CONTRIBUTIONS TO THE PHYTOCOENOLOGICAL STUDY OF SESSILE OAK AND HORNBEAM FORESTS FROM OSULUI MOUNTAINS (NORTH-WESTERN ROMANIA)

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Abstract

In the current paper we present a phytosociological study of the phytocoenoses of the association Quercetum petraeae-Carpinetum Soó et Pócs 1957 (Syn.: Carpino-Quercetum petraeae Borza 1941) identified in the sessile oak and hornbeam forests, of the Oas Mountains, situated in the north-western part of Romania.

The phytocoenoses of these association were analyzed in terms of floristic composition, life forms spectrum, floristic elements, and ecological indices.

Keywords: phytocoenologic study, Quercus petraeae, life forms, floristic elements, ecological indexes, Oaşului Mountains

INTRODUCTION

The Oas Mountains are located in the north-western Carpathians. The studied region have a temperate continental climate with mild winters and warm summers.

The sessile oak and hornbeam forests are widespread over the entire stretch of Oas Mountains, on slopes with inclination between 5°-15°, on soils belonging to the categories of Preluvisols and Luvisols.

This association was described in west, in the southen and north-western parts of Romania (Ardelean, 2006, Coldea, 1970, Groza, 2008, Hoborka, 1980, Karácsonyi, 2011, Marian, 2008, Mititelu, 1987, Pop et al., 1978, Pop et al., 2002). Contributions to the study of flora and vegetation of Oas Mountains has brought (Ratiu et Gergely, 1979, Karácsonyi et Negrean, 1986-1987).

MATERIALS AND METHODS

The identification, as detailed as possible, of the phytocoenosis of the association *Quercetum petraeae-Carpinetum Soó et Pócs 1957*, in the Oas Mountain was based on field investigations during the years 2010 - 2012. The nomenclature of taxa was done according to Ciocârlan (2009). In the study of vegetation we used phytocoenologic research methods of Central

European school based on the principles and methods elaborated by Braun-Blanquet (1964) and adapted by Borza and Boşcaiu (1965), to the particularities of the vegetal carpet in our country.

The phytocoenologic table of association was structured according to the methodology designed by Braun-Blanquet (1964) and improved by Ellenberg (1974).

The methodology we used for positioning the association *Quercetum petraeae-Carpinetum* Soó et Pócs 1957, into the superior coeno-taxonomic units, namely suballiance, alliance, order, class, took into consideration the traditional ecological-floristic systems developed by Tüxen (1955), Braun-Blanquet (1964), Borza and Boşcaiu (1965), Soó (1980), Sanda *et. al* (2008).

RESULTS AND DISSCUSIONS

The association *Quercetum petraeae-Carpinetum* Soó et Pócs 1957, (Table 1), was identified in the following places: Turţ, Cămărzana, Batarci, Bixad, Tarna Mare, Gherţa Mică, Gherta Mare, Turulung Vii.

The phytocoenoses of the association were identified on slopes with discrete exposition (N, SW, NE, N, S), with a drop of 5°- 20°, at altitudes of 200-400 m.

Flora of carpino-fagetum, inventoried through 8 relevees totaling 132 species. Out of the total number of species, 111 of them all, belong to the coenotaxa subordinating the association, and 19 species are transgressive from and adjacent to other associations.

The tree layer is domminat of *Quercus petraea,* and *Carpinus betulis* making a good canopy coverage of 0.8-0.9. Tree trunk thickness varies between 20-30 cm and heir height between 20 - 28 m. Besides the revealing species are accompanied sporadically by: *Qurcus robur, Malus sylvestris, Prunus avium, Quercus ceris, Tilia tomentosa, Acer campestre.*

The undergrowth species, unevenly dispersed in the wooded area, consist of the following: *Cornus mas, Corylus avellana, Cornus sanguinea, Rubus hirtus, Rosa canina, Crataegus monogina.*

