

CHOROLOGICAL DATA ON SOME CORMOPHYTES FROM ARGEȘ COUNTY

Monica Neblea ^{1,*}, Mădălina Marian ¹, Adrian Alboteanu ¹, Valentin Oprea ¹

¹ University of Pitesti, Targu din Vale street, no. 1, Pitesti, Romania

Abstract

This paper presents some data on chorology of five rare and vulnerable cormophytes from Argeș County discovered in 2017 during field investigations as follows: Arnica montana L., Limodorum abortivum (L.) Sw., Anacamptis pyramidalis (L.) Rich., Anacamptis coriophora (L.) R. M. Bateman, Pridgeon & M. W. Chase, Orchis militaris L..

These species were characterized taking into account: natural habitats, zoological category, their distribution in Argeș County, floristic inventory of their habitat. The main pressures and threats which threaten their survival are: illegal deforestation, storage of waste, overgrazing, harvesting for scientific collection or decorative purposes. The conservation measures necessary for their long-term conservation include: monitoring of discovered populations, control of the touristic activities, monitoring of grazing and forestry activities, reintroduction in natural habitats of new plants obtained using in vitro micropropagation.

Keywords: Argeș County, chorology, cormophytes, Romania

1. INTRODUCTION

Although Argeș County holds only 2.9% of the country's surface (6801 km²), its geographic position, the diversity and harmony of the relief forms and its altitudinal amplitude, preserves 64% of Romania's cormoflora. There are 2009 plant species, belonging to 548 genres and 121 families in cormoflora of Argeș County (Alexiu, 2008).

There were mentioned about 309 taxa of different zoological categories that vegetate in Argeș County (Alexiu, 2011) representing 56.38 % of the total threatened cormophytes from Romania.

The cormoflora from Argeș County has been studied since 18th century. The floristic studies in Argeș County were realized especially in the mountain area by the most famous botanists such us: Joseph Lerchenfeld, Dimitrie Brândză, Dimitrie Grecescu, Friedrich Fronius, Lajos Simonkai, Michael Fuss, Ferdinand Schur, Heinrich Wilhelm Schott, Erasmus Julius Nyárády, Ioan Todor, George Grințescu, Karl Theodor Kotschy, Traian Ștefureac, Alexandru Buia, Gheorghe Dihoru, Gavril Negrean, Aurel Popescu, Vasile Sanda, Bibica Drăghici, Monica Boșcaiu etc. There have been realized monographies regarding flora and vegetation of Iezer-Păpușa Mountains, Piatra Craiului Mountains, Făgăraș Mountains, Leaota Mountains by Valeriu Alexiu, Simona Mihăilescu, Daniela Ileana Stancu, Monica Neblea.

In this paper we reported new locations in Argeș County for five rare and vulnerable cormophytes. We also mentioned the main pressures and threats with a significant impact on the conservation

status of these species. Only the adoption of appropriate conservation measures will ensure their long-term survival.

2. MATERIAL AND METHOD

The cormophytes presented in this paper were identified during the field investigations in 2017 in different types of natural habitats from Argeş County. The scientific names of the taxa have been validated according to Flora Europaea and Sârbu et al. (2013). The vouchers of the specimens were deposited in the Herbarium of the University of Pitesti.

Each species had been described taking into account: characteristic habitats, zoological status, distribution in Argeş County, floristic composition of its habitat, main pressures, threats and conservation measures.

These cormophytes were characterized on the basis of specialty papers (Mihăilescu, 2001; Sanda et al., 2001; Cristea et al., 2004; Doniță et al., 2005; Gafta et al., 2008; Sanda et al., 2008; Bâtea et al., 2014; Sămărghișan and Oroian, 2014; Mihăilescu et al., 2015).

3. RESULTS AND DISCUSSIONS

Arnica montana L. (mountain arnica) is a hemicryptophyte characteristic to meadows from inferior mountain level up to superior mountain level.

Characteristic habitats: 6230* Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and sub-mountain areas, in Continental Europe); 4030 European dry heaths; 6520 Mountain hay meadows.

Sozological status: Vulnerable - Oltean et al. (1994); Least Concern - Bilz et al. (2011), IUCN; Habitats Directive 92/43/CEE: Annex Vb; OUG 57/2007 (Law 49/2011): Annex 5 Ab.

Distribution in Argeş County (Alexiu, 2008): Piatra Craiului Mountains: Dâmbovicioara Gorges, Brusturet Gorges, Ghimbav Mountain: Cheia Gorges, Dâmbovița Great Gorges, Iezer-Păpușa Mountains: Colții lui Andrei Mari.

