

THE VEGETATION OF THE NORTHERN PART OF THE SEMENIC MOUNTAINS

Iglicea BOJINESCU ROSTESCU¹

¹University of Oradea, Faculty of Medicine and Pharmacy, Doctoral School of Biomedical Sciences, 1 Universităţii Str., zip code: 410087, Oradea, Romania, email: rostescuboji@yahoo.com

RESEARCH ARTICLE

Abstract

The purpose of the research is to inventory the plant associations in order to provide a complete overview of the vegetation in this territory, by addressing the theoretical and practical aspects of phytosociology of the northern part of the Semenic Mountains in a modern perspective.

The scientific novelty of the investigations lies in the creation of a cenotaxonic conspectus for the studied region and the on-site identification of plant associations that constitute the vegetation cover.

Based on this premise, floristic and phytocenological research was conducted between 2015 and 2021, comprising over 60 field trips, resulting in over 600 phytosociological surveys in various habitats of the northern part of the Semenic Mountains: forests, shrublands, meadows, scree slopes, rocky areas and peat bogs. As a result of the systematic phytocenological study conducted in the northern part of the Semenic Mountains, a total of 64 plant associations were described, classified into 11 suballiances, 37 alliances, 30 orders and 18 classes. The studied territory is included in the Natura 2000 sites ROSCI0226 Semenic and ROSPA0086 Munții Semenic, partially overlapping with the Semenic-Cheile Caraşului Natural Park.

Keywords: phytocenosis, association, ecosystem, habitat, protection, conservation.

#Corresponding author: rostescuboji@yahoo.com

INTRODUCTION

Until now, this territory has been insufficiently researched, with only a few sporadic scientific communications and publications from specialized researchers who have occasionally passed through the area.

In the period of August 20-25, 1941, Professor Alexandru Borza initiated the first floristic research of the Semenic Mountains, being accompanied a year later, on June 20-22, 1942, by his assistant I. Todor, when the first phytosociological investigation was conducted. The observations made by the renowned botanist Prof. Alexandru Borza in the field were documented through the description of 11 plant associations, accompanied by 5 tables. This phytosociological research was continued by studies on the pastures of neighboring territories conducted by Prof. Buia A. (1963), followed by microstratigraphic research on peat bogs conducted by Prof. E. Pop and I. Ciobanu (1960), each contributing to their respective fields of expertise in understanding the most well known mountain in Banat.

The reason why we decided to initiate a comprehensive research on the flora and vegetation of the entire northern region of the Semenic massif is linked to the unexplored nature of the majority of this mountain's territory from a floristic and phytosociological perspective.

The Semenic Mountains are located in the southwest of the country, well individualized, with the peaks ranging between 45°00' and 45°23' north latitude and 21°58' and 22°18' east longitude, covering an area of 1180 km², representing 0.4% of the country's surface.

The Semenic Mountains are situated in the Caraş-Severin County, which has a total area of 8514 km², out of which a geographic area of 980 km² has been studied, including the territories of the production units within the Reşiţa and Văliug Forestry Districts.

From a geological point of view, these mountains are composed of crystalline metamorphic rocks, particularly schists and paragneisses, occasionally intercalated with quartzites. In the basins of the Secu and Râul Alb valleys, the foundation of the mountains consists of crystalline schists, overlain by Paleozoic and Mesozoic sedimentary deposits, with the oldest represented by conglomerates and sandstones. In depressions and along the main valleys, sedimentary formations such as marls, clays and alluvium (gravel and sand) predominate the area.

The most commonly encountered altitude within the researched forested areas ranges between 350-980 m. The exposition is largely determined by the flow direction of the main watercourses (Bârzava River, Secu, Râul Alb, Timiş, Stârnice, Groposu, Pietrosu, Bârzăviţa).

