

### Endemic, rare or protected cormophytes from Neagra Broștenilor basin (Eastern Carpathians)

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**Abstract.** The paper reports 68 species of endemic, rare or protected at national and international levels cormophytes identified in the natural ecosystems from Neagra Broștenilor river basin. For each species are presented: distribution in this area, habitat type where the species has been recorded, sozological category (according to Romanian Red List of Cormophyte Species, Romanian Red Book of Vascular Plants and Global Red List) and the protection status (according to Habitats Directive 92/43/EEC and Government Urgently Decree 57/2007).

**Key Words:** cormophytes, endemic, rare, protected, Neagra Broștenilor.

**Résumé.** L'oeuvre présente 68 espèces de plantes vasculaires endémiques, rares ou protégées à niveau national et international identifiés en écosystèmes naturels de bassin de Neagra Brosteni. Pour chaque espèce sont présentés: la distribution dans cette zone, le type d'habitat où l'espèce a été identifiée, la catégorie zoologique (conformément Liste Rouge de Plantes Vasculaires de la Roumanie, Livre Rouge des Plantes Vasculaires de la Roumanie et Liste Rouge Mondiale) et le niveau de protection (conformément Directive Habitat 92/43/EEC et Ordonnance d'Urgence 57/2007).

**Key Words:** plantes vasculaires, endémiques, rare, protégées, Neagra Broștenilor.

**Rezumat.** Lucrarea prezintă 68 specii de cormofite endemice, rare sau protejate la nivel național și internațional identificate în ecosistemele naturale din bazinul Negrei Broștenilor. Pentru fiecare specie sunt prezentate: distribuția în această zonă, tipul de habitat în care specia a fost identificată, categoria zoologică (conform Listei Roșii a Plantelor Superioare din România, Cărții Roșii a Plantelor Vasculare din România și Listei Roșii Globale) și nivelul de protecție (conform Directivei Habitate 92/43/EEC și Ordonanței de Urgență 57/2007).

**Cuvinte cheie:** cormofite, endemice, rare, protejate, Neagra Broștenilor.

**Introduction.** Neagra Broșteni represents an important tributary for Bistrița river. Its hydrographic basin (approximately 350 km<sup>2</sup>) includes a part of the eastern slopes of Călimani Mountains, Drăgoiasa depression and the middle region of Bistrița Mountains (Fig. 1.b). The relief (maximum altitude in Izvorul Călimanului peak - 2033 m and minimum altitude at Broșteni town - 627 m), geological substratum (eruptive in the west and the crystalline in east), soils (brown-acid soils, spodosols and litho-soils) and climate characteristics have generated great natural habitats diversity, characterized by diverse vegetation types. In this territory we have identified numerous endemic or rare cormophytes. We have chosen these types of taxa because the endemic species are restricted to a specific area, and could be defined as the exclusive biodiversity of a region. An area of endemism contains taxa found nowhere else and could be catalogued as irreplaceable and of high priority for conservation (Kerr 1997). Other species are included in National Red Lists, Red Book of Vascular plants from Romania or in European Directives on the conservation of wild flora and Global Red List and are also very important for the future conservation programs.

**Material and Method.** Identification of endemic, rare or protected cormophytes has been realized during the elaboration of the complete inventory of vascular flora from Neagra Broștenilor river basin (2005-2009). Nomenclature of species is adopted

according to V. Ciocârlan, Flora R.P.R. – R.S.R. and Flora Europaea. For each species we present:

- Distribution in Neagra Brostenilor river basin;
- Habitat type where the species has been recorded (sensu Habitats Directive 92/43/EEC); the asterisk '\*' indicates priority habitat types. In order to present the natural habitats where species occurs, very helpful have been the prestigious papers referring to natural habitats from Romania elaborated by Doniță N., Paucă-Comănescu M., Popescu A., Mihăilescu S. & Biriş I. A., 2005 and Gaftă D. & Mountford J. O., 2008.
- Sozological category of species: presents the threatening degree at national or global levels: National threatened – Romanian Red List (RRL), Romanian Red Book of Vascular Plants (RRB), Global threatened – Global Red List (GRL):
  - Oltean M., Negrean G., Popescu A., Roman N., Dihoru G., Sanda V., Mihăilescu Simona, 1994: E (endangered), V (vulnerable), R (rare), V/R (vulnerable and rare), I (indeterminate; undetermined), nt (not threatened);
  - Dihoru et Negrean 2009: NE (not evaluated), DD (data deficient), LC (least concern), NT (near threatened), VU (vulnerable), EN (endangered), CR (critically endangered);
  - Global Red List 2009: NE (not evaluated), DD (data deficient), LC (least concern), NT (near threatened), VU (vulnerable), EN (endangered), CR (critically endangered).
- Protection status according to Habitats Directive 92/43/EEC (HD: app. I - natural habitat types of community interest whose conservation requires the designation of special areas of conservation, app. 2b – plant species of community interest whose conservation requires the designation of special areas of conservation, app. 5b - plant species of community interest whose taking in the wild and exploitation may be subject to management measures) and Government Urgently Decree no. 57/20 june 2007 concerning the regime of the natural protected areas, conservation of natural habitats and wild flora and fauna (OUG 57/2007: app. 3b - plant species of community interest whose conservation requires the designation of special areas of conservation, 4b - plant species of community interest requiring strict protection, 5b - plant species of community interest whose taking in the wild and exploitation may be subject to management measures).

In literature are reported also other species, but this paper includes only the species found by us during field research.

## Results and Discussion

### Endemic species

*Aconitum moldavicum* (Hacquet, 1790)

Distribution in Neagra Brostenilor river basin: Broșteni, Dârmoxa and Neagra Broșteni.

Habitat type where the species has been recorded: 9180\* *Tilio-Acerion* forests of slopes, screes and ravines.

Status: RRL: -; RRB: -; GRL: -.

*Campanula carpatica* (Jacquin, 1770) (Fig. 1. g)

Distribution in Neagra Brostenilor river basin: Broșteni, Neagra Broșteni, Dârmoxa, Bradului rivulet and Drăgoiasa.

Habitat type where the species has been recorded: 8210 Calcareous rocky slopes with chasmophytic vegetation.

Status: RRL: R; RRB: -; GRL: -.

*Campanula rotundifolia* (Linnaeus, 1753) ssp. *polymorpha* (Witasek, 1906) (Fig. 1.f)

Distribution in Neagra Brostenilor river basin: Căliman Cerbuc.

Habitat type where the species has been recorded: 6230\* Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and sub-mountain areas, in Continental Europe).

Status: RRL: -; RRB: -; GRL: -.

*Campanula serrata* [(Kitaibel) Hendrych, 1962]

Distribution in Neagra Brostenilor river basin: Cristișor, Broșteni, Neagra Broșteni, Drăgoiasa, Păltiniș, Căliman Cerbuc, Căliman Izvor and Budacu.

Habitat type where the species has been recorded: 6230\* Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and sub-mountain areas, in Continental Europe).

Status: RRL: -; RRB: -; GRL: -.

Protection: HD: app. IIb, app. IVb; OUG 57/2007: app. 3.

*Chrysosplenium alpinum* (Schur, 1859)

Distribution in Neagra Brostenilor river basin: Căliman Cerbuc.

Habitat type where the species has been recorded: 3220 Alpine rivers and the herbaceous vegetation along their banks.

Status: RRL: R; RRB: -; GRL: -.

*Dentaria glandulosa* (Waldstein et Kitaibel, 1801)

Distribution in Neagra Brostenilor river basin: Neagra Broșteni and Budacu.

Habitat type where the species has been recorded: 9180\* *Tilio-Acerion* forests of slopes, screes and ravines.

Status: RRL: -; RRB: -; GRL: -.

*Dianthus tenuifolius* (Schur, 1859)

Distribution in Neagra Brostenilor river basin: Broșteni, Neagra Broșteni, Izvorul Călimanului, Ortoiuța rivulet and Drăgoiasa.

Habitat type where the species has been recorded: 8210 Calcareous rocky slopes with chasmophytic vegetation.

Status: RRL: nt; RRB: -; GRL: -.

*Hepatica transsilvanica* (Fuss, 1848)

Distribution in Neagra Brostenilor river basin: Grințieș.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

Status: RRL: nt; RRB: -; GRL: -.

*Heracleum palmatum* (Baumgarten, 1816)

Distribution in Neagra Brostenilor river basin: Cristișor.

Habitat type where the species has been recorded: 6430 Hydrophilous tall-herb fringe communities of plains and of the montane to alpine levels.