We have found this species near the Rucăr locality in a meadow to Crucii Peak (45°22'57.22835" N; 25°10'52.43991" E; altitude - 814 m) (figure 1).



Figure 1. *Arnica montana* L.

There was a population of *A. montana* with approximately 100 individuals/60 m², accompanied by the following species: *Briza media*, *Cirsium erisithales*, *Plantago media*, *Anthyllis vulneraria*, *Polygala comosa*, *Primula veris*, *Luzula luzuloides*, *Alchemilla xanthochlora*, *Lotus corniculatus*, *Carex pallescens*, *C. hirta*, *Linum catharticum*, *Medicago lupulina*, *Stellaria graminea*, *Dactylis*

glomerata, *Trifolium pratense*, *T. montanum*, *Ranunculus acris*, *Trollius europaeus*, *Helianthemum nummularium*, *Leucanthemum vulgare*, *Prunella vulgaris*, *Phyteuma tetramerum*, *Achillea millefolium*, *Anthoxanthum odoratum*, *Astrantia major*, *Scabiosa lucida*, *Carlina acaulis*, *Gentiana utriculosa*, *Neottia ovata*, *Gymnadenia conopsea* subsp. *densiflora*, *Arrhenatherum elatius*, *Traunsteinera globosa*, *Rhinanthus minor*, *Galium verum*, *Potentilla erecta*, *Thymus pulegioides*, *Colchicum autumnale*, *Pedicularis comosa*, *Knautia arvensis*, *Lychnis flos-cuculi*, *Hieracium aurantiacum*, *Campanula patula* subsp. *patula*, *Ajuga reptans*.

Pressures: The meadow where we found it is fenced, so we can consider the habitat somewhat protected, also taking into account that it is well maintained. The habitat is distinguished by a great floristic diversity and especially by well represented populations of orchids: *Listera ovata*, *Gymnadenia conopsea* subsp. *densiflora*, *Traunsteinera globosa*. Medicinal harvesting can be one of the pressures if the plant is known by locals. The reduced population size relative to the meadow surface (about 1000 m²) is a limiting factor.

Threats: abandoning the type of land use, as we have seen in other meadows, which are currently in afforestation stage; harvesting the plant for collections or for its use in therapy.

Conservation measures: population monitoring discovered near Rucăr, and possibly a repopulation of the habitat with *in vitro* specimens; removing tree saplings taking into account its location right next to the forest.

***Limodorum abortivum* (L.) Sw.** (violet limodore) is a species of orchids sporadically encountered in the flora of Romania, especially at the edge of the forest, but also in the xerophilic meadows.

Characteristic habitats: 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites); 6240* Sub-Pannonic steppic grasslands; 91 H0* Pannonian woods with *Quercus pubescens*.

Sozological status: Rare - Oltean et al. (1994); Least Concern - Bilz et al. (2011).

Distribution in Argeş County (Alexiu, 2008): Curtea de Argeş in Tarnița Forest.

The phytoindividuals of this species have been identified at the edge of the Trivale Forest as part of the *Quercetum robori-petraeae* Borza (1928) 1959 plant associations (44°51'08.70" N; 24°47'17.00" E; altitude - 440 m) (figure 2A). The floristic composition of the vegetal layer is made by other taxa as well: *Quercus petraea*, *Q. robur*, *Tanacetum corymbosum*, *Trifolium medium*, *Veronica officinalis*, *Cruciata laevipes*, *Cytisus hirsutus*, *Carpinus betulus*, *Crataegus monogyna*, *Poa nemoralis*, *Prunella vulgaris*, *Moehringia trinervia*, *Luzula sylvatica*, *Lathyrus vernus*, *L. pratensis*, *Festuca drymeja*, *Euphorbia amygdaloides*, *Aremonia agrimonoides*, *Melittis melissophyllum*, *Symphytum tuberosum*, *Anemone nemorosa*, *Ligustrum vulgare*, *Platanthera bifolia*, *Melica uniflora*, *Acer platanoides*, *Hedera helix*, *Hepatica nobilis*, *Dactylis glomerata*, *Sanicula europaea*, *Fagus sylvatica*.

Pressures: The characteristic habitat for *Limodorum abortivum* in Trivale Forest is near the County road 703 E that is very intense circulated especially by locals. We noticed also the storage of household waste at the edge of the forest. The populations with a few individuals could be a limiting factor.

