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THE VEGETATION LANDSCAPE OF GURGHIU VALLEY FROM A SYMPHYTOSOCIOLOGICAL PERSPECTIVE

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Abstract: Six main profiles of landscapes were identified, during researches in the area of Gurghiu Mountains, a part of the Carpathians District, four of them being represented by geoseries: the Gurghian, hilly geoseries on pyroclastic substratum of common oak *Querco robori–Carpineto* geosigmetum, the Gurghian hilly geoseries of durmast oak and hornbeam, on the pyroclastic substratum: *Querco petraeae–Carpineto* geosigmetum, the Gurghian, mountain geoseries, situated on andesite substratum of beech, *Symphyto cordato-Fageto* geosigmetum, the Gurghian, mountain series, situated on a pyroclastic substratum, of spruce *Hieracio transsilvanici-Piceeto* geosigmetum and other two by sigmeta: the edapho-hygrophilous series of common oak belonging to lower Gurghian area and sub-continental climates, on pyroclastic substratum, *Querco robori–Carpineto* sigmetum and the Gurghian edapho-halophilous series: *Salicornieto europaeae* sigmetum

Introduction

The vegetal landscape studies have developed a new conception as part of traditional phytosociology. As a result of extending his preoccupations G.M.Géhu [11] divided contemporary phytosociology into three branches according to some particular level of vegetation bed analyzes. He distinguishes besides the classic or Braun-Blanquet's Phytosociology (association level), Dynamic-Catenal or Landscape Phytosociology, whose units are the series or sigmetum (Dynamic or Successional Phytosociology) and the geoseries or geosigmetum (Catenal Phytosociology).

Dynamically, each plant association belongs to one or another of initial, intermediate, mature or deviant stages out of a vegetation series [20, 21].

The synassociations try to express all the plant communities, or collection of stages, that can be found in similar teselar places as a result of the succession processes and so, a geosigmetum includes not only the representative vegetation type of the mature stage, or head series, but also the initial or subserial communities replacing it [20].

In synphytosociological nomenclature the sigmetum, sigmetalia and sigmetea correspond to association, alliance and class being defined by specific recognizing units.

The synassociation is analyzed inside tesela, a territory or geographic area, greater or smaller in size, but ecologically homogeneous because only one vegetation series, that is, only one potential vegetation-type and only one sequence of successional plant communities, can settle within it.

Geosigmetum, also denominated geosigmassociation or geoseries, is the basic unit of the Integrated Ladscape Phytosociology (Geosynphytosociology). It seeks to be the catenal and succesional expression science. It is built up with the contigous sigmeta or vegetation series [20].

Area of study

Geologically speaking the Gurghiu Valley belongs to neocenes deposits, namely to Sarmatian and Quaternary. At top heights the andesite is dominant and at the low ones the andesite and basalt are mixed.

The yearly average temperature is between 8,56°C on hills (Batoş meteorological station, 449 m s.m) and 3,83°C in mountains (Bucin meteorological station, 1282 m s.m.). The warm oscillations are significant both in hills and mountains which indicates a major continental modification.

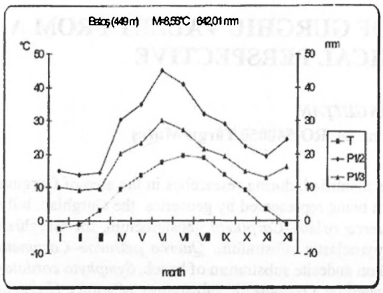


Fig. 1: The climatic diagram of Batoş meteorological station

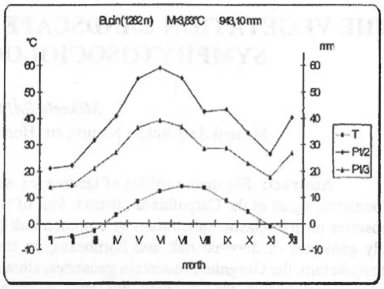


Fig. 2: The climatic diagram of Bucin meteorological station

In Gurghiu Valley two vegetation belt: the hilly belt and the mountain belt were delimitated.

Results and Discussion

Six main types of landscapes were analyzed during researches in the Gurghiu Mountains as a part of the Eastern Carpathians, four of them beying represented by geoseries and other two by sigmeta (vegetation series).