The herbaceous layer with a high frequency occur: *Stellaria holostea, Carex sylvatica, Dryopteris filix-mas , Hepatica nobilis, Carex spicata, Euphorbia amygdaloides, Pulmonaria officinalis, Lathyrus vernus, Hedera helix.* The rest of this sinusia's spectrum of species subordinates to the suballiance *Lathyro hallersteinii-Carpinenion* Boşcaiu et al. 1982, (*Galium schultesii, Melampyrum bihariense, Digitalis grandiflora),* the alliance *Symphyto cordati-Fagion* Vida 1959, (*Acer pseudoplatanus, Symphytum cordatum*), the order *Fagetalia sylvaticae* Pawlowski în Pawlowski et al. 1928, (*Salvia glutinosa, Galium odoratum, Myosotis sylvatica*) and the class *Querc-Fagetea* Br. -BL. et Vlieger în Vlieger em. Borhidi 1996, (*Astragalus*

Table 1

The association *Quercetum petraeae-Carpinetum* Soó et Pócs 1957

					Nr. releveului	1	2	3	4	5	6	7	8	K
					Altitude (m.s.m)	350	300	350	400	400	300	200	200	
					Exposition	SV	S	SV	NE	NE	S	S	S	
					Slope (degree) (°)	15	5	10	10	10	10	5	15	
					Consistencey of tree layer (%)	0,7	0,8	0,8	0,8	0,7	0,7	0,7	0,8	
					Herbaceu cover layer (%)	25	25	10	10	10	15	25	15	
L.f.	F.e	U	T	R	Surface (m2)	400	400	400	400	400	400	400	400	
					Char. Ass.									
PhM	E	3	3	3	*Carpinus betulus*	2	3	3	2	3	4	2	2	V
PhM	E	2,5	3	0	*Quercus petaea*	3	2	3	4	3	3	4	4	V
					Lathyro hallersteinii-Carpinenion									
H	Eua	2,5	3	3	*Carex pilosa*	+	-	+	+	-	+	+	-	III
H	Eua(M)	3	3	3	*Campanula trahelium*	+	-	-	-	+	-	-	+	II
H	E	2,5	3	3	*Digitalis grandiflora*	-	+	+	+	-	+	+	-	III
G	Ec	2,5	3	3	*Galium schultesii*	+	-	-	-	+	+	-	+	II
Th	D-B	2,5	3	3	*Melampyrum bihariense*	-	+	+	+	-	-	-	+	III
					Symphytum cordati-Fagion									
PhM	Ec	3,5	3	3	*Acer pseudoplatanus*	+	+	-	-	+	-	+	+	III
H	Ec	2,5	3	3	*Dactylis polygama*	-	+	+	+	-	+	+	-	III
H	D	3	2	3	*Symphytum cordatum.*	-	-	+	+	-	+	+	-	III
					Fagetalia sylvaticae									
G	E	3,5	4	0	*Anemone nemorosa*	+	-	+	+	+	+	-	+	IV
H	Eua	3,5	3	4	*Asarum europaeum*	-	+	-	-	+	-	+	-	II
H	Cosm	4	2,5	0	*Athyrium filix-femina*	+	-	+	+	+	+	-	+	IV
PhM	Eua	3	2	2	*Betula pendula*	+	+	-	+	-	+	+	+	IV
H	E(M)	2	4	3	*Campanula rapunculus*	-	+	-	-	+	-	+	-	II
H	E	3,5	3	4	*Carex sylvatica*	-	+	+	+	+	+	+	+	IV
H	Ec	3,5	3	3	*Chaerophyllum aromaticum*	+	-	-	+	+	-	+	+	III
Ch	E(M)	3	3,5	4	*Euphorbia amygdaloides*	-	+	+	-	-	+	-	-	II
PhM	E	3	3	4	*Fagus sylvatica*	-	+	+	-	-	+	-	-	II
G	Carp-B	4	2	3	*Festuca drymeia*	-	+	+	-	+	+	-	+	III