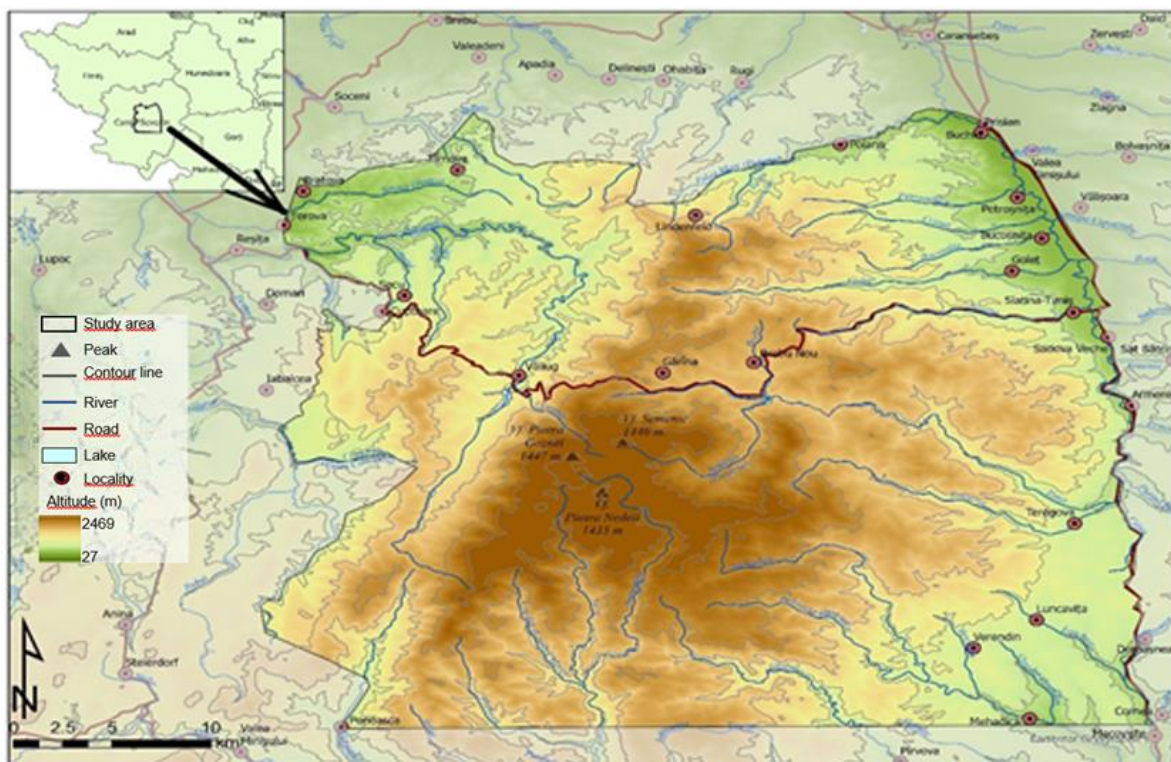


Figure 1. Geographic Location and Delimitation of the Northern Part of Semenic Mountains (taken from Stereo 70 cartographic projection)

The majority of the studied territory falls within the temperate continental climate zone, with Mediterranean influences. The thermal regime is quite consistent, with monthly precipitation throughout the year not falling below 300 mm, reaching a peak in early summer. The number of favorable days for forest crops is 210-250 days per year.

The average annual temperature for the Semenic Mountains sector ranges between 8°C and 4°C, indicating a relatively balanced thermal equilibrium and a pronounced humidity regime of the climate. The highest average monthly temperature is recorded in July at 16°C, while the lowest average monthly temperature is in January at -6°C and the average temperature during the vegetation season is 7-8°C.

Rainfall in the Semenic Mountains is abundant, with an uneven distribution throughout the year, with a minimum in January and February and a maximum during the months of May and June.

Within the atmospheric precipitation, snowfall holds an important place, resulting in a significant snow depth and a prolonged presence during the cold months of the year. The first snowfall typically occurs in early November, while the last day of snow is at the end of April.

The most important winds predominantly blow from the south, southwest, west (Austrul and Foehn) and southeast sector (Coșava).

RESULTS AND DISCUSSION

As a result of the systematic phytosociological study conducted in the northern part of the Semenic Mountains, a total of 64 plant associations were identified, classified into 11 suballiances, 37 alliances, 30 orders and 18 classes, as follows:

I. Class POTAMOGETONETEA PECTINATI R.
Tüxen et Preising 1942

Order CALLITRICHIO-BATRACHIETALIA
Passarge 1964

Alliance Ranunculion aquatilis Passarge 1964
1. *Callitricheum palustris* (Dihoru 1975 n.n.)
Burescu 1999