At the hilly belt, the Gurghian edapho-hygrophilous series of common oak *Querco robori-Carpineto* sigmetum was analyzed. Crossed by the Gurghiu River, which forms a large floodplain, the whole series depend on the phreatic water level reaching to high values in rainy season. As a result, the soils are represented by the gleyic ones. Along the valley almond willow communities (*Salicetum triandrae* Malcuit ex Noirfalise in Lebrun et al.1955) stretches out, being highly antropised. Where the area was cleared, the willows communities were replaced by *Phragmitetum australis* Soó 1927 association. A long time ago in the entire floodplain there used to be a compact wood of mixed common oak and hornbeam. That was the edaphic climax of elemental vegetation. After the woods were deforested, by increasing the phreatic level as a result of physiological draining coming to the end, a large population of *Deschampsia caespitosa* extended. At the opposite edge of the floodplain the *Querco robori-Carpinetum* Soó et Pócs (1931) 1957 association still exists (Fig. 3).

Another profile placed also in the Gurghiu River floodplain was studied at Poiana Narciselor nearby Gurghiu village. These represent the Gurghian hilly geoseries on pyroclastic substratum of common oak *Querco robori-Carpineto* geosigmetum (Fig. 4). The climatophilous series includes the forest climax (subclimax?) *Querco robori-Carpinetum* followed on the side by edapho-xerophilous series, a forest mantle with *Pruno spinosae-Crataegetum* Soó (1927) 1931. At the foot of the hill there are compact shrublands of *Salix cinerea* and *Frangula alnus,* in fact the edapho-hygrophilous series. All the floodplain, where the phreatic level is high, is populated with a compact bed of *Junco-*

Molinietum Preising in R.Tx.et Preising ex Klapp 1954, recognized as a natural reservation for its floristical landscape diversity. Where the soil is gleyic due to a high phreatic level the *Deschampsietum caespitosae* Horvatić 1930 association has populated the area. The floodplain is mostly covered by the forest ecosystem represented by *Querco robori-Carpinetum* including a compact facies of *Molinia caerulea*.

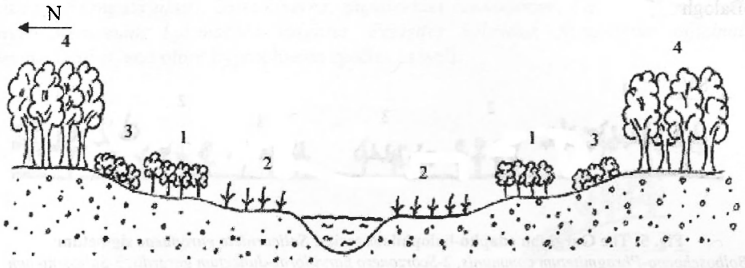


Fig. 3: The Gurghian edapho-hygrophilous hilly series on pyroclastic substratum of commone oak *Querco robori-Carpineto* sigmetum:
1-*Salicetum triandrae*, 2-*Phragmitetum australis*, 3-*Phalaridio-Petasitetum officinalis*, 4-*Querco robori-Carpinetum*

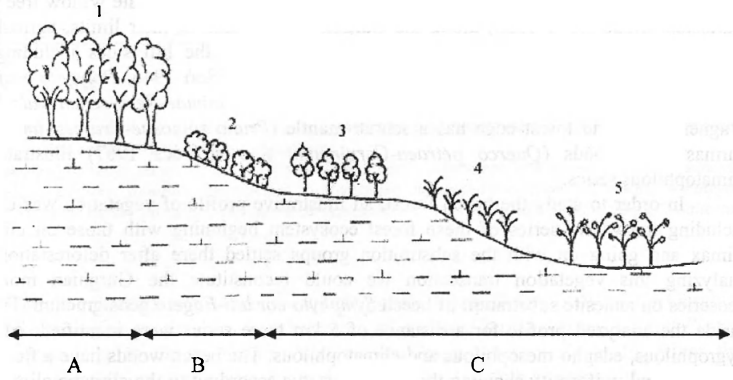


Fig. 4: The Gurghian, hilly geoseries on pyroclastic substratum of common oak: *Querco robori–Carpineto* geosigmetum:
A. Climatophilous series, B. edapho-xerophilous series, C. edapho-hygrophilous series; 1-*Querco robori-Carpinetum*, 2-*Pruno spinosae-Crataegetum*, 3-*Calamagrostio-Salicetum cinereae*, 4-*Junco-Molinietum*, 5-*Deschampsietum caespitosae*

At the foot of the Slatini Hill, nearby Orşova village, a salty soils geoseries was analyzed. The origin of salts seems to be pretty recent and comes from flows down of Slatini Hill including salty substratum as an extension of Ideciu-Praid ones. Inside this

halophilous complex the Gurghian edapho-halophilous series *Salicornieto europaeae* sigmetum was also analyzed (Fig. 5). There is a zonation of vegetation according to the soil salt concentration. In the area with the maximum salt concentration *Salicornietum europaea* Wendelbg.1953 association populates, including *Salicornia europaea* almost exclusively. At the limits of this association symmetrically populates the association *Scorzonero parviflorae-Juncetum gerardii* (Wenzl 1934) Wendelberger 1943. As the salt concentration decreases this association is replaced by the *Bolboschoeno-Phragmitetum australis* Borhidi et Balogh 1970.

