PRELIMINARY DATA REGARDING THE TYPES OF HABITATS AND SPECIFIC ASSOCIATIONS IN THE BASIN OF PESCEANA RIVER, VÂLCEA COUNTY, ROMANIA

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Abstract. The article represents a part of the researches done for the doctoral thesis, which aims at the knowledge of the vegetation in the basin of Pesceana river, Vâlcea county. This offers actual data regarding the types of habitats identified in the studied area and their typical vegetation. The phytocoenological observations developed between 2021-2023 in the basin of the Pesceana river permitted the identification of nine types of habitats of conservative interest, as: 91M0 – Pannonian-Balkanic turkey oak-sessile oak forests; 9130 – *Asperulo-Fagetum* beech forests; 91Y0 – Dacian oak - hornbeam forests; 91E0* - * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*); 9170 – *Galio-Carpinetum* oak-hornbeam forests; 6440 – Alluvial meadows of river valleys of the *Cnidion dubii*; 6430 – Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels; 6520 – Mountain hay meadows; 6240* - * Sub-Pannonic steppe grasslands.The article is focused on the description of four types of forest habitats, respectively the habitats of community interest 91M0; 9130; 91Y0 și 91E0*. The description of the habitats is followed by an analysis of the similarity on the account of the surveys done for every type of forest habitat. Also, the physical and chemical particularities of the soils in theses habitats identified at the studied area are highlighted The aim of the actual article is to identify, inventory and highlight the particularities that the forest habitats present in the studied area and the plant community typical for these habitats.

Keywords: Pesceana, Oltenia, habitats, physico-chemical particuliarities, soils.

Rezumat. Date preliminare referitoare la tipurile de habitate și asociații vegetale specifice prezente în bazinul râului Pesceana, județul Vâlcea, România. Articolul reprezintă o parte a cercetărilor efectuate în cadrul tezei de doctorat care vizează cunoașterea vegetației din bazinul râului Pesceana, județul Vâlcea. Acesta furnizează date actuale privind tipurile de habitate identificate în zona studiată și vegetația lor tipică. Observațiile fitocenologice desfășurate în intervalul 2021-2023 în bazinul râului Pesceana, au permis identificarea a 9 tipuri de habitate de interes comunitar, respectiv: habitatul 91M0 - Păduri balcano-panonice de cer și gorun; Habitatul 9130 – Păduri de fag de tip *Asperulo-Fagetum*; Habitatul 91Y0 – Păduri dacice de stejar și carpen; Habitatul prioritar 91E0* - Păduri aluviale de *Alnus glutinosa* și *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*); Habitatul 9170 – Păduri de stejar cu carpen de tip *Galio-Carpinetum*; Habitatul 6440 – Pajiști aluviale ale văilor râurilor din *Cnidium dubii*; Habitatul 6430 – Comunități de lizieră cu ierburi înalte higrofile de la câmpie și din etajul montan până în cel alpin; Habitatul 6520 – Fânețe montane; Habitatul 6240* – Pajiști stepice subpanonice. Articolul este concentrat pe descrierea a 4 tipuri de habitate forestiere, respectiv habitatele de interes conservativ 91M0; 9130; 91Y0 și 91E0*. Descrierea habitatelor este urmată de o analiză a similarității pe baza releveurilor efectuate în cadrul fiecărui tip de habitat forestier. De asemenea, sunt evidențiate particularitățile fizico-chimice ale solurilor din cadrul acestor habitate identificate la nivelul zonei studiate. Scopul prezentului articol este acela de a identifica, inventaria și evidenția particularitățile pe care le prezintă habitatele forestiere din zona de interes și asociațiile vegetale tipice acestor habitate.

Cuvinte cheie: Pesceana, Oltenia, habitate, particularități fizico-chimice, soluri.

INTRODUCTION

Habitats are a key component of biodiversity, resulting from the complex interaction of multiple biotic and abiotic factors (GIGANTE et al., 2016). They can be considered important indicators of biodiversity (BUNCE et al., 2013), which provides them with a leading role for monitoring nature conservation status (GIGANTE et al., 2016).

Thanks to the diverse site conditions, the vegetation from Oltenia has attracted the attention of botanists for so many years. However, exhaustive reseaches for a better understanding of the flora and vegetation were not performed in the basin of the Pesceana river.

The basin of the Pesceana river is located in the central-southern part of Romania, the north-eastern part of Oltenia, fully integrated in Vâlcea county, in its south-eastern part. With a total area of approximately 257 km^2, the researched area is arranged along a length of approximately 45 km from the Getic Piedmont and the subcarpathian depression of Oltenia (Fig. 1). From a biogeographic point of view, the researched territory belongs to the continental bioregion.

