VEGETATION OF ORADEA HILLS, NORTH-WESTERN ROMANIA, WESTERN CARPATHIANS

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Abstract

Research conducted aim at studying woody and herbaceous vegetation growing across the Oradea Hills laying in Northwestern Romania, Western Carpathians. One identified a number of 66 plant associations of which a total of 14 associations gather aquatic vegetation phytocoenoses, 22 associations include marsh vegetation phytocoenoes includes, 16 associations get together meadows phytocoenoses, and 14 associations integrate woody vegetation associations (forest and hedges vegetation).

Keywords: *Oradea Hills, vegetation cover, associations' synopsis*.

INTRODUCTION

The territory surveyed includes Oradea hills - a geographical subunit contained in the Crisana Hills - located in the central part of Bihor County, between the Crisul Repede river and the Barcau river.

Phytocenological research on vegetation cover has not been conducted so far by other authors but only by us Morar (2012), Sabau and Miller (2011).

In this paper we present the results of our investigations conducted following efforts representing more than 120 field incursions and conducting over 800 phytocenologic surveys.

MATERIAL AND METHODS

In the study of Oradea Hills one used phytosociological research methods of the Central-Europe School, developed by Braun-Blanquet (1964), Tüxen (1955) and subsequently adapted by Borza, and Boşcaiu (1965) to the vegetation particularities of our country. We adopted the vegetation association as basic syntaxonomic unit. Identification and description of the associations was based on floristic criteria using characteristic, dominant, and differential species.

The phytocoenoses communities identified in the region surveyed were classified into groups, suballiances, alliances, orders and classes of vegetation following a coeno-taxonomic model used in Central Europe by

Mucina et al. (1997), Pott (1995), Borhidi (1996), and in Romania by Coldea et al. (1997), Sanda et al. (2008).

RESULTS AND DISCUSSION

General appearance and spatial distribution of current vegetation

The general feature of vegetation within the Oradea Hills is the presence of the deciduous woodlands counting for 60% i.e. oak forests (oak, hornbeam, cerris, common maple, sycamore maple, linden, common ash, elm), hornbeam and beech woods (hornbeam, beech) alternating with grasslands - 15%, and agricultural land -25%.

Plant associations' synopsis

One identified a number of 66 associations assigned to 2 suballiances, 34 alliances, 29 orders, 19 classes of vegetation as follows:

I. LEMNETEA O. de Bolós et. Maclans 1955
LEMNETALIA MINORIS O. de Bolós et. Maclans 1955
Lemnion minoris O. de Bolós et. Maclans 1955
1. *Lemnetum minoris* Oberdorfer ex. Th. Müller et. Görs 1960

Riccio-Lemnion trisulcae R. Tüxen 1974
2. *Lemno minoris – Spirodeletum* Koch 1954

II. POTAMOGETONETEA PECTINATI R. Tüxen et. Preising 1942
POTAMOGETONETALIA PECTINATI Koch 1926
Potamogetion lucentis Rivas-Martinez 1973
3. *Myriophyllo – Potametum lucentis* Soó 1934
4. *Potamogetonetum nodosi* (Soó 1960) Segal 1964

Potamion pusilli Vollmar em. Hejný 1978
5. *Najadetum marinae* Fukarek 1961
6. *Najadetum minoris* Ubriszy 1941
7. *Potamogetometum pectinati* Carstensen 1955

Nymphaeion albae Oberdorfer 1957
8. *Polygonetum amphibii (natans)* Soó 1927

CALLITRICHO – BATRACHIETALIA Passarge 1964
Ranunculion aquatilis Passarge 1964
9. *Callitrichetum palustris* (Dihoru 1975) Burescu 1999

III. ISOËTO – NANOJUNCETEA Br. – Bl. et R. Tüxen ex. Westhoff et al. 1946

NANOCYPERETALIA Klika 1935
Verbenion supinae – Slavnić 1951
10. *Pulicario – Menthetum pulegii* Slavnić 1951