Threats: uncontrolled forest exploitation; grazing in forest; removal of orchid for scientific collection purposes; the absence of fungi in the soil; storage of waste; lack of favorable microclimates; absence or diminishing of pollinators.

Conservation measures: There are necessary supplementary studies regarding life cycle, propagation and evaluation of the *Limodorum abortivum* populations from Trivale Forest.

***Anacamptis pyramidalis* (L.) Rich.** (pyramid anacamptis) is a xeromesophyte orchid that vegetates in plant associations from scrubs and meadows up to inferior mountain level.

Characteristic habitats: 62C0* Ponto-Sarmatic steppes; 6520 Mountain hay meadows.

Sozological status: Vulnerable - Oltean et al. (1994); Least Concern - Bilz et al. (2011).

Distribution in Argeş County (Alexiu, 2008): Mălureni Toplița.

We found this taxon in Ștefănești locality (44°52'29.18" N; 24°57'11.76" E; altitude - 370 m; 44°52'46.66" N; 24°57'11.20" E; altitude - 378 m; 44°52'35.11" N; 24°57'08.01" E; altitude - 361 m) represented by large populations (sometimes more than 50 individuals/50 m²) in meadows, orchards or even in abandoned vineyards (figure 2B).

The most common cormophytes that accompanied *Anacamptis pyramidalis* were: *Campanula persicifolia*, *Erigeron annuus*, *Dactylis glomerata*, *Cerastium pumilum*, *Geranium columbinum*, *Elymus caninus*, *E. hispidus*, *Arrhenatherum elatius*, *Festuca pratensis*, *F. arundinacea*, *Lathyrus nissolia*, *Peucedanum cervaria*, *Acinos arvensis*, *Dorycnium pentaphyllum*, *Salvia verticillata*, *S. glutinosa*, *Lotus corniculatus*, *Centaurea stoebe* subsp. *australis*, *Ranunculus repens*, *Valeriana officinalis*, *Mentha longifolia*, *Clematis vitalba*, *Plantago lanceolata*, *Achillea millefolium*, *Potentilla argentea*, *Trifolium repens*, *T. pratense*, *Coronilla varia*, *Hieracium pilosella*, *Rhinanthus minor*, *Sanguisorba minor*, *Fragaria viridis*, *Medicago lupulina*, *M. minima*, *Muscari comosum*, *Caucalis platycarpus*, *Buglossoides arvensis*.

Pressures: Intensification of grazing could have the negative impact for their long-term survival. The scrubs of *Rosa canina*, *Crataegus monogyna*, *Prunus spinosa* are well developed in some areas. *Erigeron annuus* was the most spreaded invasive species in meadows and a good competitor.

Threats: overgrazing; soil erosion; expanding of field crops; overuse of pesticides; the absence of fungi in the soil; absence or diminishing of pollinators; competition especially with invasive species; harvesting of orchids for decorative purpose.

Conservation measures: The populations with *A. pyramidalis* are in a good state of conservation in Ștefănești. There is necessary to reduce the use of pesticides in agriculture (most of the sites with *A. pyramidalis* are near the field crops) and control the pastoral activity.



Figure 2. A - *Limodorum abortivum* (L.) Sw.; B - *Anacamptis pyramidalis* (L.) Rich.

Anacamptis coriophora (L.) R. M. Bateman, Pridgeon & M. W. Chase (bug orchid) is a meso-hygrophilous orchid frequently encountered from plain up to inferior mountain level (figure 3A).

Characteristic habitats: 62C0* Ponto-Sarmatic steppes; 6520 Mountain hay meadows; 6440 Alluvial meadows of river valleys of the *Cnidion dubii*; 6240* Sub-Pannonic steppic grasslands; 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites).

Sozological status: Rare - Oltean et al. (1994); Least Concern - Bilz et al. (2011).

Distribution in Argeş County (Alexiu, 2008): Trivale Forest; Piatra Craiului Mountains.