Phm	Eua	4	3	3	*Frangula alnus*	-	+	+	+	-	-	+	+	III
G	Eua	3	3	3	*Galium odoratum*	+	-	-	+	+	+	-	-	III
Th	Cosm	3,5	3	3	*Geranium robertianum*	-	-	+	+	+	-	-	+	III
Th	Eua	4	3	4	*Impatiens noli-tangere*	+	-	+	-	+	+	-	+	III
H	Ec	3	0	4	*Lamiastrum galeobdolon*	-	+	+	+	-	-	+	+	III
H	Eua	3	3	3	*Lathyrus vernus*	+	-	-	+	+	+	-	-	III
H	E	2,5	2,5	2	*Luzula luzuloides*	+	-	-	+	+	+	-	-	
Phm	E	3,5	3	4	*Malus sylvestris*	-	+	+	+	-	-	+	+	III
H	Cp(bor)	3,5	3	3	*Milium effusum*	-	+	+	-	+	-	-	-	II
H	Eua	3,5	3	3	*Myosotis sylvatica*	+	-	-	+	+	+	-	-	II
G	E	3	3	3	*Polygonatum multiflorum*	-	+	+	+	+	-	+	+	IV
Phn	E	2	3	3	*Rosa canina*	-	+	+	+	-	-	+	+	III
Phn	E	3	2,5	3	*Rubus hirtus*	-	-	+	+	-	-	-	+	II
Phn	Cp(bor)	3	3	3	*Rubus idaeus*	-	+	+	-	+	-	+	+	III
H	Alt-M	3,5	3	4	*Sanicula europaea*	+	-	-	+	-	+	-	-	II
H	Eua	3,5	3	4	*Salvia glutinosa*	+	-	-	+	-	+	-	-	II
H	Eua	3,5	0	0	*Stachys sylvatica*	-	+	+	-	-	+	-	-	II
H	Ec	3	3	3	*Symphytum tuberosum*	+	-	-	+	+	-	+	+	III
Phm	Eua	4	3	3	*Ulmus glabra*	-	+	+	-	-	+	-	-	II
					Querco-Fagetea									
PhM	E	2,5	3	3	*Acer campestre*	-	+	+	+	+	-	+	+	IV
H	Eua	3,5	3	3	*Aegopodium podagraria*	-	-	-	+	+	-	-	-	II
H	Eua	3	3	4	*Astragalus glycyphyllos*	-	+	+	-	-	-	+	+	III
H	Eua(M)	3	3	4	*Brachypodium sylvaticum*	-	-	-	+	+	-	-	-	II
H	Eua	3,5	3	3	*Bromus benekenii*	-	+	+	-	-	+	-	-	II
G	E	2,5	3	4	*Cephalantera longifolia*	-	+	+	-	-	+	-	-	II
Phn	Ec	3	3	3	*Clematis vitalba .*	+	-	-	+	+	-	+	+	III
H	Cp	2	3	3	*Clinopodium vulgare*	+	-	-	+	+	-	+	+	III
G	E	2,5	3	3	*Convallaria majalis*	-	+	+	-	-	-	+	+	III
Phm	P-M-Ec	2	3,5	4	*Cornus mas*	+	+	-	-	+	+	+	-	III
Phm	Ec	3	3	4	*Cornus sanguinea*	-	+	+	+	-	-	+	+	III
Phm	E	3	3	3	*Coryllus avelana*	+	-	+	+	+	+	-	+	IV
Phm	E	2,5	3	3	*Crataegus monogyna*	+	+	+	-	+	+	+	+	IV
H	Cosm	4	0	0	*Deschampsia caespitosa*	+	-	-	-	+	+	-	-	III
H	Cosm	4	3	0	*Dryopteris filix-mas*	+	-	-	+	+	+	-	-	III
Phm	E	3	3	3	*Euonymus europaeus*	-	+	+	+	-	-	+	+	III
H	Eua	3	2,5	0	*Fragaria vesca*	+	-	-	+	+	-	+	+	III
PhM	Ppn	4,5	4	4,5	*Fraxinus angustifolia*	+	-	-	-	-	-	-	-	I
H	Eua	3	3	4	*Geum urbanum*	+	-	-	+	+	-	+	+	III
Phn	Alt	3	3	3	*Hedera helix*	+	+	-	+	-	-	+	-	III
G	E	3	3	4	*Hepatica nobilis*	-	+	+	-	+	+	-	+	III
H	Eua	3	0	3	*Hieracium murorum*	-	+	+	-	-	+	-	-	II
Th	Eua(M)	2,5	3	3	*Lapsana communis*	+	-	-	+	-	-	+	-	II
Ch	E	3	3,5	0	*Loranthus europeus*	-	+	+	-	+	+	-	+	III
Ch	E	4	3	3	*Lysimachia nummularia*	-	+	+	-	+	+	-	+	III
H	Eua	2,5	2	0	*Luzula pilosa*	-	+	+	+	+	-	+	+	IV