Status: RRL: nt; RRB: -; GRL: -.

*Hieracium pojoritense* (Woloszczak, 1904)

Distribution in Neagra Brostenilor river basin: Neagra Broșteni.

Habitat type where the species has been recorded: 8210 Calcareous rocky slopes with chasmophytic vegetation.

Status: RRL: R; RRB: -; GRL: -.

*Melampyrum saxosum* (Baumgarten, 1816)

Distribution in Neagra Brostenilor river basin: Păltiniș, Broșteni, Căliman Cerbuc, Drăgoiasa and Budacu.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

Status: RRL: R; RRB: -; GRL: -.

*Phyteuma tetramerum* (Schur, 1859)

Distribution in Neagra Brostenilor river basin: Neagra Broșteni, Păltiniș, Căliman Izvor.

Habitat type where the species has been recorded: 6520 Mountain hay meadows.

Status: RRL: R; RRB: -; GRL: -.

*Poa rehmannii* [(Ascherson et Graebner) Woloszczak, 1904]

Distribution in Neagra Brostenilor river basin: Dârmoxa.

Habitat type where the species has been recorded: 8210 Calcareous rocky slopes with chasmophytic vegetation.

Status: RRL: R; RRB: VU; GRL: -.

*Primula elatior* [(Linnaeus) Grufberg, 1754] ssp. *leucophylla* (Pax, 1897)

Distribution in Neagra Brostenilor river basin: Neagra Broșteni.

Habitat type where the species has been recorded: 6520 Mountain hay meadows.

Status: RRL: R; RRB: -; GRL: -.

*Sesleria heufflerana* (Schur, 1853)

Distribution in Neagra Brostenilor river basin: Neagra Broșteni.

Habitat type where the species has been recorded: 8210 Calcareous rocky slopes with chasmophytic vegetation.

Status: RRL: -; RRB: -; GRL: -.

*Silene nutans* (Linnaeus, 1753) ssp. *dubia* [(Herbich) Zapalowicz, 1889)

Distribution in Neagra Brostenilor river basin: Stânii rivulet, Drăgoiasa, Budacu and Neagra Broșteni.

Habitat type where the species has been recorded: 8220 Siliceous rocky slopes with chasmophytic vegetation.

Status: RRL: R; RRB: -; GRL: -.

*Symphytum cordatum* (Waldstein et Kitaibel, 1802)

Distribution in Neagra Brostenilor river basin: Neagra Broșteni and Cristișor.

Habitat type where the species has been recorded: 6430 Hydrophilous tall-herb fringe communities of plains and of the montane to alpine levels.

Status: RRL: -; RRB: -; GRL: -.

**Rare and vulnerable species included in RRL (1994)**

*Abies alba* (Miller, 1768)

Distribution in Neagra Brostenilor river basin: Broșteni, Bradului rivulet, Budacu, Neagra Broșteni, Drăgoiasa, Grintieș, Căliman Cerbuc.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

Status: RRL: E; RRB: -; GRL: LC.

*Andromeda polifolia* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Drăgoiasa and Cristișor.

Habitat type where the species has been recorded: 91D0\* Bog woodland.

Status: RRL: R; RRB: -; GRL: -.

*Angelica archangelica* (Linnaeus, 1753) (Fig. 1. d)

Distribution in Neagra Brostenilor river basin: Drăgoiasa.

Habitat type where the species has been recorded: 6430 Hydrophilous tall-herb fringe communities of plains and of the montane to alpine levels.

Status: RRL: V; RRB: -; GRL: -.

*Arnica montana* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Broșteni, Călimanului Izvor, Păltiniș, Cristișor, Budacu, Neagra Broșteni, Glodu and Dârmoxa.

Habitat type where the species has been recorded: 6230\* Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and sub-mountain areas, in Continental Europe).

Status: RRL: V; RRB: -; GRL: -.

Protection: DH: app. Vb.; OUG 57/2007: app. 5A.

*Avenula planiculmis* [(Schrader) Sauer et Chmelitschek, 1976)

Distribution in Neagra Brostenilor river basin: Neagra Broșteni.

Habitat type where the species has been recorded: 6520 Mountain hay meadows.

Status: RRL: R; RRB: -; GRL: -.

*Carex alba* (Scopoli, 1772)

Distribution in Neagra Brostenilor river basin: Bradului rivulet, Păltiniș.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

Status: RRL: R; RRB: -; GRL: -.