II. Class PHRAGMITETEA AUSTRALIS R.
Tüxen et Preising 194

Order PHRAGMITETALIA Koch 1926

Alliance Phragmition communis Koch 1926

2. *Typhetum angustifoliae* Pignatti 1953

3. *Typhetum latifoliae* Lang 1973

Order NASTURTIO-GLYCERIETALIA Pignatti 1953

Alliance Sparganio-Glycerion fluitantis Br.-Bl. et Sissingh 1942

4. *Glycerietum plicatae* (Kulczynski 1928)
Oberdorfer 1952

5. *Glycerietum fluitantis* Egger 1933
Aliance Phalaridion arundinaceae Kopecký 1961
6. *Agrostetum gigantei* Sanda et al. 1994
Order OENANTHETALIA AQUATICAE Heyný in Kopecký 1961 ex Heyný 1965
Aliance Oenanthion aquaticae Heyný ex Neuhäusl 1959
7. *Eleocharitetum palustris* Schennikov 1919
Order MAGNOCARICETALIA Pignatti 1953
Aliance Magnocaricion elatae Koch 1926
Subaliance Caricicion rostratae (Balátová-Tuláčková 1963) Oberdorfer et al. 1967
8. *Caricetum rostratae* Rübel 1912
Subaliance Caricicion gracilis (Neuhäusl 1959) Oberdorfer et al. 1967
9. *Caricetum acutiformis* Egger 1933
10. *Caricetum ripariae* Knapp et Stoffer 1962
11. *Caricetum vesicariae* Chouard 1924
- III. Class MONTIO-CARDAMINETEA** Br.-Bl. et R. Tüxen 1943
Order MONTIO-CARDAMINETALIA Pawłowski 1928
Aliance Cardaminion amarae Mass 1959
12. *Cardamino-Chrysosplenietum alternifolii* Maas 1959
Aliance Cardamino-Montion Br.-Bl. 1926
13. *Carici remotae-Calthetum laetae* Coldea (1972) 1978
14. *Alchemillo mollis-Glycerietum nemoralis* Popescu et Sanda 1998
- IV. Class SCHEUCHZERIO-CARICETEA NIGRAE** R. Tüxen 1937
Order CARICETALIA NIGRAE Koch 1926
Aliance Caricion nigrae Koch 1926 em. Klika 1934
15. *Sphagno-Caricetum rostratae* Steffen 1931
16. *Carici echinatae-Sphagnetum* (Balázs 1942) Soó 1955
17. *Junco-filiformis-Caricetum nigrae* Sanda et Popescu 1988
- V. Class OXYCOCCO-SPHAGNETEA** Br.-Bl. et R. Tüxen ex Westhoff et al. 1946
Order SPHAGNETALIA MAGELLANICI (Pawłowski 1928) Moore 1968
Aliance Sphagnion magellanicum Kästner et Flösner 1933
18. *Sphagnetum magellanicum* (Malcuit 1929) Kästner et Flösner 1933
19. *Eriophoro vaginati-Sphagnetum recurvi* Hueck 1925
- VI. Class ASPLENIETEA TRICHOMANIS** (Br.-Bl. in Meier ET Br.-Bl. 1934) Oberdorfer 1977
Order Tortulo-Cymbalarietalia Segal 1969
Aliance Cymbalarion-Asplenion Segal 1969 em. Mucina 1993
20. *Asplenietum rutae-murariae-trichomanis* R. Tüxen 1937
Aliance Cystopteridion Richard 1972
21. *Asplenio quadrivalenti-Poëtum nemoralis* Soó ex Gergely et al. 1966
Order Androsacetalia vandellii Br.-Bl. In Meier et Br.-Bl. 1934
Subaliance Asplenion-septentrionalis Oberdorfer 1938
22. *Saxifrago-Poëtum nemoralis* Pop 1968
23. *Asplenio trichomani-Poëtum nemoralis* Boşcaiu 1971
Aliance Hypno-polypodion Mucina 1993
24. *Ctenidio-Polypodietum* Jurko et Peciar 1963
- VII. Class THLASPIETEA ROTUNDIFOLII** Br.-Bl. 1926
Order ANDROSACETALIA ALPINAE Br.-Bl. 1926
Aliance Festucion pictae Krajina 1933
25. *Festucetum pictae* Krajina 1933
- VIII. Class NARDO-CALLUNETEA** Preising 1949
Order NARDETALIA Oberdorfer 1949
Aliance Potentillo-Nardion Simion 1959
26. *Nardo-Festucetum rubrae fallax* Puşcaru et al. 1959
27. *Violo declinatae-Nardetum* Simion 1966
- IX. Class SESLERIETEA ALBICANTIS** Br.-Bl. 1948 EM. Oberdorfer 1978
Order SESLERIETALIA ALBICANTIS Br.-Bl. in Br.-Bl. et Jenny 1926
Aliance Seslerio rigidae Zólyomi 1939
28. *Seslerietum filifoliae* Zólyomi 1939
- X. Class MOLINIO-ARRHENATHERETEA** R. Tüxen 1937
Order MOLINIETALIA CAERULEAE Koch 1926
Aliance Molinion caeruleae Koch 1926
29. *Junco-Molinietum* Preising 1951
Aliance Calthion palustris R. Tüxen 1937
30. *Scirpetum sylvatici* Ralski 1931, Maloch 1935 em. Schwick 1944
Order ARRHENATHERETALIA R. Tüxen 1931
Aliance Cynosurion R. Tüxen 1947
31. *Festuco rubrae-Agrostietum capillaris* Horvat 1951
32. *Anthoxantho-Agrostietum capillaris* Sillinger 1933
Order POTENTILLO-POLYGONETALIA R. Tüxen 1947
Aliance Potentillion anserinae R. Tüxen 1937
Subaliance Juncenion effusi Westhoff et van Leeuwen ex Heyný et al. 1979
33. *Juncetum effusi* Soó (1931) 1949
34. *Junco inflexi-Menthetum longifoliae* Lohmeyer 1953