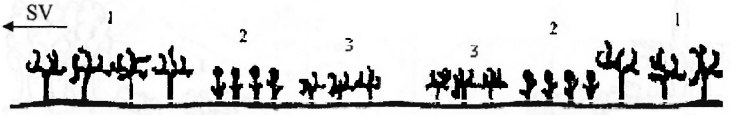


Fig. 5: The Gurghian edapho-halophilous series: *Salicornieto europaeae* sigmetum: 1-*Bolboschoeno-Phragmitetum communis*, 2-*Scorzonero parviflorae-Juncetum gerardii*, 3-*Salicornietum europaeae*,

From the beginning of Viilor Hill up to the peak, a highly representative vegetation transection for the entire hill belt of Reghin depression was analyzed. It was described the Gurghian geoseries of durmast oak and hornbeam on the pyroclastic substratum *Querco petraeae – Carpineto* geosigmetum (Fig. 6). In this profile we notice the component series of this geoseries: the edapho-hygrophilous series illustrated by the white willow tree plots (*Salicetum albae* Issler 1926) along the Gurghiu River bank; at their limits, agricultural crops stretch out; the edapho-xerophilous series populate the hill sides including the following associations: *Danthonio-Brachypodietum pinnati* Soó 1946, *Polygalo majoris-Brachypodietum pinnati* Wagner 1941 and *Medicagini minimae-Festucetum valesiacae* Wagner 1941. The forest edge has a schrub mantle (*Pruno spinosae-Crataegetum*). The durmast oak woods (*Querco petraea-Carpinetum* Soó et Pócs 1957) illustrate the climatophilous series.

In order to study the beech forest, an illustrative profile of vegetation was chosen including the whole series of these forest ecosystem beginning with those on climatic climax and going on with the substitution groups settled there after deforestation. By analyzing this vegetation transection we could reconstitute the Gurghian mountain geoseries on andesite substratum of beech *Symphyto cordati-Fageto* geosigmetum (Fig. 7). Inside the analyzed profile for a distance of 5 km three series were identified: edapho-hygrophilous, edapho-mesophilous and climatophilous. The beech woods have a floristical and structural uniformity showing their mature status according to the climatic climax. On the edge, where the beech woods were deforested, there is an extended compact population of *Telekia speciosa* (*Telekietum speciosae* Treg.1941). This is facilitated especially by the edaphic humidity provided by abundant rainfalls (800 mm yearly). The *Telekia speciosa* groups are featurely ecotonal and in their structure we can find both particular species to *Origanetalia* order and forest species as remains of cleared beech woods. At the limits of the deforested beach woods, there are secondary groups from *Sambuco-Salicion capreae* alliance and in their composition we can notice: *Salix caprea, Sambucus racemosa, Epilobium angustifolium, Rubus idaeus, Fragaria vesca, Populus tremula, Calamagrostis arundinacea, Atropa bella-donna*, advancing to progressive stages of resilience or

regressive stages as a stadium in secondary grasslands development. The edapho-mesophilous series is illustrated by an extended population of *Festuco rubrae-Agrostietum capillaries* Horv.1951 with a remarkable floristic diversity and high fodder productivity. At the basis of the profile, this association presents edapho-meso-hygrophilous facieses in transition to edapho-hygrophilous groups of *Cirsietum rivularis* Nowiński 1928 and *Scirpetum lacustris* Chouard 1924. On the Pietroasa River banks there are compact shrubs of *Calamagrostio-Salicetum cinereae* Soó et Zólyomi in Soó 1955. We can find here species as: *Frangula alnus, Salix cinerea, Eupatorium cannabinum, Equisetum maximum, Cirsium oleraceum, Lysimachia vulgaris, Petasites hybridus, Symphytum officinale, Viburnum opulus,* and other hygrophilous species as well.