With a relatively small area, compared to the area of Romania, the territory of the basin of Pesceana river has not attracted the attention of specialists until now, although it presents types of habitats of European conservation interest. In this sense, the information regarding the vegetation in the studied territory is quite sporadic. The first reports are from the end of the 19th century and the beginning of the 20th century (GRECESCU, 1898; ENCULESCU, 1923; PRODAN, 1939). Until the year 2020, when NEBLEA et al., (2020) presents some considerations regarding the natural habitats from Pesceana forest, the data were completely absent.

In accordance with Annex I of the Habitats Directive (92/43/EEC), based on their distribution area, the forests in the basin of the Pesceana river belong to the main category "Forests of Temperate Europe" distinguished by the code 91. As for the meadows, they belong to the category "Semi-natural tall-herb humid meadows" distinguished by code 64.

On the national level, according to the Palearctic Habitats classification, the forest habitats inventoried in the studied area belong to the following categories: "Temperate deciduous forests with deciduous leaves" (code 41);

"Meadow and swamp forests and thickets" (code 44), while meadows are included in the categories: "calcic xeric steppes and grasslands" (code 34) and "Mesophile grasslands" (code 38) .

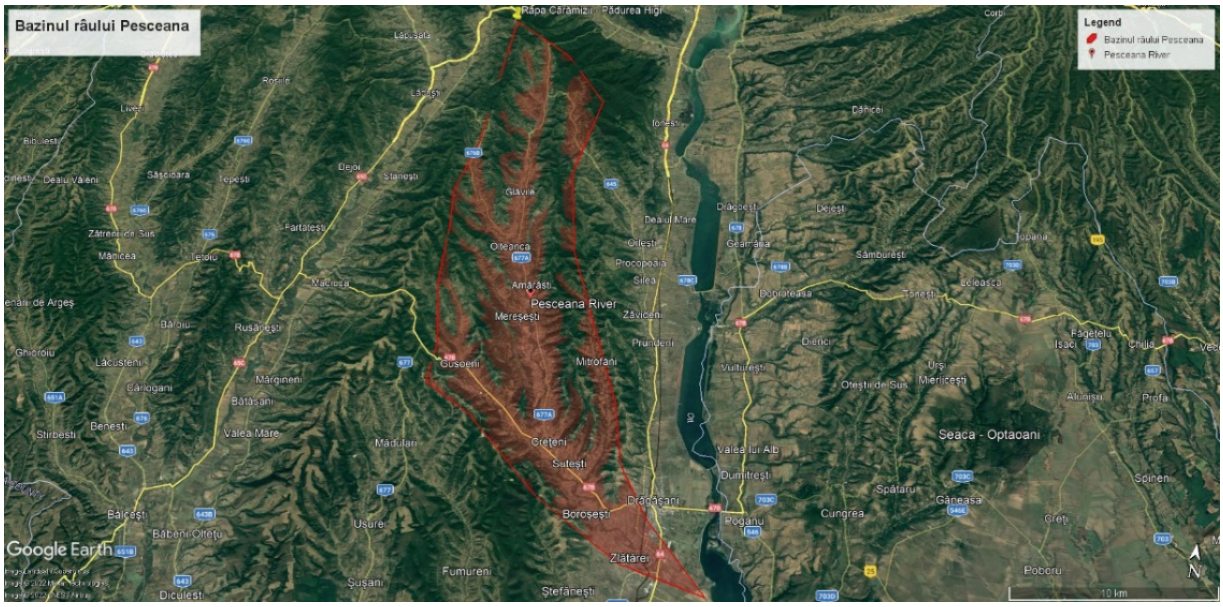

Figure 1. Geographical position of the basin of the Pesceana river (Google Earth Pro).

MATERIALS AND METHODS

The phytocoenological study was carried out during 2021-2023, a period which involved a good bibliographical documentation regarding the physical-geographical conditions of the area. The surveys were carried out between May and September, thus covering the main vegetation seasons.

The sampling method used was the selective one, the surveys being carried out in the sample surfaces with high homogeneity within the phytocoenoses, in areas representative of the phytocoenoses, not in the ecotone areas.

The survey technique respects the methodological principles of the Western European School, with adaptations to the specifics of the vegetation in Romania, taking into account the recommendations of BORZA & BOȘCAIU (1965).

The nomenclature of the taxa is in accordance with Flora Europaea, updated in the case of some species according to Euro+Med Plant Base (https://www.emplantbase.org/home.html). The nomenclature of the coenotaxa is in accordance with the Romanian Phytocoenoses (SANDA et al., 2008).

The identification of the types of habitats in the basin of the Pesceana river was based on the descriptions from the specialized literature (GAFTA & MOUNTFORD, 2008; DONIȚĂ et al., 2005; PASCOVSCHI & LEANDRU, 1958; BELDIE & CHIRIȚĂ, 1967).

The affiliation of the associations to the types of identified habitats was done according to the indications in the "Romanian Manual for interpretation of EU habitats" (GAFTA & MOUNTFORD, 2008).