Order DESCHAMPSIETALIA CAESPITOSAE
Horvatic 1956

Aliance Deschampsion caespitosae Horvatic 1930

35. *Caricetum brizoides* O. Rațiu 1966

XI. Class FESTUCO-BROMETEA Br.-Bl. et R. Tüxen in Br.-Bl. 1949

Order STIPIO PULCHERRIMAE-FESTUCETALIA PALLENTIS I. Pop 1968

Aliance Seslerio-Festucion pallentis Klica 1931

36. *Asplenio rutae-murariae-Melicetum ciliatae* Soó 1962

Order FESTUCETALIA VALESIIACAE Br.-Bl. et R. Tüxen ex Br.-Bl. 1949

Aliance Festucion valesiaca Klica 1931

37. *Agrostio-Festucetum valesiaca* Borisavljevic et al. 1955

38. *Botriochloetum (Andropogonetum) ischaemi* (Kristiansen 1937) Pop 1977

Order BROMETALIA ERECTI Br.-Bl. 1937

Aliance Cirsio-Brachypodion pinnati Hadac et Klica in Klica en Hadac 1944

39. *Gypsophilo-Brachypodietum pinnati* Szabo 1983

XII. Class ARTEMISIETEA VULGARIS
Lohmeyer et. Al. In R. Tüxen 1950

Order ACROPYRETALIA REPENTIS
Oberdorfer et. Al. 1967

Aliance Artemisio-Agropyron intermedii Th. Müller et. Gors. 1969

40. *Artemisio campestris-Agropyretum intermedii* Schneider-Binder msc. 1974 c.f. 1976

