

THE DISTRIBUTION AND STRUCTURE OF THE FOREST NATURA 2000 HABITATS FOUND IN THE SANATORIU AND ARSANCA FORESTS OF THE GOVORA RIVER BASIN

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ABSTRACT

The thematic area provided in this paper is situated in the Govora river basin, Vâlcea County. Within this study had been aimed the identification, description, diversity, ecological analysis and monitoring of the herbaceous and wooden plant communities, which belong to the Natura 2000 habitats and implicitly of the rare plant species, vulnerable, endemic within Sanatoriu and Arsanca Forest from the Govora river basin. In this area we identified the following plant communities: *Quercetum petraeae-cerris* Sóo (1957) 1969; *Carpino-Fagetum (sylvaticae) Paucă* 1941; *Scirpetum sylvatici Ralski* 1931 emend. Schwich 1944; *Petasitetum albae Dihoru* 1975; *Botriochloetum ischaemi* (Kristiansen 1937) Pop 1977, *Agrostietum stoloniferae (Ujvárosi* 1941) Burduja et al. 1956; *Calamagrostetum epigei Juraszek* 1928. According to the targets of this research, a very important place we gave to the complex studies of the habitats: 91M0 Pannonian-Balkan turkey oak sessile oak forests, 9170 *Galio-Carpinetum* oak-hornbeam forests; 91E0*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae); 6430 Hydrophilous tall-herb fringe communities of plains and of the montane to alpine levels; 6440 Alluvial meadows of river valleys of the *Cnidion dubii*; 6240*Sub-pannonic steppic grasslands; 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation; 3160 Natural Dystrophic Lakes and Ponds (Gaffa and Mountford coord, 2008). Considering the place where the studies had been located to, the eco-pedo-climatic conditions and the anthropic term exerted we have considered that is necessary to develop some ecological studies for the plants communities for this habitats from this area.

INTRODUCTION

The Sanatoriu Forest is situated in the Govora river basin, Vâlcea County. In this area we give an important attention of the identification, description, diversity, ecological analysis and monitoring of the wooden plant communities, which belong to the Natura 2000 habitats and implicitly of the rare plant species, vulnerable, endemic within Sanatoriu and Arsanca Forest from the Govora river basin. According to the targets of this studies, a very important place we give to the complex studies of the Natura 2000 habitats: 91M0 and 9170. In this area the habitat 91M0 is edified of the *Quercetum petraeae-cerris* Sóo (1957) 1969 plants community. The habitat 9170 is edified of the *Carici pilosae-Carpinetum* Neuhäusl et Neuhäuslova-Novotna 1964 plant community.

From a dendrological point of view in the Sanatoriu Forest predominates *Quercus petraea*, followed by beech *Fagus sylvatica*, with which it develops as companion species *Carpinus betulus*, *Tilia tomentosa*, *Quercus cerris*, *Fraxinus excelsior*, *Cerasus avium*,

Acer platanoides. In the Arsanca Forest, next to the species characteristic of the Sanatorium Forest, there are also isolated specimens of *Acer campestre* and *Sorbus torminalis*.

MATERIAL AND METHODS

Study area:

The thematic area provided in this paper is situated in the Govora river basin, in the Arsanca and Sanatoriu Forest, Vâlcea County (fig. 1).

The Sanatorium Forest occupies the Baracii Hill with the Rapa Arsa Peak and the Pietrisului Hill which are part of the great Govora Hills unit, the geomorphological unit being represented by slopes with low tilt to the sea, predominating the slopes with moderate inclination.

From a hydrological point of view, the Sanatorium Forest is crossed by several streams: Boalca, Bordee, Mondii and Turnil. In this forest there is also a pond characterized by a well-developed aquatic vegetation.

Arsanca Forest occupies the Ciocului Hill, the Bordei Hill, the Pican Hill, the Inalt hill and the Rarime hill. From a hydrological point of view, the Arsanca Forest is crossed by several streams: Salcia Roșie, Lupilor, Coserii, Drumul Tiganului.

The Arsanca Forest covers an area of 460.7 ha and consists of 12 land-use plots.