For each type of habitat identified in the area of interest, a description was made in which the characteristic associations were mentioned. For the types of habitats of community interest present in the studied area, the Natura 2000 codes (according to Directive 92/43/EEC), the codes from the Palearctic Habitats classification according to the manual "Habitats in Romania" (DONIȚĂ et al., 2005) and the EUNIS2020 codes were specified (CHYTRY et al., 2020) (Table 1).

Statistical analysis was performed using R software (https://cran.r-project.org/), vegan, stats, ggplot and factoextra libraries. Dissimilarity was determined using the vegdist function (vegan library), using the Bray-Curtis index and the UPGMA (Unweighted Pair Group Method with Arithmetic Mean) classification method.

The dendrograms highlighted the high similarity of surveys belonging to the same association.

For the inclusion of associations to alliances, orders and classes, the information from the database FloraVeg.EU – Database of European Vegetation, Habitats and Flora (www.floraveg.eu) was taken into account.

As part of the collaboration with the Monitoring Laboratory of the Dolj Environmental Protection Agency, the physical and chemical analyses of the soil were carried out, according to the standards and models accepted by the environmental legislation in force at the collection points. The study of the physical and -chemical characteristics of the soil within the forest habitats in the researched area, offered the possibility of establishing certain correlations between the degree of vegetation development, as well as the degree of naturalness/anthropization of the vegetation.

RESULTS AND DISSCUSIONS

Following the researches, nine types of habitats of conservative interest were observed in the basin of the Pesceana river, among which, the alluvial forests with *Alnus glutinosa* and the Sub-Pannonic steppe grasslands represent priority habitat types (code 91E0*; code 6240*), in accordance with the Habitats Directive, Annex 1.

In this article, the focus is on the observations made within the forest habitats 91M0; 9130; 91Y0 and 91E0*.

Table 1. Habitats of European interest in the studied area.

No	Habitat types	Natura 2000 code	Palaearctic Habitats code	EUNIS code	Specific associations
1.	Pannonian-Balkanic turkey oak-sessile oak forests	91M0	41.7693	G1.7693	*Quercetum frainetto-cerris* (Georgescu 1945) Rudski 1949
2.	*Asperulo-Fagetum* beech forests	9130	41.1D224	-	*Carpino-Fagetum* Paucă 1941
3.	Dacian oak & hornbeam forests	91Y0	41.2C	-	*Potentillo micranthae – Quercetum dalechampii* A. O. Horvat 1981
4.	* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)	91E0*	44.323	G1.2123	*Aegopodio podagrariae-Alnetum glutinosae* Karpati et Jurko 1964 (sin. *Stellario nemori-Alnetum glutinosae* Kästner 1938) Lohm. 1957
5.	*Galio-Carpinetum* oak-hornbeam forests	9170	-	-	*Carici pilosae – Carpinetum* Chifu 1995
6.	Alluvial meadows of river valleys of the *Cnidium dubii*	6440	37.23	-	*Poetum pratensis* Răvăruț et al., 1956
				E2.251	*Agrostietum stoloniferae* (Ujvarosi 1941) Burduja et al., 1956
7.	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	6430	37.814	E5.5143	*Scirpetum sylvatici* Ralski 1931 em. Schwich
8.	Mountain hay meadows	6520	38.233	E1.721	*Anthoxantho – Agrostetum capillare* Silinger 1933
9.	* Sub-Pannonic steppe grasslands	6240*	34.911	-	*Medicagini minimae-Festucetum valesiacae* Wagner 1941
			-	-	*Botriochloetum ischaemi* (Krist. 1937) Pop 1977

Habitat 91M0 - Pannonian-Balkanic turkey oak-sessile oak forests

The habitat was identified, mainly in the lower part of the basin of the Pesceana river. This habitat type corresponds to one natural subtype of habitats according to the Romanian classification system (DONIȚĂ et al., 2005): **R4153** Danubian-Balkanic forests of *Quercus cerris* and *Q. frainetto* with *Crocus flavus*. The association specific to this type of habitat, at the level of the studied area, is *Quercetum frainetto-cerris* (Georgescu 1945) Rudski 1949. The phytocoenoses of the turkey oak and Hungarian oak forests have a scattered distribution in the areas with sunny, southern, south-eastern or south-western exposures.

The arborescent layer is composed of the recognition species of the association, respectively *Q. cerris* and *Q. frainetto*, where *Q. frainetto* predominates, in which the species of *Q. robur*, *Q. dalechampii*, *Fraxinus excelsior*, *Sorbus torminalis*, *Acer campestre* participate. Despite the fact that regeneration cuts have been made within the habitat, the degree of recovery is good, so the habitat is not significantly affected. The shrub layer is variable, consisting mainly of *Crataegus monogyna*, *Cornus sanguinea*, *C. mas*, *Ligustrum vulgare* and *Rosa canina*.