XIII. Class GALIO-URTICETEA Passarge 1967 em. Kopecký 1969

Order LAMIO ALBI-CHENOPODIETALIA BONI-HENRICI Kopecký 1969

Aliance Galio-Alliarion Lohmeyer et Oberdorfer 1967 et. Al 1967

41. *Sambucetum ebuli* Felföldy 1942

Subaliance Rumicion alpine (Rübel 1933) Klica 1944

42. *Veratretum albi* (Pușcaru et. Al. 1956) Buia et. Al. 1962

Order CONVOLVULETALIA SEPIUM R. Tüxen em. Mucina 1993

Aliance Petasition officinalis Sillinger 1933 em. Kopecký 1969

43. *Telekio-Petasitetum hybridi* (Morariu 1967) Răsmeriță et. Rațiu 1974

44. *Telekio-speciosae-Aruncetum dioici* Oroian 1998

XIV. Class EPILOBIETEA ANGUSTIFOLII R. Tüxen et Preising in R. Tüxen 1950

Order ATROPETALIA Vlieger 1937

Aliance Carici piluliferae-Epilobion angustifolii R. Tüxen 1950

45. *Calamagrostietum epigei* Juraszek 1928

Order SAMBUCETALIA RACEMOSAE
Oberdorfer 1957

Aliance Spireion chamaedryfoliae Sanda et Popescu 1999

46. *Spiraeo-Coryletum* Ujvárosi 1944

47. *Coryletum avellanae* Soó 1927

XV. Class TRIFOLIO-GERANIETEA SANGUINEI
Th. Müller 1961

Order ORIGANETALIA VULGARIS Th. Müller 1961

Aliance Trifolion medii Th. Müller 1961

48. *Clinopodio-Pteridietum aguillini* Dihoru 1975

XVI. Class QUERCO-FAGETEA Br.-Bl. et Vlieger in Vliegerem. Borhidi 1996

Order FAGETALIA SYLVATICAE Pawłowski in Pawłowski et al. 1928

Aliance Alno-Ulmion Br.-Bl. et R. Tüxen 1943 emend. Th. Müller et Görs 1958

Subaliance Alnenion glutinosae-incanae
Oberdorfer 1953

49. *Stellario nemori-Alnetum glutinosae* (Kästner 1938) Lohmeyer 1957

Subaliance Ulmenion Oberdorfer 1953

50. *Fraxino danubialis-Ulmetum* Sanda et Popescu 1999

Aliance Symphyto cordati-Fagion Vida 1959

Subaliance Symphyto-Fagenion Boșcaiu et al. 1982

51. *Symphyto cordati-Fagetum* Vida (1959) 1963

52. *Pulmonario rubrae-Fagetum* (Soó 1964) Täuber 1987

53. *Festuco drymejae-Fagetum* Morariu et al. 1968

Subaliance Calamagrostio-Fagenion Boșcaiu et al. 1982

54. *Hieracio rotundati-Fagetum* (Vida 1963) Täuber 1987

55. *Luzula albidae -Fagetum sylvaticae* Zólyomi 1955

Subaliance Moehringio muscosae-Acerenion
Boșcaiu et al. 1982

56. *Phyllitidi-Fagetum* Vida (1959) 1963

Subaliance Lathyrio hallersteinii-Carpinenion Boșcaiu et. al. 1982

57. *Carpino-Fagetum* Paucă 1941

Order QUERCETALIA ROBORIS R. Tüxen 1931

Aliance Genisto germanicae-Quercion
Neuhäusel et Neuhäuslova-Novotna 1967

58. *Genisto tinctoriae-Quercetum petraeae* Klica 1932

59. *Fago-Quercetum petraeae* R. Tüxen 1955

Aliance Pino-Quercion Medweka-Kornas et Pawlowski 1959, Ruzicka 1964 em. Soó 1971

60. *Leucobryo-Pinetum* Matuszkiewicz 1962

XVII. Class QUERCETEA PUBESCENTI-PETRAEAE (Oberdorfer 1948) Jakucs 1960

Order Fraxino orni-Cotinetalia Jakucs 1960

Aliance Quercion petraeae Zólyomi et Jakucs in Soó 1963

61. *Cytiso nigricantis-Quercetum petraeae* Paucă 1941

62. *Festuco drymejae-Quercetum petraeae* Morariu et al. 1970

Aliance Syringo-Carpinion orientalis Jakus et Vida 1959

63. *Corno-Fraxinetum orni* Pop et Hodişan 1964

XVIII. Class VACCINIO-PICEETEA Br.-Bl. in Br.-Bl. et al. 1939

Order MYRTILLO-PICEETALIA Hadač 1962

Aliance Myrtillo-Piceion excelsae Březina et Hadač 1962

64. *Myrtillo-Piceetum excelsae* Březina et Hadač 1962.

CONCLUSIONS

In the study of the vegetation cover in the northern part of the Semenic Mountains, we identified 64 plant associations, of which 16 represent forest vegetation, classified into the *Quercus-Fagetea* Br.-Bl. et Vlieger in Vlieger em. Borhidi 1996 class, *Quercetum pubescenti-Petraeae* (Oberdorfer 1948) Jakucs 1960 class and *Vaccinio-Piceetea* Br.-Bl. in Br.-Bl. et al. 1939 class. These are followed by mesophilic grasslands of the *Molinio-Arrhenatheretea* R. Tüxen 1937 class (7 associations), *Festuco-Brometea* Tüxen 1949 class (4 associations), swamp vegetation of the *Scheuchzerio-Caricetea nigrae* Tüxen 1937 class (3 associations) and *Oxycocco-Sphagnetum* Tüxen ex Westoff et al. 1946 class (2 associations), which have no forage value but hold significant scientific importance due to the preservation of pollen grains representing the historical archive of vegetation evolution in Mount Semenic.