*Carex chordorrhiza* (Ehrhart, 1781)

Distribution in Neagra Brostenilor river basin: Drăgoiasa.

Habitat type where the species has been recorded: 7140 Transition mires and quaking bogs.

Status: RRL: R; RRB: CR; GRL: -.

Protection: OUG 57/2007: app. 4B.

*Cimicifuga europaea* (Schipczinchi, 1937)

Distribution in Neagra Brostenilor river basin: Neagra Broșteni.

Habitat type where the species has been recorded: 91E0\* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).

Status: RRL: R; RRB: -; GRL: -.

*Comarum palustre* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Drăgoiasa.

Habitat type where the species has been recorded: 7140 Transition mires and quaking bogs.

Status: RRL: R; RRB: -; GRL: -.

*Corralorhiza trifida* (Chatelain, 1760)

Distribution in Neagra Brostenilor river basin: Căliman Cerbuc.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

Status: RRL: R; RRB: -; GRL: -.

*Corydalis capnoides* [(Linnaeus) Person, 1819]

Distribution in Neagra Brostenilor river basin: Neagra Broșteni.

Habitat type where the species has been recorded: 9180\* *Tilio-Acerion* forests of slopes, screes and ravines.

Status: RRL: R; RRB: -; GRL: -.

*Dactylorhiza latifolia* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Budacu.

Habitat type where the species has been recorded: 6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*).

Status: RRL: R; RRB: -; GRL: -.

*Dactylorhiza maculata* [(Linnaeus) Soó, 1960]

Distribution in Neagra Brostenilor river basin: Păltiniș, Neagra Broșteni, Cristișor, Drăgoiasa, Broșteni and Budacu.

Habitat type where the species has been recorded: 6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*).

Status: RRL: R; RRB: -; GRL: -.

*Dianthus barbatus* (Linnaeus, 1753) ssp. *compactus* [(Kitaibel) Heuffel, 1858]

Distribution in Neagra Brostenilor river basin: Păltiniș, Căliman Izvor and Dârmoxa.

Habitat type where the species has been recorded: 6230\* Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and sub-mountain areas, in Continental Europe).

Status: RRL: R; RRB: -; GRL: -.

*Drosera rotundifolia* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Drăgoiasa.

Habitat type where the species has been recorded: 91D0\* Bog woodland.

Status: RRL: R; RRB: -; GRL: -.

*Empetrum nigrum* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Căliman Cerbuc.

Habitat type where the species has been recorded: 4060 Alpine and Boreal heaths.

Status: RRL: R; RRB: -; GRL: -.

*Epipactis atrorubens* [Hoffmann) Besser, 1814]

Distribution in Neagra Brostenilor river basin: Drăgoiasa.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

Status: RRL: R; RRB: -; GRL: -.

*Epipogium aphyllum* (Swartz, 1814)

Distribution in Neagra Brostenilor river basin: Dârmoxa.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

Status: RRL: R; RRB: -; GRL: -.

*Erythronium nigrum* (Marschall von Bieberstein, 1819) (Fig. 1. c)

Distribution in Neagra Brostenilor river basin: Cristișor.

Habitat type where the species has been recorded: 91E0\* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).

Status: RRL: R; RRB: -; GRL: -.

*Galanthus nivalis* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Neagra Broșteni.

Habitat type where the species has been recorded: 9180\* *Tilio-Acerion* forests of slopes, screes and ravines.

Status: RRL: nt; RRB: -; GRL: -.

Protection: DH: app. Vb; OUG 57/2007 app. 5A.

*Gentiana acaulis* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Păltiniș, Căliman Izvor and Budacu.

Habitat type where the species has been recorded: 6150 Siliceous alpine and boreal grasslands.

Status: RRL: R; RRB: -; GRL: -.

*Gentiana punctata* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Căliman Cerbuc.

Habitat type where the species has been recorded: 6150 Siliceous alpine and boreal grasslands.

Status: RRL: R; RRB: -; GRL: -.

*Goodyera repens* [Linnaeus] Brown, 1813]

Distribution in Neagra Brostenilor river basin: Neagra Broșteni.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

Status: RRL: R; RRB: -; GRL: -.

*Gymnadenia conopsea* [(Linnaeus) R. Brown, 1813]

Distribution in Neagra Brostenilor river basin: Broșteni, Păltiniș, Căliman Cerbuc, Drăgoiasa and Neagra Broșteni.