The herbaceous layer covers the soil in a proportion of 30-70%, being dominated by *Allium ursinum*, *Festuca heterophylla*, *Scilla bifolia*, *Erythronium dens-canis* ssp. *niveum*, *Veronica hederifolia*, *Ranunculus ficaria*, *Lathyrus niger*. InGușoeni, the species of European conservation interest *Ruscus aculeatus* (Fig. 2) was identified, a species with a weak coverage in the sample area. The composition of the association described at the level of the researched area does not differ from that described at the national level (SANDA et al., 2008). A large number of southern elements (sub-Mediterranean, Balkan, Mediterranean, Pontic) are identified in the surveys: *Dioscorea communis*; *Chamaecytisus hirsutu*s subsp *leucotrichus*; *Lychnis coronaria*; *Fragaria viridis*; *Tilia tomentosa* etc. Also, the presence of the *Spiranthes spiralis* orchid is mentioned in a single survey, on the outskirts of Pesceana.

Figure 2. *Ruscus aculeatus* (habitat 91M0) from Gușoeni (original).

Three groups of relevés are clearly defined: the group formed by relevé 5, the group formed by relevés 3 and 6, and the group formed by relevés 2, 4, 1 (Fig. 3). Two of the groups (R3, R6 and R2, R4, R1) have closer similarity (distance of about 0.45). The third group (relevé 5) has a more different floristic composition.

In the two groups of relevés with a high similarity, the floristic composition is similar, so that approximately half of the total species are present in the relevés belonging to the two groups, respectively: *Quercus frainetto*; *Quercus cerris*; *D. communis*; *Euphorbia epithymoides; S. bifolia*; *Erythronium dens-canis* ssp. *niveum*; *Ranunculus auricomus*; *Galium aparine*; *Carex divulsa*; *Agrimonia eupatoria* etc. The two recognition species of the association (*Q. frainetto*; *Q. cerris*), are close to dominance, and the predominant species, *Q. frainetto* has a coverage of ½ - ¼ of sample areas.

Within the latter group of survey, the floristic composition is poorer, and those belonging to the *Festuco-Brometea* class (*Galium pseudaristatum, Agrimonia eupatoria, Sedum sexangulare*) are missing. Regarding to the predominant species, *Q. frainetto* has better coverage, more than half of the sample area.

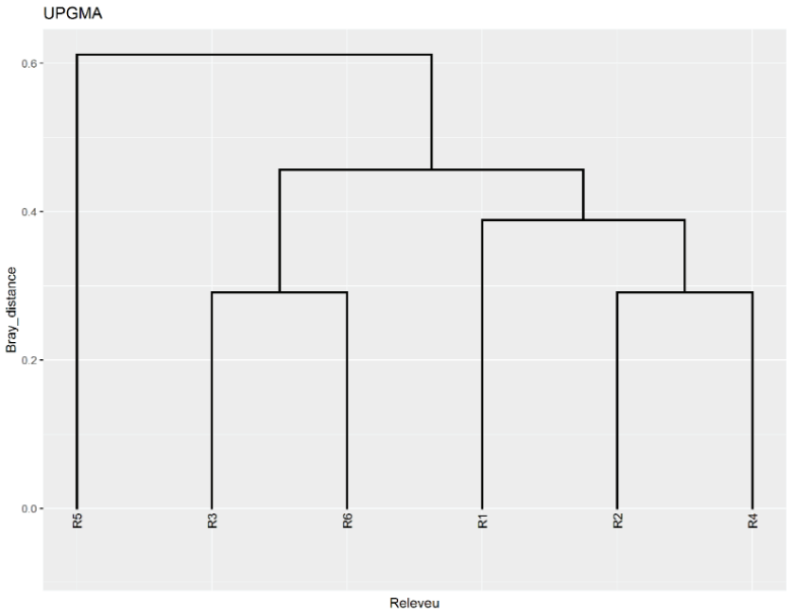

Figure 3. Similarity of relevés within the association *Quercetum frainetto-cerris* (Georgescu 1945) Rudski 1949.

Habitat 9130 – *Asperulo-Fagetum* beech forests

In the researched area, hilly beech trees were identified in the upper part along the village and on the northern slopes at the level of the Getic Piedmont. These are classified under subtype 41.135 – Pannonic neutrophile beech forests (GAFTA & MOUNTFORD, 2008). Neutrophile beech forests in the researched area are rich in herbaceous species, but no rare species were reported in the inventoried sample areas.

In the basin of the Pesceana river, this habitat type only corresponds to one subtype of natural habitat, according to the Romanian classification system (DONIȚĂ et al., 2005): **R4118** – Dacian forests of beech (*F. sylvatica*) and hornbeam (*C. betulus*) with *Dentaria bulbifera*. The type of association characteristic of the studied area is *Carpino-Fagetum* Paucă 1941, according to SANDA et al., 2008 (Fig. 4). Significant phytocoenoses were identified in the localities of Gușoeni, Glăvile, Ursoaia and Pesceana. În the localities of Sutești and Aninoasa, they occupy small areas.