Throughout our research in the northern part of the Semenic Mountains, we identified and described a number of 27 rare, endangered, vulnerable plant associations with conservation and scientific importance, included in natural habitats of community interest.

A total of 45 plant associations included in natural habitats of community interest have been described, within which we identified 73 rare, vulnerable, endangered, protected, relic, endemic and nature monument species. These species require special measures for protection and sustainable management. The management

of these areas, included in the Natura 2000 sites ROSCI0226 Semenic and ROSPA0086 Munții Semenic, partially overlapping with the Semenic-Cheile Caraşului Natural Park, must consider the principles of species and habitat conservation, as well as biodiversity conservation.

The floristic inventory of vascular plants in the northern part of the Semenic Mountains highlights a total of 1076 phytotaxa, representing over 27.06% of the total number of 3976 vascular plant species in our country, indicating rich biodiversity.

In light of the gathered information, it can be conclusively stated that the presence of diverse vegetation in the northern region of the Semenic Mountains, predominantly dominated by forests, followed by secondary mesophilic grasslands, can be attributed to the complexity of landforms, pedoclimatic factors and anthropogenic and zoogenic impacts.

REFERENCES

- Borza, A., Boşcaiu, N., (1965): Introduction to the study of plant cover. Romanian Academy Publishing House, Bucharest, 342 p.
- Borza, Al., (1946): Vegetation of Semenic Mountain in Banat. Bulletin of the Botanical Garden of the Cluj Botanical Museum, 26, Cluj-Napoca, 1-2 24-53.
- Boşcaiu, N., (1971): Flora and vegetation of the Ţarcu, Godeanu and Cernei Mountains. Romanian Academy Publishing House, Bucharest, 494 p.
- Borhidi, A., (1996): Critical revision of the Hungarian plants communities. Janus Pannonius University Press, Pécs, pp. 43-94.
- Braun-Blanquet, J., Pavillard, J., (1928): Vocabulaire de Sociologie Végétale. Troisième édition. Imprimerie Lemair - Ardes, pp. 15-18.
- Braun-Blanquet, J., (1964): Pflanzensoziologie. Springer-Verlag, Wien-New York, 3, Aufl, pp. 12-24.
- Chifu, T., Mânzu, C., Zamfirescu, O., (2006): Flora and vegetation and vegetation Moldova (Romania). University "Alexandru Ioan Cuza" Publishing House, Iaşi, pp. 437-452.
- Ciocărlan, V., (2009): Illustrated flora of Romania. Pteridophyta & Spermatophyta. Ceres Publishing House, Bucharest, 1141 p.
- Cristea, V., Gafta, D., Pedrotti, F., (2004): Phytosociology. Cluj University Press Publishing House, Cluj-Napoca, 394 p.
- Dihoru, Gh., Negrean, G., (2009): The Red Book of vascular plants of Romania. Romanian Academy Publishing House, Bucharest, 630 p.
- Doniţă, N., Popescu, A., Paucă-Comănescu, M., Mihăilescu, S., Biriş, I.A., (2005): Habitats in Romania. Silviculture Publishing House, Bucharest, pp. 207-208.
- Ellenberg, H., (1974): Zeigerwerte der Gefäßpflanzen Mitteleuropas - Scripta Geobotanica. Göttingen, 9: 1- 97.
- Gehu, J.M., Rivas-Martinez, S., (1981): Notions fondamentales de phytosociologie (Fundamentals of phytosociology). Berichte der