Th	E	3	3	3,5	*Melampyrum nemorosum*	+	-	-	+	-	+	-	-	II
H	Ec	2,5	3	4	*Melica uniflora*	-	+	+	-	-	-	+	+	III
Th	Eua	2,5	3	3	*Moehringia trinervia*	-	-	-	+	+	-	-	-	II
H	E	3	3	0	*Mycelis muralis*	-	+	+	-	-	-	+	+	III
H	Eua(M)	4,5	3	4	*Rubus caesius*	+	-	-	+	+	+	-	-	III
H	Eua	3	3	0	*Poa nemoralis*	+	-	-	+	+	+	-	-	III
PhM	Eua	3	2	2	*Populus tremula*	-	+	+	+	-	-	+	+	III
H	Eua	3	2	5	*Primula veris*	-	-	+	+	-	+	+	-	III
Phm	Eua	2	3	3	*Prunus spinosa*	-	-	+	+	+	+	+	+	III
H	E	3,5	3	3	*Pulmonaria officinalis*	+	-	-	-	+	-	-	+	II
Phm	E	2	3	4	*Pyrus piraster*	+	+	-	-	+	-	-	+	III
Phm	Eua	3	3	3	*Salix caprea*	-	+	+	-	-	+	-	-	II
PhM	E	3	3	3	*Sambucus nigra*	-	+	+	+	-	+	+	-	III
G	E	3,5	3	4	*Scilla bifolia*	+	+	-	-	+	-	-	+	III
Ch	Eua	2	2	2	*Veronica officinalis*	+	+	-	-	+	-	-	+	III
Ch	M	3	3	3	*Vinca minor*	-	+	-	+	+	-	+	+	III
H	Eua	3	2,5	3	*Viola reichenbachiana*	-	+	+	+	-	+	+	-	III
H	Eua	2,5	0	2	*Viola collina*	+	-	-	-	+	-	-	+	II
					Carpinion									
H	Ec	3	2,5	3,5	*Aposeris foetida*	+	+	+	-	+	+	-	+	IV
Phm	E	3	3	3	*Cerasus avium*	+	+	-	+	+	-	+	+	IV
H	E(M)	2,5	3	3	*Festuca heterophylla*	+	-	+	-	+	+	-	+	III
H	Eua	3,5	3	3	*Ranunculus auricomus*	+	-	-	+	+	+	-	+	III
H	Eua	3	3	0	*Stellaria holostea*	-	+	+	+	+	-	+	-	III
PhM	E	3	3	3	*Tilia cordata*	+	-	+	+	-	+	-	+	III
					Quercetea pubescenti-petraeae									
Phm	E(C)	2,5	3,5	4	*Acer tataricum*	-	+	+	-	+	+	-	+	III
H	Eua	2,5	3	3	*Campanula cervicaria*	-	+	+	-	+	+	-	+	III
G	Ec	3	3	4	*Cardamine bulbifera*	-	+	+	+	-	+	+	-	III
G	E	2,5	3	4	*Cephalanthera damasonium*	+	-	-	+	+	-	+	+	III
Phn	Ec	2,5	3	0	*Cytisus nigricans*	-	-	+	+	-	+	+	-	II
H	Ec	2,5	3	3	*Dactylis polygama*	+	-	-	-	+	-	-	+	II
H	D-B	2,5	3	5	*Galium pseudoaristatum*	+	-	-	+	+	-	+	+	III
Ch	Eua	3	3	0	*Glechoma hederacea*	-	-	+	+	-	+	+	-	III
H	Cp	2	3	3	*Hieracium umbellatum*	+	-	+	+	-	+	-	+	III