The arborescent layer has a coverage of 90-95%, being edified by *F. sylvatica* ssp. *moesiaca*, next to which *C. betulus* is frequently found, and scattered species of *Q. dalechampii*, *Q. frainetto*, *Q. cerris*, *S. torminalis* appear.

The development of shrubs varies according to the degree of arborescent layer cover, while the herbaceous layer is dominated by *Galium odoratum*, *Stellaria holostea*, *Viola reichenbachiana*, *Lathyrus venetus*, *Dentaria bulbifera*, *Asarum europaeum*, *Carex remota*. Only one orchid is mentioned within this association, respectively *Neottia nidus-avis*, at the level of the Pesceana commune, Ursoaia village.

Figure 4. *Carpino betuli-Fagetum sylvaticae* Paucă 1941 from Pesceana (original).

Three groups of relevés are defined within this association, respectively: the group formed by relevé 6, the group formed by relevés 1, 2, 3 and the group formed by relevées 7, 8, 4, 5 (Fig. 5).

Among them, two groups have a closer similarity (R1, R2, R3; R7, R8, R4 and R5), and the third group shows a different floristic composition.

Groups of relevées with closer similarity include the common presence of a large number of species: *Fagus sylvatica* ssp *moesiaca*; *Carpinus betulus*; Carex *pendula*; *Asarum europaeum*; *Sanicula europaea*; *Galium odoratum*; *Pulmonaria officinalis*; *Stellaria holostea*; *Tilia platyphyllos*; *Viola reichenbachiana*; *Lathyrus venetus* etc. Regarding the edifying species of the association, *F. sylvatica* ssp *moesiaca* covers approximately half of the sample areas.

Regarding the group formed by relevé 6, the floristic composition differs by the lack of the previously mentioned species at the other two groups of relevés. Also, *Fagus sylvatica* ssp *moesiaca* and *Carpinus betulus* have a greater surface coverage compared to the other two groups of relevés.

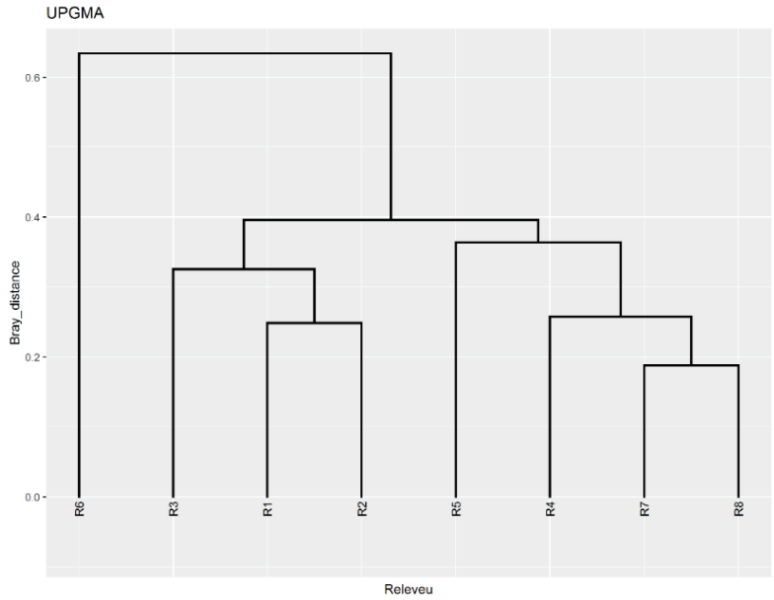

Figure 5. Similarity of relevés within the association *Carpino betuli-Fagetum sylvaticae* Paucă 1941.

Habitat 91Y0 - Dacian oak & hornbeam forests

In the researched area, the 91Y0 habitat includes hill mixed foliage forests and sessile oak forests. As for the hill mixed foliage forests identified in the study area, they include a mixture of species that cannot be classified as a certain type of vegetation mentioned in the specialized literature in Romania.

Representative phytocoenoses were identified in the localities of Sutești, Crețeni, Amarăști and Glăvile, at altitudes between 250-400 m. Following the inventory of the 5 sample areas, the trees with a good representation are: *C. betulus, Q. dalechampii, Q. robur, Q. cerris, Q. frainetto* and *A. campestre* (Fig. 6).

Following the research in the field, we can say that some hornbeam forests were formed secondarily from the oak and dalechamp's oak forests with hornbeam.

The herbaceous layer is characterized by the dominance of the species: *A. europaeum, G. odoratum, S. holostea, Vinca minor, P. officinalis, Anemone nemorosa, Allium ursinum* ssp. *ucrainicum*, *Corydalis cava* ssp. *marschalliana, Polygonatum multiflorum, P. latifolium, Scrophularia nodosa* etc.

Figure 6. Hill mixed foliage forest with beech and sessile oak from Glăvile (original).