In this study we have used methods of phyto-sociologic research characteristic to the Central European phyto-sociologic School for the study of the plant communities. Considering the place where the study had been located to, the eco-pedo-climatic conditions and the anthropic term exerted we have considered that is necessary to develop some ecological studies for the plants communities from this area. Within this study had been aimed the identification, description, diversity, ecological analysis and monitoring of the herbaceous and wooden plant communities, which belong to the Natura 2000 habitats and implicitly of the rare plant species, vulnerable, endemic within Sanatoriu and Arsanca Forest from the Govora river basin.



Fig. 1. Sanatoriu Forest (foto M. Niculescu)

RESULTS AND DISCUSSIONS

Within this study had been aimed the identification, description, diversity, ecological analysis and monitoring of the herbaceous and wooden plant communities, which belong to the Natura 2000 habitats and implicitly of the rare plant species, vulnerable, endemic within Sanatoriu and Arsanca Forest from the Govora river basin.

In this area we identified the following plant communities: *Quercetum petraeae-cerris* Sóo (1957) 1969; *Carpino-Fagetum (sylvaticae)* Paucă 1941; *Scirpetum sylvatici* Ralski 1931 emend. Schwich 1944; *Petasitetum albae* Dihoru 1975; *Botriochloetum ischaemi* (Kristiansen 1937) Pop 1977, *Agrostietum stoloniferae* (Ujvárosi 1941) Burduja et al. 1956; *Calamagrostetum epigei* Juraszek 1928. According to the targets of this research, a very important place we gave to the complex studies of the habitats: 91M0 *Pannonian-Balkan turkey oak sessile oak forests*, 9170 *Galio-Carpinetum oak-hornbeam forests*; 91E0* *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*; 6430 *Hydrophilous tall-herb fringe communities of plains and of the montane to alpine levels*; 6440 *Alluvial meadows of river valleys of the Cnidion dubii*; 6240* *Sub pannonic steppic grasslands*; 3150 *Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation*; 3160 *Natural Dystrophic Lakes and Ponds* (Gafta and Mountford coord, 2008).

➤ 91E0* *Alluvial forests with Alnus*

glutinosa and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)

CLAS. PAL.: 44.3, 44.2 și 44.13

RO habitat type code: R4401, R4402, R4405, R4407, R4408

Within this priority habitat, the *Salicetum albae* Issler 1924 plant community has been identified. This habitat is found on small areas on the valleys of the two forests.

In the floristic composition of phytocoenosis are found with a high constancy the following species: *Populus nigra*, *Salix alba*, *S. fragilis*, *Ulmus glabra*, *Angelica sylvestris*, *C. remota*, *C. sylvatica*, *Cirsium oleraceum*, *Equisetum telmateia*, *Filipendula ulmaria*, *Lycopus europaeus*, *Lysimachia nemorum*, *Rumex sanguineus*, *Stellaria nemorum*, *Urtica dioica*.

The conservation status of this habitat is relatively good. The main pressures and threats are: household waste and grazing.

➤ 9170 *Galio-Carpinetum oak*

hornbeam forests

CLAS. PAL.: 41.261, 41.262

RO habitat type code: R4123, R4128

This habitat is the most widespread and important within the two forests. This habitat is edified by the following plant community - *Carici pilosae-Carpinetum* Neuhäusl et Neuhäuslova-Novotna 1964 (syn.: *Dentario bulbiferae-Quercetum petraeae* Resmeriță (1974) 1975, *Carici pilosae-Carpinetum* Chifu 1995, *Carici pilosae-Quercetum petraeae typicum* Sanda et Popescu 1999). In the floristic composition of phytocoenosis are found with a high constancy the following species: *Quercus petraea*, *Fagus sylvatica*, *Carpinus betulus*, *Sorbus torminalis*, *S. domestica*, *Acer campestre*, *Ligustrum vulgare*, *Convallaria majalis*, *Carex montana*, *C. umbrosa*, *Festuca heterophylla*.

The conservation status of the habitat is good, it is of particular importance from the point of view of biodiversity but also economic. It is home to many Natura 2000 species of both animals and plants, rare or endemic: *Cerambyx cerdo*, *Lucanus cervus*, *Morimus funereus*, *Cephalantera longifolia*, *Neottia nidus-avis*.

➤ 91M0 *Pannonian-Balkan turkey*

oak -sessile oak forests

CLAS. PAL.: 41.76

RO habitat type code: R4132, R4133, R4140, R4149-4155

This habitat is spread over very small areas in certain plots in the area and is edified by the plant community - *Quercetum petraeae-cerris* Soó (1957) 1969. Most of the time *Q. cerris* is missing. *Q. frainetto* appears in some phytocoenoses. Also, it is of particular importance from the point of view of biodiversity but also economic.