H	Eua	3	3	0	*Hypericum perforatum*	+	-	-	+	+	+	-	-	III
H	Ec	2,5	3	3	*Lathyrus niger*	-	+	+	-	-	-	+	+	III
Phm	E	2,5	3	3	*Ligustrum vulgare*	+	-	-	+	+	+	-	-	III
H	E	2	3	4	*Inula conyza*	+	-	-	+	+	+	-	-	III
G	Cosm	3	3	0	*Pteridium aquilinum*	-	+	+	+	-	-	+	+	III
H	Ec-M	2,5	3	5	*Melittis melyssophyllum*	-	-	-	+	-	-	-	-	I
H	Eua	2,5	3	4	*Pulmonaria mollis*	+	-	+	+		+	-	+	III
PhM	E	3,5	3	0	*Quercus robur*	+	-	+	+	-	+	-	+	III
PhM	M	2	3,5	3	*Quercus ceris*	-	+	+	+	-	+	+	-	III
PhM	M	2,5	3	0	*Quercus dalechampii*	-	-	-	+	-	-	+	-	II
H	M	2	3,5	3	*Silene viridiflora*	+	+	+	-	+	+	-	+	IV
H	Eua	2,5	2,5	3	*Tanacetum corymbosum*	-	-	+	+	-	-	-	-	II
PhM	B	2,5	3,5	3	*Tilia tomentosa*	-	+	-	-	+	+	-	+	III
PhM	Ec	2,5	3	4	*Tilia platyphyllos*	+	+	+	-	+	+	-	+	IV
Ch	Eua	3	0	0	*Veronica chamaedrys*	+	-	-	-	-	+	-	+	II
H	E	2	4	4	*Vincetoxicum hirundinaria*	-	+	+	-	+	-	-	-	II
					Variae syntaxa									
H	Cp	0	0	2	*Agrostis capilaris*	+	-	-	-	-	-	-	-	I
H	E	3,5	2,5	0	*Ajuga reptans*	+	-	+	-	-	+	+	-	III
H	Eua(M)	3	3	0	*Betonica officinalis*	-	-	-	-	+	+	-	+	II
TH	E	3	2,5	3	*Campanula patula*	+	+	-	-	-	+	-	+	III
H	D-Pn	3,5	3	0	*Centaurea banatica*	-	-	-	-	+	+	-	+	II
G	E	2	3	5	*Cephalanthera rubra*	+	+	-	-	-	+	-	+	III
H	Cp	3	3	3	*Gnaphalium sylvaticum*	-	+	-	+	-	-	+	-	II
H	Eua	4	3	0	*Eupatorium cannabinum*	+	-	-	-	+	-	-	+	II
H	Eua	3,5	3	4	*Humulus lupulus*	-	+	-	+	-	-	+	-	II
H	Eua	3	0	0	*Leucanthemum vulgare*	-	+	+	-	-	+	-	-	II
H	Ec	2	3	3	*Hieracium racemosum*	-	+	-	+	-	+	-	+	II
PhM	Eua	3,5	3,5	4	*Prunus serotina*	-	-	-	-	+	-	-	-	I
PhM	Eua	1,5	4	4,5	*Pinus sylvestris*	-	-	+	+	-	-	-	+	II
PhM	Adv	2,5	4	0	*Robinia pseudacacia*	-	+	-	-	+	-	+	-	II
H	Cosm	2	3	2	*Rumex acetosella*	+	-	-	+	-	+	-	-	II
Phm	Eua	5	3	3	*Salix cinerea*	+	-	-	-	+	+	-	-	II
Ch	Eua	4,5	3	4	*Solanum dulcamara*	+	-	-	-	-	+	-	-	II
H	Cp	2,5	3	3	*Solidago virgaurea*	-	+	-	-	+	-	+	-	II