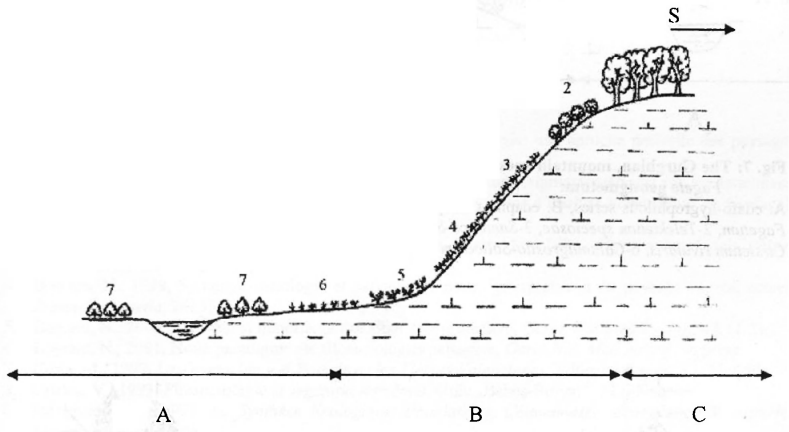


Fig. 6: The Gurghian hilly geoseries of durmast oak and hornbeam, on the pyroclastic substratum: *Querco petraeae–Carpineto* geosigmetum:
A. edapho-hygrophilous series, B. edapho-xerophilous series, C. climatophilous series; 1-*Querco petraeae-Carpinetum*, 2-*Pruno spinosae-Crataegetum*, 3-*Medicagini minimae-Festucetum valesiacae*, 4-*Polygalo majoris-Brachypodietum pinnati*, 5-*Danthonio-Brachypodietum pinnati*, 6- agricultural crops, 7-*Salicetum albae*

On the mountain belt, where the spruce forests prevail it was analyzed the Gurghian mountain geoseries on pyroclastic substratum, of spruce *Hieracio transsylvanici-Piceeto* geosigmetum (Fig. 8). On the Bătrâna Valley riversides, a tributary of Gurghiu River, this mountain geoseries presents symmetry to the valley axe. On both riversides there are lines of white alder as remains of *Telekio speciosae-Alnetum incanae* Coldea (1986) 1990 association which used to extend along the whole floodplain. After deforesting the alder woods, *Telekio-Petasitetum hybridi* Morariu 1967 nom.inv.association has populated there. This reaches the compact groups of *Telekia speciosa* at the foot of sides. On the sides, there are spruce woods represented by *Hieracio transsilvanici-Piceetum* Pawlowski et Br.-Bl. 1939 association. The edaphophilous series is represented by *Telekia* and *Petasites* coenoses and the spruce fir woods correspond to the climatophilous series of the present subatlantic succession.

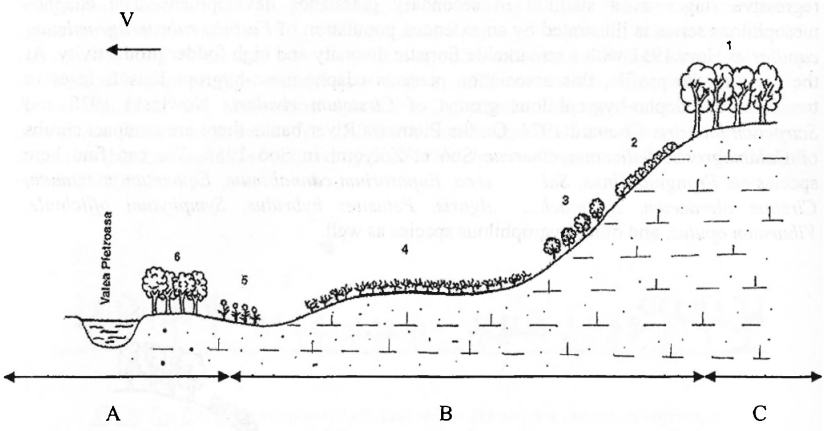


Fig. 7: The Gurghian, mountain geoseries, situated on andesite substratum of beech *Symphyto cordati-Fageto* geosigmetum:
A. edafo-hygrophilous series, B. edapho-mezophilous series, C. climatophilous series; 1-*Symphyto cordati-Fagetum*, 2-*Telekietum speciosae*, 3-*Sambuco-Salicion capreae*, 4-*Festuco rubrae-Agrostietum capillaris*, 5-*Cirsietum rivularis*, 6-*Calamagrostio-Salicetum cinereae*