In the shrub layer are commonly found: *Ligustrum vulgare*, *Euonymus europaeus*, *Crataegus monogyna*, *Viburnum lantana* and *Cornus sanguinea*.

In the composition of the floristic composition of the grass layer participates with a high constancy the following species: *Festuca heterophylla*, *Carex montana*, *Poa nemoralis*, *Potentilla micrantha*, *Tanacetum corymbosum*, *Campanula persicifolia*, *Viscaria vulgaris*, *Lychnis coronaria*, *Campanula persicifolia*, *Vincetoxicum hirundinaria*, *Melica uniflora*, *Silene nutans*, *Hieracium sabaudum*, *Galium schultesii*, *Lathyrus vernus*, *Helleborus odoratus*, *Asperula taurina*, *Brachypodium sylvaticum*, *Poa nemoralis*, *Carex praecox*, *Astragalus glycyphyllos*, *Lithospermum purpureo coeruleum*, *Teucrium chamaedrys*.

Habitat phytocoenoses are in a good state of conservation, requiring only hygiene and conservation cuts. Among the limiting factors that act at the level of these arboretums, summer water deficit has a significant role.

➤ 6430 Hydrophilous tall-herb fringe

communities of plains and of the montane to alpine levels

CLAS. PAL.: 37.7 și 37.8

RO habitat type code: R3701, 3702, 3703, 3706, 3707, 3708, R3714

This habitat is found in the valleys of the tributaries of the Govora River, at the edge of the pond of the Sanatoriu Forest, in places with high humidity, especially in the prevernal period.

The main plant communities are: *Scirpetum sylvatici* Ralski 1931 em. Schwich and *Petasitetum albae* Dihoru 1975.

The most common species within the phytocoenosis of this habitat are: *Glechoma hederacea*, *Epilobium hirsutum*, *Senecio fluviatilis*, *Filipendula ulmaria*, *Angelica archangelica*, *Petasites hybridus*, *Cirsium oleraceum*, *Chaerophyllum hirsutum*, *Aegopodium podagraria*, *Alliaria petiolata*, *Geranium robertianum*, *Silene dioica*, *Lamium album*, *Lysimachia punctata*, *Lythrum salicaria*, *Crepis paludosa*.

➤ 6140*Sub-pannonic steppic

grasslands

CLAS. PAL.: 34.315

RO habitat type code: R3414, R3415, R3501

This habitat is met at the limit of the two forests and in the forest cuttings, and in the forest clearings.

It is built by the *Botriochloëtum ischaemi* (Krist. 1937) Pop 1977 plant community. It has in the floristic structure the following species: *Botriochloa ischaemum*, *Festuca valesiaca*, *Teucrium chamaedrys*, *Medicago minima*, *Helianthemum canum*, *Poa badensis*, *Potentilla arenaria*, *Artemisia austriaca*, *Chrysopogon gryllus*, *Astragalus onobrychis*, *Oxytropis pilosa*, *Carex humilis*, *Festuca rupicola*, *Botriochloa ischaemum*.

The conservation of this habitat is weak due to intensive grazing.

➤ 6440 Alluvial meadows of river

valleys of the *Cnidion dubii*

CLAS. PAL.: 37.23

RO habitat type code: R3712, R3715, R3716

The phytocoenoses of this habitat are found at the limit or inside of the Sanatoriu and Arsanca forests in places with excess humidity being quite widespread.

Edifying plant communities are: *Poëtum pratensis* Răvăruț et al. 1956; *Agrostio-Festucetum pratensis* Soó 1949 and *Agrostietum stoloniferae* (Ujvárosi 1941) Burduja et al. 1956.

The species commonly found in habitat phytocoenoses are: *Cnidium dubium*, *Scutellaria hastifolia*, *Gratifolia officinalis*, *Carex praecox*, *Juncus atratus*, *Lythrum virgatum*.

Conservation status of this habitat is good.

➤ 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation (fig. 2).

CLAS. PAL.: 22.13 x (22.41 sau 22.421)

RO habitat type code: R2202, R2203, R2204, R2205, R2206

This habitat is found on a very small area, on the pond of the Sanatoriu forest, but it shows a special importance from a conservative point of view.