Place: 1..Tarna Mare,02.08.2011; 2. Cămărzana 19.07.2011; 3. Bixad, 26.07.2010; 4. Gheţa Mare; 5. Gherţa Mică, 15.07.2011; 6.Turţ, 04.08.2010; 7. Batarciului, 30.07.2011; 8. Turulung-Vii 21.07. 2011.

glycyphyllos, *Cornus mas*, *Crataegus monogyna*,).

In life forms spectrum (Fig. 1), the dominant are hemicryptophytes (H = 49.24%), their abundence being largely influenced by the mild temperate climate, and the natural hazards (trees felled by wind and snow).

The hemicryptophytes are followed by phanerophytes (Ph = 29.53%), geophytes (G = 9.84%), terophytes (Th + TH = 5.29%) and camephytes (Ch = 5.30%).

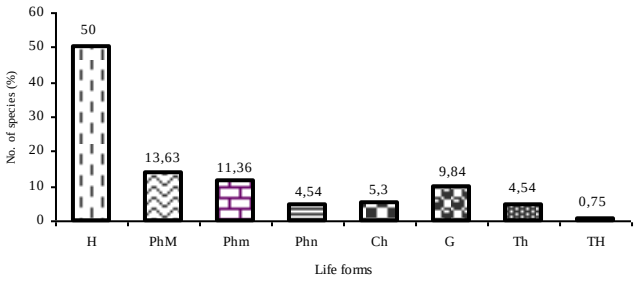

Fig. 1. Life forms spectrum of the association *Quercetum petraeae-Carpinetum* Soó et Pócs 1957

In the floristic elemens spectrm (Fig. 2), Euroasian species are predominate (Eua = 36.36%), followed by European (E = 30.30%) and Central-European (Ec = 12.11%), and with a small weight Cosmopolitan species (Cosm = 4.54%), Circumpolar (Cp = 3.5%), Atlanto-Mediterranean (Atl-M = 0.75%), Circumpolar boreal-(Cp (boron) = 1.51%), Carpathian-Balkan (Carp-B = 0.75%), Adventive (Adv = 0.75), Mediterranean (M = 3.03%), Daco-Balkan (DB = 1.51%), Dacian (D = 0.75%), Balkan (B = 0.75%), Ponto-Pannonian (PPN = 0.75), Dacian-Pannonian (D-Pn =0.75%), and Ponto-Mediterranean-Central European (PM-Ec = 1.75%).

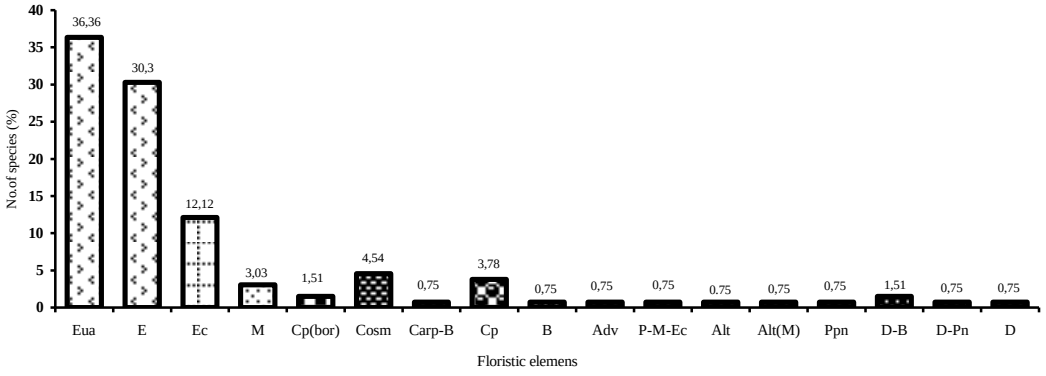

Fig. 2. Floristic elemens spectrum of the asociation *Quercetum petraeae-Carpinetum* Soó et Pócs 1957

The diagram of the ecological indices (Fig. 3), shows that most species of the association are mesophylous in terms of humidity ($U_{3-3,5}$ =

52.27%), followed by xero-mesophylous ($U_{2-2,5}$ = 36.36%). Depending on the temperature the majority are micro-mesothermophylous ($T_{3-3,5}$ = 77.27%) followed by microthermophylous species ($T_{2-2,5}$ = 12.11%), and from the chemical reaction of the soil, the dominant species are acid-neutrophylous ($R_{3-3,5}$ = 48.48%) followed by those weak acid-neutrophylous (R_4 = 24.24%), euri-ionical (R_0 = 18.93%).