IV. PHRAGMITETEA AUSTRALIS R. Tüxen et Preising 1942
PHRAGMITETALIA Koch 1926
Phragmition communis Koch 1926
11. *Scirpo – Phragmitetum* Koch 1926
12. *Typhetum angustifoliae* Pignatti 1953
13. *Typhetum latifoliae* Lang 1973
14. *Glycerietum maximae* Hueck 1931
15. *Equisetetum fluviatilis* Steffen 1931
NASTURTIO – GLYCERIETALIA Pignatti 1953
Sparganio – Glycerion fluitantis Br. – Bl. et Sissingh 1942
16. *Sparganietum erecti* Roll 1938
17. *Mentho – Sietum angustifoliae* Nedelcu 1971 corr. *Mentho aquatice – Beruletum erectae* Sanda et al. 2001
Phalaridion arundinaceae Kopecký 1961
18. *Phalaridetum arundinaceae* (Koch 1926) Lilbert 1931
OENANTHETALIA AQUATICAE Hejný in Kopecký 1961 ex Hejný 1965
Oenanthion aquaticae Hejný ex Neuhäusl 1959
19. *Eleocharitetum palustris* Schennikov 1919
MAGNOCARICETALIA Pignatti 1953
Caricenion gracilis (Neuhäusl 1959) Oberdorfer et al 1967
20. *Caricetum gracilis* Almquist 1929
21. *Caricetum ripariae* Knapp et Stoffer 1962
22. *Caricetum vesicariae* Chouard 1924
23. *Irideto – Caricetum otrubae* Burescu 1999

V. PUCCINELLIO – SALICORNIETEA Ţopa 1939
PUCCINELLIETALIA LIMOSAE (Soó 1968) Gehu et Rivas – Martinez 1982
Cypero – Spergularion Slavnić 1948
24. *Heleochloëtum alopecuroidis* Rapaics 1927

VI. BIDENTETEA TRIPARTITI
BIDENTETALIA TRIPARTITI Br. – Bl. et R. Tüxen ex Klika et Hadač 1944
Bidention tripartiti Nordhagen 1940 em. R. Tüxen in Poli et J. Tüxen 1960

25. *Polygono lapathifolii – Bidentetum tripartiti* Klika 1935

VII. MOLINIO – ARRHENATHERETEA R. Tüxen 1937

MOLINIETALIA CAERULEAE Koch 1926

Calthion palustris R. Tüxen 1937

26. *Scirpetum sylvatici* Ralski 1931, Maloch 1995 em. Schwick 1944
27. *Scirpo – Cirsietum cani* Balátová – Tuláčková 1973

ARRHENATHERETALIA R. Tüxen 1931

Cynosurion R. Tüxen 1947

28. *Festuco rubrae – Agrostetum capillaris* Horvat 1951
29. *Trifolio repenti – Lolietum* Krippelová 1967, Resmeriţă et Pop 1967
30. *Anthoxantho – Agrostietum capillaris* Sillinger 1933, Fig 4

POTENTILLO – POLYGONETALIA R. Tüxen 1947

Potentillion auserinae R. Tüxen 1937

31. *Potentilletum anserinae* Felfòldy 1942
32. *Rorippo austriacae – Agropyretum repentis* (Timár 1947) R. Tüxen 1950

Juncenenion effusi Westhoff et van Leeuwen ex Hejný et al. 1979

33. *Juncetum effusi* Soó (1931) 1949
34. *Junco inflexi – Menthetum longifoliae* Lohmeyer 1953
35. *Lythro – Calamagrostetum epigei* I. Pop 1968
36. *Lythro salicariae – Juncetum effusi – inflexi* Todor et al. 1971

VIII. FESTUCO –BROMETEA Br. – Bl. et R. Tüxen in Br. – Bl. 1949

STIPIO PULCHERRIMAE – FESTUCETALIA PALLENTIS I. Pop 1968

Thymio comosi – Festucion rupicolae Pop 1968

37. *Thymo comosi – Festucetum rupicolae* (Csüros et Gergely 1959) Pop et Hodişan 1985

FESTUCETALIA VALESIACAE Br. – Bl. et R. Tüxen ex Br. – Bl. 1949

Festucion valesiacae Klika 1931

38. *Agrostio – Festucetum valesiacae* Borisavljevič et al. 1955
39. *Poterio – Festucetum valesiaceae* J. Danon 1964
40. *Botriochloetum (Andropogonetum) ischaemi* (Kristiansen 1937) Pop 1977