It is represented by the Lemnetum minoris Soó 1927 plant community and presents in its structure species characteristic of the *Hydrocharition* - *Lemna* spp.

The conservation status is very poor due to fishing and storage of household waste

➤ 3160 Natural Dystrophic Lakes and Ponds (fig. 2)

CLAS. PAL.: 22.14

RO habitat type code: R2207

Also this habitat occupies the remaining surfaces, meeting on the pond of the Sanatoriu forest. It is represented by two communities of plants very important from a floristic and conservative point of view: *Myriophyllo verticillati-Nupharetum luteae* W. Koch 1926 and *Nymphaeetum albae* Vollmar 1947.

Like the previous habitat and it shows a state of conservation very poor due to fishing and storage of household waste.



Fig. 2. The 3150 and 3160 habitats in the Sanatoriu Forest (foto M. Niculescu)

CONCLUSIONS

The Sanatorium and Arsanca forests located in the subcarpathian area of oltenia, romania presents a very rich biodiversity. In these forests there are a large number of habitats from all the most important categories being the forest ones. From a floristic point of view in these forests there are numerous species natura 2000, rare or endemic. In

forest habitats in these forests there are three species of protected insects: *Morimus funereus*, *Lucanus cervus* and *Cerambyx cerdo*.

Some habitats have good conservation status but others require protection to stop current and especially future pressures and threats

BIBLIOGRAPHY

1. **Barbuceanu, D., Niculescu, M., Boruz, V., Niculescu, L., Stoleriu, Ursu, A.**, 2015 - *Protected saproxylic Coleoptera in "the forests in the southern part of the Candesti Piedmont", a Romanian Natura 2000 protected area*, Analele Universității din Craiova, seria Agricultura – Montanologie – Cadastru (Annals of the University of Craiova - Agriculture, Montanology, Cadastre Series) Vol. XLV, <http://anale.agro-craiova.ro/index.php/aamc/article/view/210/200>
2. **Coldea, Gh.**, 1997 - *Les associations vegetales de Roumanie*, Ed. Presses Universitaires de Cluj, Cluj-Napoca
3. **Gafta, D., Mountford, O., (coord.)**, 2008 - *Manual de interpretare a habitatelor Natura 2000 din România*, Ed. Risoprint, Cluj-Napoca
4. **Géhu, J.-M., Rivas-Martinez, S.**, 1981 - *Notions fondamentales de Phytosociologie*, Ber. Intern.Symposion Syntaxonomie in Rinteln: 1-33.
5. **Imbrea Ilinca Merima, Nicolin Alma Lioara, Niculescu Mariana.**, 2008 - *Studies concerning the rock vegetation in the Cheile Globului Nature Reserve (South-Western Romania)*, Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Vol. 65 (1), ISSN 1843-5246, AcademicPress, Cluj-Napoca, p.141-146, <http://journals.usamvcj.ro/agriculture/index>, <http://www.cabi.org/AbstractDatabase>
6. **Mucina, L.**, 1997 - *Conspectus of Classes of European vegetation*, Folia Geobot.Phytotax., Praha, 32: 117-172.
7. **Nicolin Alma Lioara, Niculescu Mariana, Imbrea Ilinca Merima, Arsene Gicu Gabriel, Bădescu Bogdan, Bărbos Marius Ioan, Filipaș Liviu**, 2014 - *Biodiversity, spatial and conservation status assessment on alluvial gallery-forests within the Natura 2000 site*, Research Journal of Agricultural Science, Vol. 46 (2), 222-232 p., Timisoara
8. **Niculescu M.**, 2006 - *Flora and vegetation in the upper basin of the Luncavat River*, Ph.D. thesis, "Babes-Bolyai" University of Cluj-Napoca, 347 pp.
9. **Niculescu, M., Bercea, I., Matei, G., Nuta, I.S., Iovu, I., Ciupitu, S. A., Salceanu, C.**, 2009 - *Researches about Quercus cerris forests situated in the North-East of Dolj County*, Analele Universitatii din Craiova, Agricultura, Montanologie/ Annals of the University of Craiova, Agriculture, Montanology, Cadastre series, <http://agronomie.administrativ.ucv.ro/aamc/index.php/aamc>, vol. XXXIX/B 2009
10. **Niculescu Mariana, Bercea Iulian, Nicolin Alma Lioara, Stănescu Ștefan, Nuță Ilie Silvestru, Niculescu Laurențiu, Neag Ovidiu**, 2013 - *Diversity, distribution and ecology of the dacian beech forests in the Susara Valley- part of the National Park Nerei-Beușnița Gorges*, Analele Universității din Craiova, seria Agricultura – Montanologie – Cadastru (Annals of the University of Craiova - Agriculture, Montanology, Cadastre Series), <http://agronomie.administrativ.ucv.ro/aamc/index.php/aamc>, Vol. XLIII/2
11. **Niculescu, M., Bercea, I., Niculescu, L., Hirjeu, N.**, 2014 - *The forest habitats found in Lespezi Quarry, Dambovită County*, Analele Universității din Craiova, seria Agricultura – Montanologie – Cadastru (Annals of the University of Craiova - Agriculture, Montanology, Cadastre Series) Vol. XLIV 2014, Vol. 1, <http://anale.agro-craiova.ro/index.php/aamc/article/view/1>
12. **Niculescu M., Grecu, F., Popescu, C.**, 2014 - *The corology, ecology and phytosociology of the sands plant communities and natural habitats in the sandy area from Dabuleni, Dolj county – Romania* - References: 14th SGEM GeoConference on