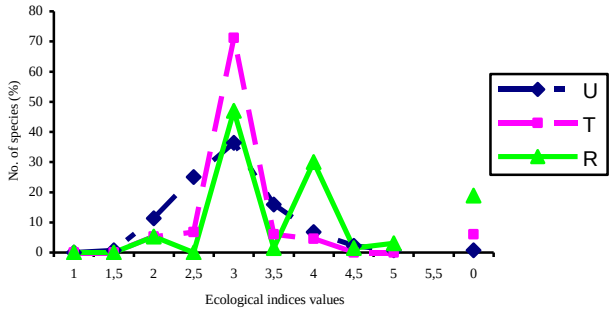

Fig. 4. Diagram of ecological indices for the association *Quercetum petraeae-Carpinetum* Soó et Pócs 1957

The phytocoenosis of the association *Quercetum petraeae-Carpinetum* Soó et Pócsi 1957, occupy important areas in the Oas Mountains. Within this area were identified and other forest associations such as: *Quercetum petraeae-cerris* Soó 1963, *Genisto tinctoriae-Quercetum petraeae* Klika 1932, *Carpino-Fagetum* Paucă 1941 and *Tilio argenteae-Quercetum petraeae-cerris* Soó 1957.

If we compare the association identified and described by us from the Oas Mountains with those of the Zarand Mountains, described by (Pop, 1978) we find many similarities and few differences.

In the floristic composition of phytocoenosis of the association *Quercetum petraeae-Carpinetum* Soó et Pócsi 1957, 132 species are described in Oas Mountains and 85 species in Zarand Mountains.

The life forms spectrum reveals the prominence of hemicryptophytes in both territories (H = 49.24% (Oas Mountains); H = 51.76% (Zarand Mountains). The lush of hemicryptophytes in the two territories suggests a climate that is temperate, which favours the grassy species.

Differences in life-forms give terophytes biennial species (TH = 0.75%) found in Oas Mountains, which on the Zarand Mountains, are missing.

In terms of floristic composition (Zarand Mountains), there is some similarity in the fact that they share a total of 45 species.

There are also some disimillarities by the fact that from the Zarand Mountains, there are a number of 40 species, which are missing in the forests of Oas Mountains.

European species together with Central European species amount to a percentage of 42.41%, which explains the wet and moderately thermophilous nature of the stations where mixed oak forests, lime and cerris develop.

In the Oas Mountains, there are present Carpathian-Balkan (0.75%), Cosmopolitan (4.54%), Adventive (1.72%) and Pontic-Mediterranean-Central European (0.75 %) elements, which in the Zarand Mountains are missing.

In the Zarand Mountains there are present sub-Mediterranean (8.23) which in the Oas Mountains are missing.

The associations described are stable in terms of dynamics and ecological balance, none of the dominant species of the tree or of the grassy layer tend to replace each other.

The economic value of these forests is high; they provide wood for industry and are also used as firewood. They also host different economic categories of plants: food, fodder, honey, medicinal, industrial and decorative.

CONCLUSION

The association is dominated by hemicriptophytes, megaphanerofite and mezophanerofite (fig. 1), European and Eurasian respectively (fig. 2), common situation quercinee forests between 200 and 400 m, altitude in the north-western country.

The analysing the data from the diagram of ecological indices we conclude that the sessile oak and hornbeam forests, from the two hydrographic areas (Oas Mountains and Zarand Mountains) have a strong mesophylous, micromesothermophylous character, growing on weak acid brown earths, as seen from the prevalence of acid-neutrophylous, weakly acid-neutrophylous, and euri-ionical species.

The sessile oak and hornbeam forests, have suffered in the recent years an anthropogenic influence due to the aggressive timber exploitation by traders, the abusive and uncontrolled cuttings by some owners.

REFERENCES

1. Ardelean A., 1999, Flora şi vegetaţia din Valea Crişului Alb – de la izvoare până la ieşirea din ţară, Edit. “Vasile Goldiş” University Press, Arad, 311 p.
2. Ardelean A., 2006, Flora şi vegetaţia judeţului Arad, Edit. Academiei Române Bucureşti, 508 p.