Habitat type where the species has been recorded: 6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*).

Status: RRL: R; RRB: -; GRL: -.

*Ligularia sibirica* [(Linnaeus) Cassini, 1823]

Distribution in Neagra Brostenilor river basin: Drăgoiasa and Cristișor.

Habitat type where the species has been recorded: 7140 Transition mires and quaking bogs.

Status: RRL: R; RRB: -; GRL: -.

Protection: HD: app. IIb; OUG 57/2007: app. 3.

*Menyanthes trifoliata* (Linnaeus, 1753) (Fig. 1. i)

Distribution in Neagra Brostenilor river basin: Drăgoiasa.

Habitat type where the species has been recorded: 7140 Transition mires and quaking bogs.

Status: RRL: R; RRB: -; GRL: -.

*Neottia nidus-avis* [(Linnaeus) L.C.M. Richard, 1818]

Distribution in Neagra Brostenilor river basin: Budacu.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

Status: RRL: R; RRB: -; GRL: -.

*Oxycoccus palustris* (Person, 1805)

Distribution in Neagra Brostenilor river basin: Drăgoiasa, Cristișor.

Habitat type where the species has been recorded: 91D0\* Bog woodland.

Status: RRL: R; RRB: -; GRL: -.

*Pedicularis sceptrum-carolinum* (Linnaeus, 1753) (Fig. 1. j)

Distribution in Neagra Brostenilor river basin: Drăgoiasa.

Habitat type where the species has been recorded: 7140 Transition mires and quaking bogs.

Status: RRL: V/R; RRB: CR; GRL: -.

*Pinus sylvestris* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Neagra Broșteni, Drăgoiasa, Grintieș and Ortoiuș rivulet.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*), 91Q0 South-East Carpathians acidiphilous forests of Scottish Pine (*Pinus sylvestris*) (Oprea A., Sârbu I., 2009).

Status: RRL: R; RRB: -; GRL: LC.

*Platanthera bifolia* [(Linnaeus) L.C.M. Richard, 1818]

Distribution in Neagra Brostenilor river basin: Budacu, Drăgoiasa and Ortoaia rivulet.

Habitat type where the species has been recorded: 91E0\* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).

Status: RRL: R; RRB: -; GRL: -.

*Rhododendron myrtifolium* (Schott et Kotsky, 1854) (Fig. 1. h)

Distribution in Neagra Brostenilor river basin: Căliman Izvor and Căliman Cerbuc.

Habitat type where the species has been recorded: 4070\* Bushes with *Pinus mugo* and *Rhododendron hirsutum* (*Mugo-Rhododendretum hirsuti*).

Status: RRL: V; RRB: -; GRL: -.

*Salix aurita* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Drăgoiasa, Cristișor.

Habitat type where the species has been recorded: 91E0\* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).

Status: RRL: R; RRB: -; GRL: -.

*Sempervivum montanum* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Grintieș.

Habitat type where the species has been recorded: 8220 Siliceous rocky slopes with chasmophytic vegetation.

Status: RRL: R; RRB: -; GRL: -.

*Spiraea salicifolia* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Drăgoiasa.

Habitat type where the species has been recorded: 91D0\* Bog woodland.

Status: RRL: R; RRB: -; GRL: -.

*Streptopus amplexifolius* [(Linnaeus) De Candolle, 1805)

Distribution in Neagra Brostenilor river basin: Broșteni, Bradului rivulet, Cristișor, Neagra Broșteni, Păltiniș and Drăgoiasa.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

Status: RRL: R; RRB: -; GRL: -.

*Trifolium spadiceum* (Linnaeus f., 1755)

Distribution in Neagra Brostenilor river basin: Păltiniș and Drăgoiasa.

Habitat type where the species has been recorded: 6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*).

Status: RRL: R; RRB: -; GRL: -.

*Trollius europaeus* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Drăgoiasa, Broșteni, Păltiniș, Cristișor, Căliman Cerbuc, Neagra Broșteni and Glodu.

Habitat type where the species has been recorded: 6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*).

Status: RRL: R; RRB: -; GRL: -.

*Typha shuttleworthii* (Koch et Sonder, 1844) (Fig. 1. k)

Distribution in Neagra Brostenilor river basin: Neagra Broșteni, Arsurii rivulet and Cristișor.