Within the hill mixed foliage forests, three groups of relevés are formed, respectively: the group formed by relevé 5, the group formed by relevés 2 and 3 and the one formed by relevés 1 and 4 (Fig. 7).

The floristic composition includes an obviously smaller number of species, where almost half are missing from two or even three relevés.

The relatively close similarity between the two groups of relevés (R2, R3, R1 and R4) is based on the large number of common species present, among which we mention the species that define these forests (*Q. dalechampii*, *Q. robur* and *F. sylvatica* ssp *moesiaca*), which add *Carpinus betulus*, *Acer campestre*, *Ranunculus ficaria*, *Acer tataricum*, *Corydalis cava ssp marschaliana*, *Stellaria holostea*, *Arum orientale* etc.

The floristic composition of the group formed by relevé 5 includes a small number of species and reveals a low abundance and dominance of the defining species of this type of forest, but a better coverage of hornbeam and field maple.

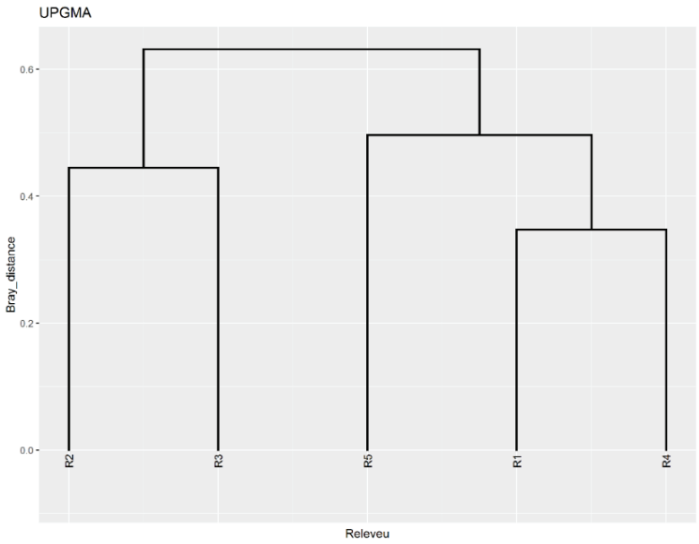

Figure 7. Similarity of relevés within the hill mixed foliage forest.

Q. dalechampii forests are spread across the Piedmont hills and the Subcarpathian depression. These forests differ from hill mixed forests mainly by the lack of the following species: *Q. cerris*; *Q. frainetto*; *F. sylvatica* ssp. *moesiaca*.

Representative phytocoenoses can be found in the localities: Amărăști – Nemoiu village, Olteanca, Glăvile – Glăvile village, Pesceana – Ursoaia village (Fig. 8).

Among the three species of sessile oak, respectively *Q. dalechampii*, *Q. polycarpa* and *Q. petraea*, the one that predominates in the researched area is *Q. dalechampii*, as also mentioned by ROMAN (1974), following the research carried out in the south of Mehendinți Plateau.

The arborescent layer covers between 70-100%, and the herbaceous layer covers the soil in a proportion of up to 50-60%.

The surveys carried out within this association include a large number of southern species (Pontic, Mediterranean, sub-Mediterranean): *C. mas*; *P. latifolium*; *L. coronaria*; *A. clematitis*; *P. micrantha* etc.

Only one orchid is mentioned within this association, respectively *Neottia nidus-avis*, in the Pesceana commune, Ursoaia village.

Figure 8. *Potentillo micranthae-Quercetum dalechampii* A.O. Horvat 1981 from Pesceana commune, Ursoaia village (original).

Four groups of relevés are defined within the association: the group formed by relevé 5, the group formed by relevé 2, the group formed by relevés 3 and 4, and the group formed by relevés 1 and 6 (Fig. 9). Among them, the following relevé groups have a closer similarity: R3, R4, R1 and R6, and the other two groups have a more different floristic composition.

Regarding the floristic composition within the groups of relevée with closer similarity, among the common species found in high numbers, we mention: *Q. dalechampii, Sanicula europaea*, *Lamium galeobdolon*, *Carex pilosa*, *Potentilla micrantha*, *Ligustrum vulgare*, *Galium pseudaristatum*, *Veronica serpyllifolia*, *Vincetoxicum hirundinaria* etc. the diagnostic species of the association, *Q. dalechampii*, has a high abundance and dominance, achieving an area coverage of about ½.

Within the group formed by relevé 2, more than half of the total species belonging to the order *Prunetalia spinosae* (*Clematis vitalba*, *Aristolochia clematitis*, *Polygonatum odoratum* etc.) are missing. At the same time, with a small coverage area, but with numerous individuals, the species *C. betulus* and *R. ficaria* are found.

In relevés 5, the floristic composition is poorer in species, and the recognition species covers only ¼ of the analysed surface.