BROMETALIA ERECTI Br. – Bl. 1937

Cirsio – Brachypodion pinnati Hadač et Klika in Klika et Hadač 1944

41. *Festuco valesiacae – Danthonietum calycinae* Boşcaiu 1972

IX. KOELERIO – CORYNEPHORETEA Klika in Klika et Novák 1941

COPYNEPHORETALIA CANESCENTIS Klika 1934

Thero – Airion R. Tüxen ex Oberdorfer 1957

42. *Filagini – Vulpietum* Oberdorfer 1938
43. *Vulpio – Airetum capillaris* Paucă 1941

X. STELLARIETEA MEDIAE R. Tüxen et al. Ex von Rochow 1951

SISYMBRIETALIA J. Tüxen in Lohmeyer et al. 1962

Sisymbrion officinalis R. Tüxen, Lohmeyer et al. 1962

44. *Xeranthemo cylindracei – Brometum arvensis* G. Popescu 1992
45. *Bromo squarrosi – Xeranthemetum annui* M. Coroi 2001

XI. PLANTAGINETEA MAJORIS R. Tüxen et Preising 1950

PLANTAGINETALIA MAJORIS R. Tüxen et Preising in R. Tüxen 1950

Lolio – Plantaginion R. Tüxen 1947

46. *Lolio – Plantaginetum majoris* (Linkola 1921) Berger 1930 em. Sissingh 1969
47. *Sclerochloo – Polygonetum avicularis* (Gams 1927) Soó 1940

XII. ARTEMISIETEA VULGARIS Lohmeyer et al. In R. Tüxen 1950

ONOPORDETALIA ACANTHII Br. – Bl. et R. Tüxen ex Klika et Hadač 1944

Onopordion acanthii Br. – Bl. et al. 1936

48. *Onopordetum acanthii* Br. – Bl. et al. 1936

XIII. GALIO – URTICETEA Passarge 1967 em. Kopecký 1969

LAMIO ALBI – CHENOPODIETALIA BONI – HENRICI Kopecký 1969

Galio – Alliarion Lohmeyer et Oberdorfer 1967 in Oberdorfer et al. 1967

49. *Sambucetum ebuli* Felföldy 1942

CONVOLVULETALIA SEPIUM R. Tüxen em. Mucina 1993

Senecion fluviatilis R. Tüxen 1952

50. *Galegetum officinalis* Dobrescu et Viţalariu 1981

XIV. EPILOBIETEA ANGUSTIFOLII R. Tüxen et Preising in R. Tüxen 1950
ATROPETALIA Vlieger 1937
Carici piluliferae – Epilobion angustifolii R. Tüxen 1950
51. *Calamagrostietum epigei* Jurasyek 1928

XV. TRIFOLIO – GERANIETEA SANGUINEI Th. Müller 1961
ORIGANETALIA VULGARIS Th. Müller 1961
Trifolion medii Th. Müller 1961
52. *Clinopodio – Pteridietum aquilini* Dihoru 1975

XVI. SALICETEA PURPUREAE Moor 1958
SALICETALIA PURPUREAE Moor 1958
Salicion albae Soó 1930 em Th. Müller et Görs 1958
53. *Salicetum albae* Issler 1924 s.l.

XVII. QUERCO – FAGETEA Br. – Bl. et Vlieger in Vlieger 1937 em. Borhidi 1996
FAGETALIA SYLVATICAE Pawlowski in Pawlowski et al. 1928
Lathyro hallersteinii – Carpinenion Boşcaiu et al. 1982
54. *Carpino – Fagetum* Paucă 1941, Fig 1
55. *Querco robori – Carpinetum* Borya 1937
56. *Querco petreae – Carpinetum* Soó et Pócs 1957
57. *Carpino – Quercetum cerris* Klika 1938
Aro orientalis – Carpinenion (Dobrescu et Kovács 1973) Täuber 1992
58. *Tilio tomentosae – Quercetum dalechampii* Sârbu 1979
QUERCETALIA ROBORIS R. Tüxen 1931
Genisto germanicae – Quercion Neuhäusl et Neuhäuslová – Novotná 1967
59. *Quercetum robori – petraeae* Borza (1928) 1959
60. *Petraeo – Fagetum* Scamoni (1956) 1959