Habitat type where the species has been recorded: 6430 Hydrophilous tall-herb fringe communities of plains and of the montane to alpine levels.

Status: RRL: V/R; RRB: -; GRL: -.

*Vaccinium uliginosum* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Drăgoiasa, Broșteni.

Habitat type where the species has been recorded: 91D0\* Bog woodland.

Status: RRL: R; RRB: -; GRL: -.

Protection: OUG 57/2007: app. 4B.

*Veronica baumgartenii* (Roemer et Schultes, 1817)

Distribution in Neagra Brostenilor river basin: Căliman Cerbuc.

Habitat type where the species has been recorded: 8220 Siliceous rocky slopes with chasmophytic vegetation.

Status: RRL: R; RRB: -; GRL: -.

*Veronica scardica* (Grisebach, 1844)

Distribution in Neagra Brostenilor river basin: Neagra Broșteni.

Habitat type where the species has been recorded: 6430 Hydrophilous tall-herb fringe communities of plains and of the montane to alpine levels.

Status: RRL: -; RRB: VU; GRL: -.

**Species included in GRL (2009) but not included in RRL (1994) or RRB (2009)**

*Alnus glutinosa* [(Linnaeus) Gaertner, 1791]

Distribution in Neagra Brostenilor river basin: Neagra Broșteni.

Habitat type where the species has been recorded: 91E0\* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).

Status: GRL: LC.

*Corylus avellana* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Broșteni, Pinului rivulet, Bradului rivulet, Cristișor, Budacu, Neagra Broșteni; Păltiniș; Dârmoxa and Drăgoiasa.

Habitat type where the species has been recorded: 9180\* *Tilio-Acerion* forests of slopes, screes and ravines, 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

Status: GRL: LC.

*Juniperus communis* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Broșteni, Căliman Izvor, Căliman Cerbuc, Drăgoiasa, Budacu, Grintieș and Glodu.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*), 4070\* Bushes with *Pinus mugo* and *Rhododendron hirsutum* (*Mugo-Rhododendretum hirsuti*).

Status: GRL: LC.

*Picea abies* [(Linnaeus) Karsten, 1880-1883]

Distribution in Neagra Brostenilor river basin: Broșteni, Cristișor, Drăgoiasa, Căliman Izvor, Căliman Cerbuc, Budacu, Neagra Broșteni, Glodu and Păltiniș.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

Status: GRL: LC.

*Pinus mugo* (Turra, 1790)

Distribution in Neagra Brostenilor river basin: Căliman Izvor and Căliman Cerbuc.

Habitat type where the species has been recorded: 4070\* Bushes with *Pinus mugo* and *Rhododendron hirsutum* (*Mugo-Rhododendretum hirsuti*).

Status: GRL: LC.

**Species protected by DH 92/43/EEC (1992) and OUG 57/2007 but not included in RRL (1994), RRB (2009) or GRL (2009)**

*Lycopodium alpinum* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Căliman Izvor.

Habitat type where the species has been recorded: 6150 Siliceous alpine and boreal grasslands.

*Lycopodium annotinum* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Dârmoxa, Grintieș, Cristișor, Căliman Cerbuc and Glodu.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

*Lycopodium clavatum* (Linnaeus, 1753)

Distribution in Neagra Brostenilor river basin: Cristișor, Călimanu Izvor, Căliman Cerbuc, Grintieș and Neagra Broșteni.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

*Lycopodium selago* (Linnaeus, 1753)

Distribution in Neagra Broștenilor river basin: Broșteni, Neagra Broșteni, Căliman Izvor, Căliman Cerbuc, Cristișor, Budacu, Grintieș, Neagra Broșteni, Păltiniș, Glodu and Bradului rivulet.

Habitat type where the species has been recorded: 9410 Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio-Piceetea*).