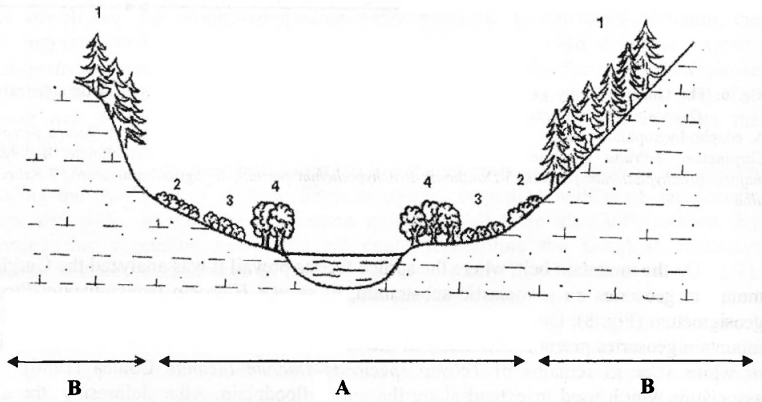


Fig. 8: The Gurghian, mountain series, situated on a pyroclastic substratum, of spruce *Hieracio transsilvanici-Piceeto* geosigmetum:
A. edaphofilous series, B. climatofilous series; 1-*Hieracio transsilvanici-Piceetum*, 2-*Telekietum speciosae*, 3-*Telekio-Petasitetum hybridi*, 4- *Telekio speciosae-Alnetum incanae*

The reversible transformation of vegetation expressed with the following terms sylva → saltus→ ager has a major role in landscape phytosociology. Empirically these terms had been already known but their scientific importance was shown later by G.Kuhnholtz-Lodat [15] and P.Duvigneaud [9]. These correspond to a dynamic reality coming from comprising some vegetation respects as well as from the relationship connecting man and vegetation. The human activities impacting with vegetation landscape are illustrated by sylva → saltus→ ager recognized in each temperate belt landscapes. The succession sylva → saltus→ ager shows the existence of several stages in landscapes development in the same time with the etnoecosystem evolution. The vegetation landscape where the rural population activities take place looks like a dynamic mosaic of different stages for a spatial series advancing from sylva to saltus and back in case human impacts get lower. These three stages in landscape evolution can be noticed all along the populated area, mostly in the inferior course of Gurghiu River.

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PEISAJUL VEGETAL AL VĂII GURGHIULUI DIN PERSPECTIVA SIMFITOSOCIOLOGIEI

(Rezumat)

În cadrul cercetărilor efectuate în sectorul Munţilor Gurghiu, din circumscripţia Carpaţii Orientali, au fost identificate şase tipuri principale de peisaje vegetale, din care patru sunt reprezentate prin geoserii, iar altele două prin sigmete.

Astfel, în etajul subcolinar a fost identificată seria edafo-higrofilă, planar gurghiană, subcontinentală, pe substrat piroclastic, a stejarului, reprezentată prin *Querco robori-Carpineto* sigmetum.

Un alt profil a fost analizat la Poiana Narciselor de lângă comuna Gurghiu: în ansamblul său acest profil reprezintă geoseria colinară, gurghiană, piroclastică, a stejarului–*Querco robori-Carpineto* geosigmetum.

Un interes floristic remarcabil îl prezintă pentru teritoriul cercetat şi enclava de vegetaţie halofilă extrazonală, identificată la baza dealului Slatini de lângă comuna Orşova. În acest complex halofil a fost stabilită seria subcolinară edafohigrohalofilă gurghiană, *Salicornieto europaeae* sigmetum.

De la baza Dealului Viilor până la culme a fost analizat un profil de vegetaţie care este reprezentativ pentru întreaga bordură colinară a Depresiunii Reghinului. A fost reconstituită geoseria colinară, gurghiană, de pe substrat piroclastic, a gorunului cu carpen – *Querco petraeae-Carpineto* geosigmetum.

Pentru studiul făgetelor montane a fost ales un profil de vegetaţie reprezentativ, care cuprinde întreaga serie a acestor ecosisteme forestiere, începând de la cele aflate în stadiu de climax climatic şi continuând cu grupările de substituire, instalate după defrişarea pădurii. Studiul acestui profil a oferit posibilitatea reconstituirii geoseriei montane, gurghiene, de pe substrat andezitic, a fagetului – *Symphyto cordati-Fageto* geosigmetum.

În etajul montan superior, dominat de molidişe, a fost pusă în evidenţă geoseria montană, gurghiană, pe substrat piroclastic, a molidului – *Hieracio transsilvanici-Piceeto* geosigmetum.