XVIII. QUERCETEA PUBESCENTI – PETRAEAE (Oberdarfer 1948) Jakucs 1960
FRAXINO ORNI – CONTINENTALIA Jakucs 1960
Quercion petreae Zólyomi et Jakucs in Soó 1963
61. *Quercetum petreae – cerris* Soó 1963, Fig.2, Fig.5
62. *Tilio argenteae – Quercetum petraeae –cerris* Soó 1957

Aceri tatarico – Quercion Zólyomi 1957

63. *Polygonato latifolio – Quercetum roboris* (Hargitai 1940) Borhidi 1966 in Borhidi et Kevey 1996
64. *Quercetum frainetto – dalechampii* (Bârcă 1984) Chifu et al. 2006

Robinion pseudacaciae M. Csürös – Káptalan 1968

65. *Bromo sterilis – Robinietum pseudacaciae* (Pócs 1954) Soó 1964

XIX. RHAMNO – PRUNETEA Rivas Goday et Borja Carbonell 1961

PRUNETALIA SPINOSAE R. Tüxen 1952

Prunion spinosae Soó 1951

66. *Pruno spinosae – Crataegetum* (Soó 1927) Hueck 1931, Fig. 3

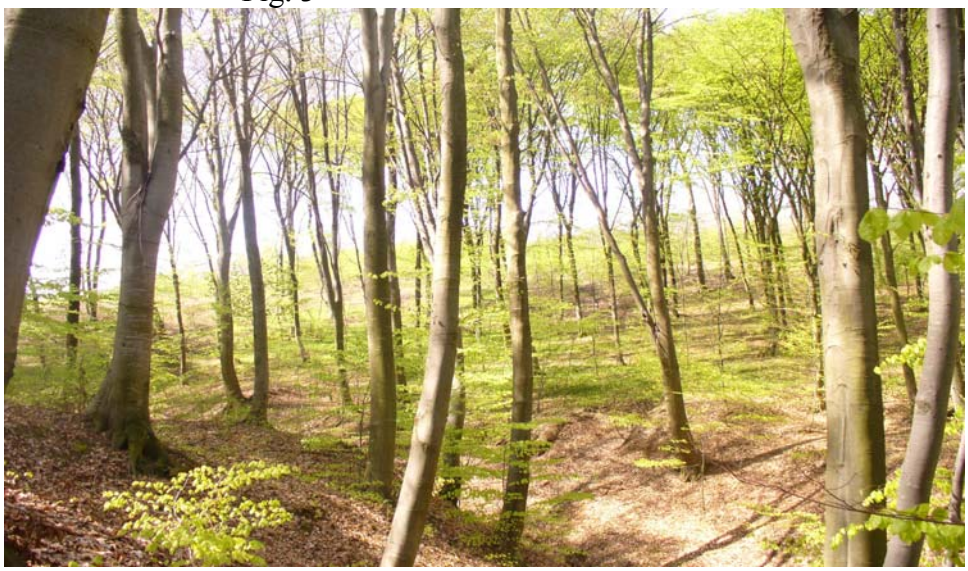

Fig. 1 H*ornbeam and beech woods,* Pauca 1941, Burzuc forest (Sarbi commune, Bihor county)

Fig. 2 Association *Quercetum petraeae-cerris* Soó 1963; facies with *Ruscus aculeatus*; Tautelec (original)

Fig. 3 *Pruno spinosae – Crataegetum* (Soó 1927) Hueck 1931; Spinus (original)

Fig. 4 Overview on meadows of the association *Anthoxantho – Agrostietum capillaris* Sillinger 1933; Spinus (original)

Fig. 5 Association *Quercetum petraeae-cerris* Soó 1963; facies with *Allium ursinum* – Ineu (original)

CONCLUSIONS

1. The vegetal cover surveyed contains 66 plant associations of which 14 associations represent forest and hedges vegetation, 16 associations represent the mesophilic and xero-mesophilic grassland plants, 22 associations represent the hygrophile and meso-hygrophile plants, and 14 associations represent the lakes and ponds related vegetation.

2. The coenotaxa identified shows scientific and practical importance because it generates scientific knowledge on pastoral value of the grasslands surveyed and the oak and oak-beech forest management in order to promote a sustainable forestry and preserving the forests hosting relict, rare, endangered and vulnerable species.

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