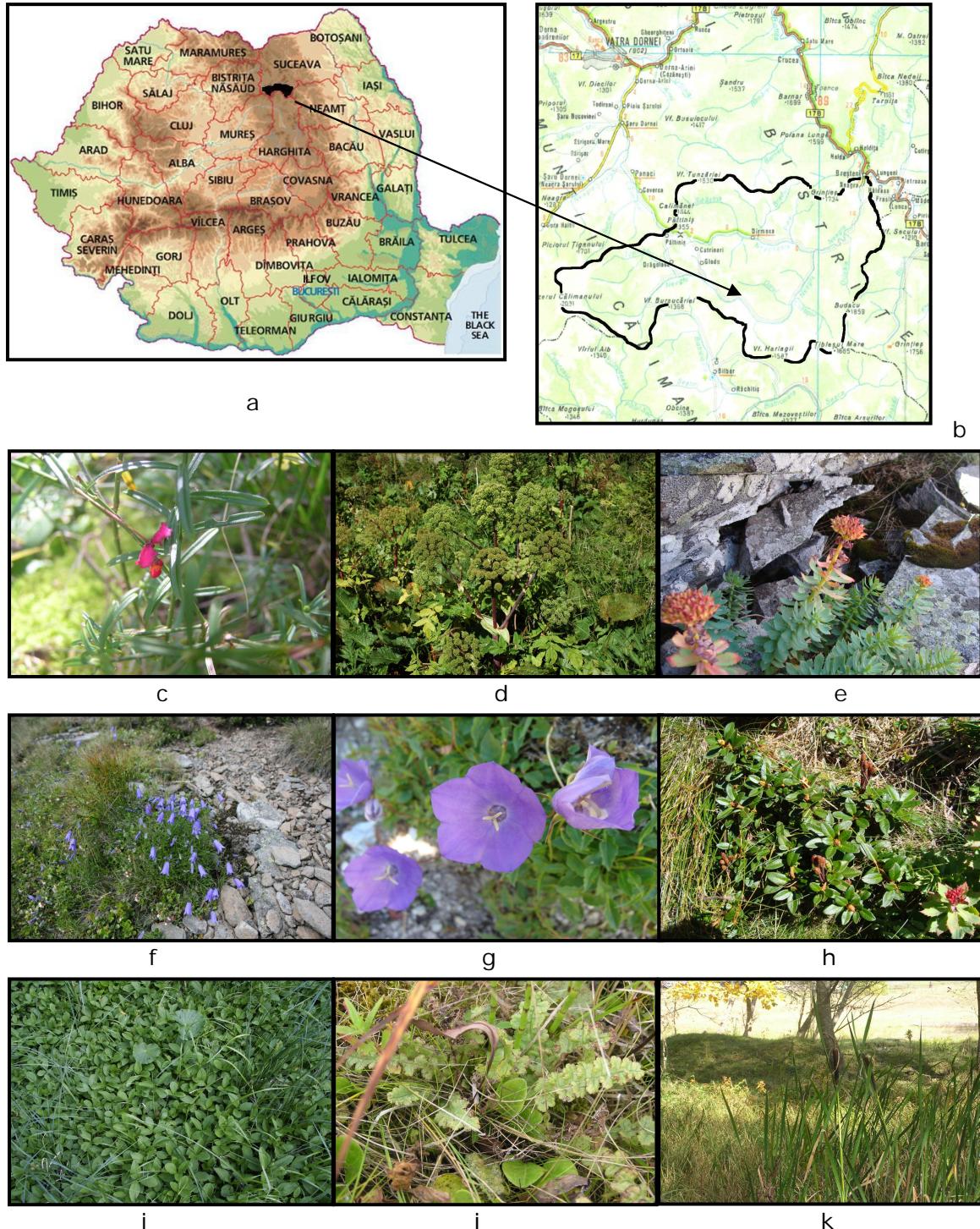


Fig. 1. Geographical position, the map of Neagra Broștenilor basin and some protected species: a - geographical position related to Romania's territory; b - map of Neagra Broștenilor basin (Dragomir et al 1981); c – *Evonymus nana*; d – *Angelica archangelica*, e – *Rhodiola rosea*; f – *Campanula rotundifolia* ssp. *polymorpha*; g – *Campanula carpatica*; h – *Rhododendron myrtifolium*; i – *Menyanthes trifoliata*; j – *Pedicularis sceptrum-carolinum*; k – *Typha shuttleworthii* (original).

**Conclusion.** The paper reports 68 species of endemic for Carpathians Mountains (17 taxa), rare or protected (51 taxa) cormophytes identified in the natural ecosystems from Neagra Broștenilor river basin. Some of these species are included in National Red Lists, Red Book of Vascular plants from Romania or in European Directives on the conservation of wild flora and Global Red List and are important for the future conservation programs.

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