Ecology, Economics, Education And Legislation, www.sgem.org, SGEM2014 Conference Proceedings, ISBN 978-619-7105-18-6 / ISSN 1314-2704, June 19-25, 2014, Vol. 2, 697-702 pp <http://www.sgem.org/sgemlib/spip.php?article4905&lang=en> DOI: 10.5593/SGEM2014/B52/S20.092

13. **Mariana Niculescu, Marius Făgăraș**, 2015 - *The grassland Natura 2000 habitats found in Lespezi Quarry and the surroundings, Dambovita county*, 15th International Multidisciplinary Scientific GeoConference SGEM 2015, www.sgem.org, SGEM2015 Conference Proceedings, ISBN 978-619-7105-39-1 / ISSN 1314-2704, June 18-24, 2015, Book5 Vol. 1, 877-882 pp, DOI: 10.5593/SGEM2015/B51/S20.116, <http://www.sgem.org/sgemlib/spip.php?article6369&lang=en>

14. **Niculescu, M., Făgăraș, M., Niculescu, L.**, 2015 - *Environmental rehabilitation and preservation measures in Baita-Craciunesti Quarry*, references: 15th International Multidisciplinary Scientific GeoConference SGEM 2015, www.sgem.org, SGEM2015 Conference Proceedings, ISBN 978-619-7105-39-1 / ISSN 1314-2704, June 18-24, 2015, Book5 Vol. 1, 297-304 pp, DOI: 10.5593/SGEM2015/B51/S20.039

15. **Niculescu Mariana** - *Diversity, distribution and ecology of the freshwater natural habitats from Southern of Oltenia, Romania*- USAMV Bucuresti, **SCIENTIFIC PAPERS-SERIES A-AGRONOMY**, Volume: 59, 2016, <http://agronomyjournal.usamv.ro/index.php/scientific-papers/past-issues?id=602>

16. **Sanda, V., Popescu, A., Barabaș, N.**, 1997 - *Cenotaxonomia și caracterizarea grupărilor vegetale din România*, St. Com., Muz. Șt. Nat. Bacău, 14: 5-366.

17. **Rodwell J.S. et al.**, 2002 - *The Diversity of European Vegetation*, Raport EC-LNV nr. 2002/054, Wageningen

18. **Trif, CR., Făgăraș, MM., Hîrjeu, NC., Niculescu, M.**, 2015 - *Ghid sintetic de monitorizare pentru habitate de interes comunitar (sărături, dune continentale, pajiști, apa dulce) din Romania*, Editura Boldăș, Constanta, 134 p.

19. **Tutin, T.G., (eds.)**, 1964–1980 & 1993 - *Flora Europaea*. Vols 1–5 & Vol. 1 (2nd edition). Cambridge: Cambridge University Press.

20. **Weber, H.E., Moravec, J., Theurillat, P.**, 2000 - **International Code of Phytosociological Nomenclature**. 3rd edition, Journal of Vegetation Science, 11 (5): 739–768.

21. **XXX** - 1952-1976, Flora României, Vol. I-XIII, Ed. Acad. Române, București

22. **XXX** - 2007, *European Commission Interpretation Manual of European Union Habitats - EUR27*, DG Environment - Nature and Biodiversity.