- internationalen Symposien der Internationalen. Vereinigung Vegetationskunde, Cramer, Berlin: 5-33.
- Grigore Mihai (1981): *Semenic. Part of the collection 'Our Mountains'*, Sport-Tourism Publishing House, Bucharest.
- Knapp, D.G. (1942): *Methods used in the production of the 1940 isogonic chart of the United States*. Transactions, American Geophysical Union.
- Majovszky, J., Murin, A., (1987): *Karyotaxonomický prehľad flóry Slovenska*. Veda, Bratislava, 436 p.
- McNeill, J., Barrie, F.R., Burdet, H.M., Demoulin, V., Hawksworth, D.L., Marhold, K., Nicolson, D.H., Prado, J., Silva, P.C., Skog, J.E., Wiersema, J.H., Turland, N.J., (2007): *International Code of Botanical Nomenclature (Vienna Code) adopted by the Seventeenth International Botanical Congress Vienna, Austria, July 2005*. *Regnum Vegetabile*, 146, 18, Gantner, Ruggell., 568 p.
- McNeill, J., Barrie, F.R., Buck, W.R., Demoulin, V., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Marhold, K., Prado, J., Prud'Homme Van Reine, W.F., Smith, G.F., Wiersema, J.H., Turland, N.J., (2011): *International Code of Nomenclature for algae, fungi and plants (Melbourne Code) adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011*. *Regnum Vegetabile*, 154, 30, A.R.G. Gantner Verlag KG, 240 p.
- Meusel, H., Jäger, E.J., (1992): *Vergleichende Chorologie der Zentraleuropäischen Flora III*. Gustav Fischer Verlag, Jena, 333 p.;
- Mucina, L., Grabherr, G., Ellmaner, T., (1993): *Die Pflanzengesellschaften Österreich, teil I. Anthropogene Vegetation*, (Gustav Fischer) Verlag, Jena-Stuttgart New-York, 13: 149-169.
- Oberdorfer, E., (1992): *Süddeutsche Pflanzengesellschaften (South German plant communities). III - Walder und Gebüsche*, Gustav Fischer Verlag.
- Oltean, M., Negrean, G., Popescu, A., Roman N., Dihoru., G., Sanda, V., (1994): *Red List of higher plants in Romania, studies, syntheses, ecological documentation. Volume I*, Bucharest, pp. 1-52.
- Oprea, A., (2005): *Critical List of vascular plants in Romania*. University Alexandru Ioan Cuza Publishing House, Bucharest, 400 p.
- Pignatti, S., (1996): *Polyploidie - Verhältnisse der anthropogenen pflanzengesellschaften und vegetationsserien*. *Anthropogene Vegetationi*, pp. 108-120.
- Pop, I., Cristea, V., Hodişan, I., (2002): *Vegetation of Cluj County: A phytocoenological, ecological, bioeconomic and eco-protective study*. *Botanical Contributions*, 1999-2000, Cluj-Napoca, 35(2): 40-43.
- Pott, R., (1995): *Die Pflanzengesellschaften Deutschlands*. 2 Auflage, Verlag Eugen Ulmer, Stuttgart, 622 p.
- Puimalainen, J., Kennedy, P., Folving, S., (2003): *Monitoring forest biodiversity: a European perspective with reference to temperate and boreal forest zone*. *Journal of environmental management*, London, 67, 5-14.
- Raunkier, C., (1937): *Plant life forms*. Clarendon Press, Oxford.
- Rodwell, J.S., Schaminée, J.H.J., Mucina, L., Pignatti, S., Dring, J., Moss, D., (2002): *The diversity of European vegetation - An overview of phytosociological alliances and their relationships to EUNIS habitats*. National Centre for Agriculture, Nature Management and Fisheries, Wageningen, 168 p.
- Rothmaler, W., (2000): *Exkursionsflora von Deutschland, Band 3, Gefäßpflanzen. Atlasband*, Spektrum Akademischer Verlag, Heidelberg-Berlin.
- Sanda, V., (2002): *Vademecum of Ceno-structural aspects regarding the vegetation cover in Romania*. Vergiliu Publishing House, Bucharest, 331 p.
- Sanda, V., Biţă-Nicolae, C., Barabaş, N., (2003): *Flora of spontaneous and cultivated cormophytes in Romania*. Ion Borcea Publishing House, Bacău, 316 p.
- Sanda, V., Barabaş, N., Biţă-Nicolae, C., (2005): *Breviary on structural parameters and ecological characteristics of phytocoenoses in Romania. Part I*. Ion Borcea Publishing House, Bacău, 255 p.
- Sanda, V., Kinga, Ö., Burescu, P., (2008): *Phytocoenoses in Romania: syntaxonomy, structure, dynamics and evolution*. Ars Docendi Press, Bucharest, 570 p.
- Soó, R., (1980): *A magyar flóra és vegetáció rendszertani-növényföldrajzi kézikönyve VI*. Akadémia Kiadó, Budapest, 556 p.
- Tüxen, R., (1955): *Das System der Nordwestdeutschen Pflanzengesellschaften, Mit Floristic-Sociologie Arbeitsgen, n. Folge*, 5: 155-176.
- Weber, H. E., Moravec, J., Theurillat, J.-P., (2000): *International code of phytosociological nomenclature*. 3rd edition, *Journal of vegetation Science* 11: 739-768. Opulus Press, Uppsala, Sweden