THE STUDY OF *SYMPHYTO CORDATI-FAGETUM* ASSOCIATION IN CODRU-MOMA MOUNTAINS

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Abstract

In the present paper are presented the results of research of pure European bech forests with Symphytum cordatum encountered in Codru-Moma Mountains (North-Western Romania).

The pure European bech forests, falling in Symphyto cordati-Fagetum association Vida (1959) 1963, achieved a forestry formation area feature middle and lower mountain layer, installed on flat or gently sloping land, deep soils, poor skeletal, rich humus mull type.

The association has been analyzed in terms of life forms, floristic elements and ecological indices.

Key words: Codru-Moma Mountains, association, phytocoenoses, floristic elements, life forms, ecological indices

INTRODUCTION

Thanks to their individualization in contrast with the low surrounding units, the Codru-Moma Mountains limits can be traced fairly easily in most areas.

The territory of Codru-Moma Mountains is located in the counties of Bihor and Arad, being gripped between 46°20'-46°41' North latitude and 22°06'-22°32' longitude East (Buz, 1980).

Codru-Moma Mountains are part of the internal areas of the Carpathians being formed in the paleozoic and mezozoic formations, to which, in small measure, tertiary volcanic rocks are added. They have a typical structure of canvas (overlapped tectonic units) as a result of such movements that occurred during the last period of Mesozoic, in the Cretaceous era (Coteţ, 1971).

As an integral part of the Apuseni Mountains, the massif of Codru-Moma Mountains got individualized under a long process, during which there were several stages of marine and tectono-igneous sedimentaring, and cycles of mainland modeling (Buz, 1980).

Data on this association were supplied by Paucă (1941), who placed the pure European beech forests with *Symphytum cordatum*, from Codru-Moma Mountains, in a group of associations called by Moor *Fagetum carpaticum* (Carpathian European beech forest). Of the total of 14 phytocoenological relevées made, 11 relevées were made on limestone

bedrock (granite) and 3 relevées on silicate rocks, in which *Symphytum cordatum* species occurs in 5 of these.

Dacian European beech forest with *Symphytum cordatum* and *Dentaria glandulosa* have been identified in the area under investigation on small surfaces encountered in Bihor County on Tărcăiţei Valley, Şesuţa Valley, Măgurii Hill, Large Hill, Ronţaru Hill, Caprei Peak, as well as in Arad County on Cerbului Valley, Luștilor Vallley, Băilor Valley, Zugăului Valley, Brook of Lacul, Brook of Ponoraș, Peak of Izoiu, Peak of Bălătească, Trei Holumburi, between the Tinoasa field and Brătcoaia field.

MATERIAL AND METHODS

Phytocoenologic research methods of central European school were used in the study of the vegetation in Codru-Moma Mountains.

The identification and description of the association was made on the basis of floristic criteria, with the help of characteristic, edifying, and differential species. The name of the association was given in accordance with the provisions laid down in the Phytocoenologic Nomenclature Code (Weber et al., 2000).

For a more accurate description of vegetation in the the field sheet there were recorded data relating the forest site conditions and those of habitat in which these phytocoenoses develop, namely: altitude, exposition, slope, tilt rock, soil, vegetation cover layer (%), height (m) and tree diameter (cm), and the list of species, location and date of the research.

The determination of ecological indices values, floristic elements and life forms was made after the synthesis works developed by Sanda et al. (1983, 2003), Ciocârlan (2000), Sanda (2002), Cristea et al. (2004).

The values represented in the association tables through +, 1, 2, 3, 4, 5, which means the abundance-dominance of each species, have the following percentage values: +=0.5%, 1=10%, 2=17.5%, 3=37.5%, 4=62.5%, 5=87.5% (Ivan and Doniţă, 1975).

The quantitative criteria in the phytocoenoses research was the abundance and dominance of individuals, according to the system developed by Braun-Blanquet, with the establishment of classes of constancy (K = I-V).

Vertical grouping of species present in the synthetic table was done using the coenotaxonomic, economic and alphabetically criteria combined.