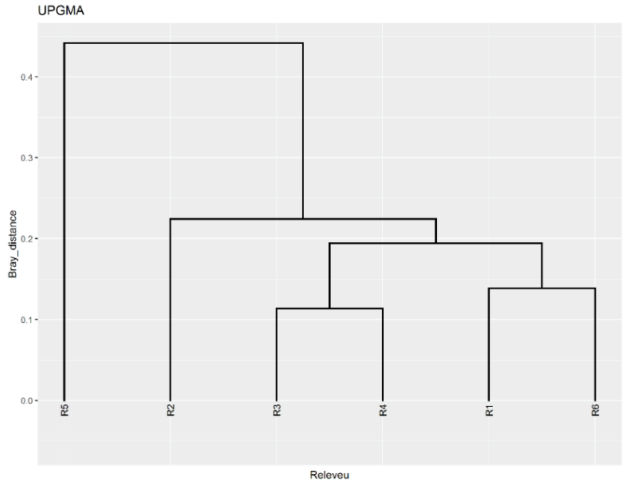

Figure 9. Similarity of relevés within the association *Potentillo micranthae-Quercetum dalechampii* A.O. Horvat 1981.

91E0* - *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)

Along the Pesceana River and its main tributaries, one can find alluvial forests of black alder (*Alno-Padion*), which develop on soils rich in alluvial deposits, periodically flooded.

In the researched territory, this habitat type corresponds to one subtype of natural habitat, according to the Romanian classification system (DONIȚĂ et al., 2005): **R4402 –** Getic-Dacian forests of hilly meadows of black alder (*Alnus glutinosa*) with *Stellaria nemorum*. The association characteristic of this type of habitat is *Aegopodio podagrariae-Alnetum glutinosae* Karpati et Jurko 1964 (sin. *Stellario nemori-Alnetum glutinosae* Kästner 1938) Lohm. 1957 (SANDA et al., 2008) (Fig. 10).

Figure 10. *Aegopodio podagrariae – Alnetum glutinosae* Karpati & Jurko 1961 from Pesceana (original).

In the studied area, the habitat has a well-layered structure. The diversity of arborescent species is relatively high, with the majority participation of the species *Alnus glutinosa*, and the following species are found scattered: *F. excelsior*, *P. nigra*, *U. glabra*.

The shrub layer is dominated by *S. nigra*, *C. monogyna*, *L. vulgare*, *E. europaeus* and *C. sanguinea*, while the characteristic herbaceous species are *Aegopodium podagraria*, *S. nemorum* and *S. glutinosa*.

One of the problems of this type of habitat, in the researched territory, is given by the ease with which it is invaded by invasive alien species (*Bidens frondosus, Helianthus* tuberosus, *Solidago canadensis* ș.a.) (Fig. 11).

The degree of ruderalization is also indicated in this case by the groups of species from the *Arction lappae* alliance, their entrance being determined by zoo-anthropogenic influences.

Both in Oltenia and in the country, the association is widespread, the proof being the large number of works in which it is cited (ZAHARIA, 1972; ROMAN, 1974; POPESCU, 1974; MALOȘ, 1977 etc.).

The southern elements are also present in this association, among which we mention: *Brachypodium sylvaticum*; *Oenanthe banatica* (species reported only in Pesceana - Ursoaia village); *Polygonatum latifolium*; *Anthriscus trichosperma*; *Narcissus poeticus* ssp. *poeticus* etc.

Figure 11. *Bidens frondosus* – Amărăști, Nemoiu village (original).

Four relevé groups are defined within this association: the group formed by relevé 1, the group formed by relevés 7, 8, 9, 10, the group formed by relevés 5 and 6 and the one formed by relevés 4, 2, 3 (Fig. 12).

Three of the groups (R7, R8, R9, R10, R5, R6, R4, R2 and R3) have a closer similarity. The fourth group (R1) having different floristic composition.

The similarity of the three relevé groups is explained by the presence of common species belonging, mainly, to the *Alno-Ulmion* alliance (*Alnus* glutinosa, *Aegopodium podagraria,* Carex *sylvatica*, *Fraxinus excelsior*, *Impatiens noli-tangere*, *Rubus caesius*, *Brachypodium sylvaticum* etc.) and the *Querco-Fagetea* class (*Ranunculus auricomus*, *Glechoma hirsuta*, *Acer campestre*, *Tilia platyphyllos* etc.).

In the floristic composition of relevé 1, the species of *Sambucus nigra* and *Lysimachia nummularia* stand out with a high presence. Of the total species mentioned at the level of the researched area, which belong to the *Querco-Fagetea* class, more than half are missing from this group (*G. hirsuta*, *R. auricomus*, *A. campestre* etc.).

Also, the presence of invasive allochthonous species (*Ambrosia artemisiifolia*, *Helianthus tuberosus*, *Solidago canadensis*, *Erigeron annuus*) indicates a sign of the influence of the zoo-anthropogenic factor at the level of the researched area.