3. Borza Al., N. Boşcaiu, 1965, Introducere in studiul covorului vegetal, Edit. Academiei Romane, Bucureşti, 342 p.
4. Braun-Blanquet J., 1964, Pflanzensoziologie. Springer- Verlag, Wien-New York, 3, Aufl, pp. 12-24.
5. Ciocarlan V., 2009, Flora ilustrată a Romaniei. Pteridophyta et Spermatophyta. Edit. Ceres, Bucureşti, 141 p.
6. Coldea Gh., 1970, Cercetări fitocenologice asupra pădurilor din Munţii Plopiş, Studii si Cercetări de Biologice, Seria Botanică, 22 (1) pp. 17-32.
7. Cristea V., D. Gafta, F. Pedrotti, 2004, Fitosociologie, Edit. Presa Universitară Clujeană, Cluj-Napoca, 394 p.
8. Ellenberg H., 1974, Zeigerwerte der Gefässpflanzen Mitteleuropas - Scripta Geobotanica. Göttingen, 9: 1-97.
9. Groza Gh., 2008, Flora şi vegetaţia Munţilor Pădurea Craiului, Edit. Risoprint, Cluj-Napoca, 295 p.
10. Hoborka I., 1980, Flora şi vegetaţia din Munţii Dognecei. PhD Thesis, University „Babes-Bolyai", Cluj-Napoca, Csürös, Şt., coordinator.
11. Karácsonyi C., G. Negrean, 1986-1987, Contribuţii la flora Munţilor Oaş – Gutâi (jud. Satu Mare), Satu – Mare, Studii şi Comunicari, VII- VIII, 373-377.
12. Karácsonyi C., 1995, Flora şi vegetaţia judeţului Satu Mare, Edit. Muzeului Sătmărean.
13. Karácsonyi C., 2011, Flora şi vegetaţia Dealurilor Tăşnadului şi a colinelor marginale, „Vasile Goldis" University Press, Arad, pp. 127-132.
14. Marian M., 2008, Flora şi vegetaţia Culmii Codrului (jud. Satu-Mare). Universitatea de Nord Press, Baia Mare, 259 p.
15. Mititelu D., M. Dorca, 1987, Flora şi vegetaţia din imprejurimile municipiului Baia Mare, Contribuţii Botanice, Cluj-Napoca:143-180.
16. Pop I., V. Cristea, I. Hodişan, 2002, Vegetaţia Judeţului Cluj. (Studiu fitocenologic, ecologic, bioeconomic şi ecoprotectiv). Contribuţii Botanice, Cluj-Napoca, 35(2): 5-254.
17. Pop I., I. Hodişan, 1972, Vegetaţia dealului Şomleu-Oradea (jud. Bihor), Contibuţii Botanice, Cluj-Napoca, pp. 247-258.
18. Pop I., A. Ardelean, V. Codoreanu, A. Crişan, V. Cristea, Csürös Káptalan M., Csürös Ş., Ghişa E., Hodişan I., Raţiu O., Szász E., 1978, Flora şi vegetaţia Munţilor Zarand, Contribuţii Botanice, Cluj-Napoca, 18, pp. 1-215.
19. Raţiu O., I. Gergely, I. Moldovan, 1977, Consideraţii fitocenologice asupra pădurilor depresionare din "Ţara Oaşului" Contribuţii Botanice, Cluj Napoca, 9-18.
20. Raţiu O., I. Gergely, 1978, Analiza complexă a florei „Ţării Oaşului", Contribuţii Botanice, Cluj-Napoca, 217-226.
21. Raţiu O., I. Gergely, 1979, Caracterizarea sinecologică a principalelor fitocenoze lemnoase din „ Ţara Oaşului", Contribuţii Botanice Cluj-Napoca, 85-118.
22. Sanda V., O. Kinga, P. Burescu, 2008, Fitocenozele din Romania, sintaxonomie, structură, dinamică şi evoluţie. Ars Docendi Publishing House, Bucharest, p. 570.
23. Soó R., 1964-1980, A magyar flora és vegetacio rendszertani, növényföldrajzi kézikönyve, Akadémiai Kiadó, Budapest, pp. 1-6.
24. Tüxen R., 1955, Das System der nordwestdeutschen Pflanzengesellschaften, Mitt Floristic-Sociologie Arbeitsgen, n. Folge, 5: 155-176.