This orchid has been identified on Crucii Peak (45°22'38.60" N; 25°10'50.43" E; altitude - 1010 m) in the coenotic ambiance of the plant grouping edified by *Arrhenatherum elatius* (*Arrhenatheretum elatioris* Br.-Bl. ex Scherrer 1925) together with: *Phyteuma tetramerum*, *Trifolium montanum*, *Leucanthemum vulgare*, *Colchicum autumnale*, *Pedicularis comosa*, *Briza media*, *Tragopogon dubius*, *Lotus corniculatus*, *Trollius europaeus*, *Prunella vulgaris*, *Stellaria graminea*, *Ranunculus acris*, *Primula veris*, *Neottia ovata*, *Anthoxanthum odoratum*, *Thymus pulegioides*, *Dactylis glomerata*, *Potentilla erecta*, *Polygala comosa*, *Hypericum maculatum*, *Hypochoeris uniflora*, *Plantago media*, *Galium verum*, *Dianthus tenuifolius*, *Carex pallescens*, *Silene nutans*, *Gentiana utriculosa*, *Scabiosa ochroleuca*, *Hieracium aurantiacum*, *Anacamptis morio*, *Gymnadenia conopsea* subsp. *densiflora*, *Knautia arvensis*, *Lychnis flos-cuculi*, *Euphrasia stricta*, *Campanula abietina*, *Luzula campestris*, *Filipendula vulgaris*, *Carum carvi*, *Cerastium fontanum*, *Rhinanthus minor*.

Pressures: The grazing with cattle and sheep had a moderate impact on floristic structure of vegetal layer in habitats with *A. coriophora*. The populations with a few individuals could be a limiting factor.

Threats: removal of orchid for scientific collection purposes; the absence of fungi in the soil; absence or diminishing of pollinators.

Conservation measures: The important conservation measures are monitoring the pastoral activities and reintroduction in natural habitats plants obtained using *in vitro* techniques.

***Orchis militaris* L.** is an orchid frequently spreaded in forests, meadows, up to mountain level (figure 3B).

Characteristic habitats: 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites); 91V0 Dacian beech forests (Symphyto-Fagion).

Sozological status: Rare - Oltean et al. (1994); Least Concern - Bilz et al. (2011).

Distribution in Argeş County (Alexiu, 2008): Ghimbav Mountain: Ghimbav Valley, Culmea Zacotelor, Câmpulung, Cânduşti on Plesnitoarea Mountain, Zăbava Mountain, Sturu Mountain, Boteni, Leordeni, Conţeşti on Râncăciuv Valley.

Both in Brusturet Gorges (45°28'59.35" N; 25°13'35.14" E; altitude - 1134 m) and in Rucăr (Crucii Peak; 45°22'43.30" N; 25°10'54.29" E; altitude - 1000 m) has been found sporadically *Orchis militaris* in scrubs, at the edge of the forest, accompanied by: *Astrantia major*, *Rhinanthus minor*, *Aegopodium podagraria*, *Melittis melissophyllum*, *Neottia ovata*, *Trifolium montanum*, *Lotus corniculatus*, *Polygala comosa*, *Rumex acetosa*, *Campanula patula* subsp. *patula*, *Laserpitium latifolium*, *Tragopogon dubius*, *Cruciata laevipes*, *Trollius europaeus*, *Phyteuma tetramerum*, *Dactylis glomerata*, *Prunella vulgaris*, *Fragaria vesca*, *Colchicum autumnale*, *Lathyrus pratensis*, *Briza media*, *Ranunculus acris*, *Crepis paludosa*, *Stellaria graminea*, *Carum carvi*, *Melampyrum bihariense*, *Anthyllis vulneraria*, *Carlina acaulis*.

Pressures: The forestry habitat with *O. militaris* is near the touristic route from Brusturet Challet to Grind Meadow. So, there is important to control the touristic activities by the rangers of Piatra

Craiului National Park to prevent the collection of this orchid. Both in Brusturet Gorges and Crucii Peak we identified small populations with few individuals of *O. militaris*.

Threats: uncontrolled forest exploitation; grazing in forest, removal of orchid for scientific collection purposes; uncontrolled tourism; the absence of fungi in the soil; absence or diminishing of pollinators.



Figure 3. A - *Anacamptis coriophora* (L.) R. M. Bateman, Pridgeon & M. W. Chase; B - *Orchis militaris* L.

Conservation measures: There are favorable environmental conditions of development and propagation for *O. militaris* in natural habitats both from Brusturet Gorges and Crucii Peak. It is important to maintain the genetic integrity of species using *in vitro* techniques for propagation.

4. CONCLUSIONS

We identified new locations in Argeş County for some species of cormophytes: Peak Crucii (*Arnica montana*, *Anacamptis coriophora*, *Orchis militaris*), Brusturet Gorges (*Orchis militaris*), Ştefăneşti (*Anacamptis pyramidalis*), Trivale Forest (*Limodorum abortivum*).

The main conservation measures necessary for long-term conservation of these species include: populations monitoring, control of the touristic activities, monitoring of grazing and forestry activities, reintroduction in natural habitats of new plants obtained using *in vitro* micropropagation.

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