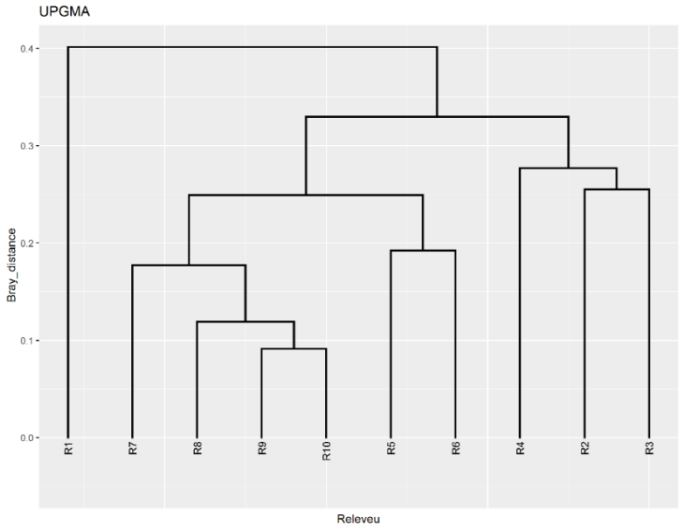

Figure 12. Similarity of relevés within the association *Aegopodium podagrariae-Alnetum glutinosae* Karpati et Jurko 1964.

Physico-chemical structure of soils within forest habitats

Soil samples were taken from forest habitats 91Y0 (association *Potentillo micranthae-Quercetum dalechampii* A.O. Horvat 1981), 91E0* (association *Aegopodio podagrariae-Alnetum glutinosae* Karpati et Jurko 1964), 91M0 (association *Quercetum frainetto-cerris* (Georgescu 1945) Rudski 1949) and 9130 (association *Carpino betuli – Fagetum sylvaticae* Paucă 1941) (Table 2).

Table 2. The physical and chemical peculiarities of the soils within the forest habitats in the basin of the Pesceana river.

Determined indicator	Test method	Aninoasa	Aninoasa	Gușoeni	Gușoeni	Nemoiu
		Habitat 91Y0	Habitat 91E0*	Habitat 91M0	Habitat 9130	Habitat 91Y0
pH	Electrochemical method pH-meter	7,23	6,93	6,31	6,53	6,91
Conductivity	Conductometric from aqueous suspension	245	36,7	31,7	32	64
Chloride	Colorimetric method applied to aqueous leachate: 1:5 S/L	14,2	14,2	17,75	17,75	17,75
Ammonium ion	Photometric method applied to aqueous leachate 1:5 S/L	SLD	0,4	SLD	0,11	1,47
THP	Gravimetric method	9.4	36.05	16.63	36.91	50.1

The analysis of physical and chemical indicators reveals the conditions of soil formation, through the accumulation of forest humus, and the decomposition of bulbs, rhizomes and roots, as well as the particularities of podzolite brown and alluvial clay soils.

Regarding soil pH, in the researched habitats, the values range from 6.31 to 7.23 (weakly acid to neutral range), being consistent with the predominantly forest soil types.

The values resulting from the analysis of the total oil hydrocarbons indicate that in the past the studied area was subject to pollution following the breakage of an oil pipeline. In these conditions, the currently low values of oil hydrocarbons are explained. Referring to these values, we can say that oil pollution is manifested locally and not at the level of the entire habitat.

Also, the chemical composition of the soil influences the characteristics of the state of vegetation highlighted by the values of chloride and ammonium ions, which prove the anthropogenic impact at the level of forest habitats.

CONCLUSIONS

Following the research carried out in the basin of the Pesceana river, nine types of Natura 2000 habitats were identified. In this article, the types of forest habitats in the area of interest were presented, a description of them and the typical associations, highlighting the particularities they present.

The analysed associations belong to three alliances, as follows: *Quercion frainetto* alliance, with two associations (*Quercetum frainetto-cerris* (Georgescu 1945) Rudski 1949 and *Potentillo micranthae-Quercetum dalechampii* A. O. Horvat 1981); alliance *Symphyto-Fagion* with association *Carpino betuli-Fagetum sylvaticae* Paucă 1941 and *Alno-Ulmion* alliance with association *Aegopodio podagrariae-Alnetum glutinosae* Karpati et Jurko 1964.

The calculation of the similarity of the relevés within the three alliances differentiates the groups of relevés belonging to each association by the fact that they are similar due to the presence of a large number of common species. The inclusion of the relevés in the four associations is determined by the presence of the same characteristic species, as well as the high abundance and dominance of the characteristic species in the respective relevés.

The identification in the basin of the Pesceana river of some types of habitats of community interest make certain areas eligible to become Natura 2000 sites, which is in line with the European Union Biodiversity Strategy for 2030, whose objectives include the legal protection of at least 30% of the land surface of the European Union, by declaring new protected areas and ecological corridors.

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