

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