Special attention was paid to the analysis of life forms, floristic elements and ecological indices through their graphical interpretation in the form of histograms and diagrams (Cristea et al., 2004).

The study of *Symphyto cordati-Fagetum* association from Codru-Moma Mountains is based on research carried out in the period 2007-2011.

The Botanical Nomenclature used is therefore developed for Romania by Ciocârlan (2000), in conjunction with the information provided by the "International Code of Botanical Nomenclature" (Code of Tokyo, 1993).

RESULTS AND DISCUSSION

In our country this association is frequently cited from Moldova (Pascal and Mititelu, 1971; Chifu and Ştefan, 1973; Chifu et al., 2006; Oprea and Sîrbu, 2009), from Muntenia (Dihoru, 1975; Alexiu, 1998), from Crişana (Resmeriţă, 1970; Coldea, 1975; Raţiu and Gergely, 1976; Pop et al., 1978; Raţiu et al., 1984; Groza, 2008), from Transylvania (Marian, 1998; Oroian, 1998; Mihăilescu, 2001; Sămărghiţan, 2005), from Oltenia (Niculescu, 2006; Răduţoiu, 2006).

The European mountain beech with *Symphytum cordatum* are spread in Codru-Moma Mountains at altitudes of 650-900 m, an we place them in *Symphyto cordati-Fagetum* association Vida (1959) 1963. The specific relief of this association is that of slopes with low inclination (0-10°) with various exhibitions, plateaus and valleys bottoms. The substrate consists of alkaline, intermediate and less acidic rocks. European beech forests with *Symphytum cordatum* live on eutricambosol type of soils, profound or skeletal ones, middle-wet, with high trophicity, soils rich in mull humus.

In then tree layer, which reaches heights of 20-30 m and diameters of 40-120 cm, the dominant and edifying species is *Fagus sylvatica*, with an abundance-dominance of 78.29%. In this layer of vegetation *Abies alba*, *Acer pseudoplatanus*, *Ulmus glabra*, *Acer platanoides*, *Betula pendula*, *Fraxinus excelsior*, *Populus tremula* can be found.

The layer of bushes brings together a small number of species, *Sambucus nigra*, *Sambucus racemosa*, *Corylus avellana*, *Salix capraea*, *Euonymus latifolius*. The grassy layer, with a coverage of 55-100%, indicates the high presence of *Symphytum cordatum* with a general coverage 7.76% ADm.

It is an association with a rich floristic composition, totaling 92 species (table 1). From the species that are characteristic to the ***Symphyto-Fagenion*** suballiance, ***Symphyto cordati-Fagion*** alliance, ***Fagetalia sylvaticae*** order, ***Querco-Fagetea*** class, we mention: *Acer pseudoplatanus*, *Helleborus purpurascens*, *Rubus hirtus*, *Allium ursinum*, *Athyrium filix-femina*, *Corydalis solida*, *Euphorbia amygdaloides*, *Galanthus nivalis*, *Galium odoratum*, *Isopyrum thalictroides*, *Lamium galeobdolon*, *Oxalis acetosella*, *Pulmonaria officinalis*, *Anemone nemorosa*, *Corydalis cava*, *Dentaria bulbifera*, *Dryopteris filix-mas*, *Erythronium dens-canis*, *Geranium robertianum*, *Glechoma hirsuta*, *Ranunculus ficaria*, *Scilla bifolia*.

In addition to the typical association in which *Symphytum cordatum*, the characteristic species, is also dominant, in 8 phytocoenoses the differential species *Dentaria glandulosa* is distinguished by abundance and dominance (Adm=22.16%), and together with the 3 differential species: *Anemone ranunculoides*, *Arum maculatum*, *Mercurialis perennis* forms a compact population, which in terms of floristic and ecological characteristics I placed in *dentarietosum glandulosae* subas. nova (rel. 1-7), subordinated to the basic association. The subassociation holotype is no. 1 relevée from table 1.

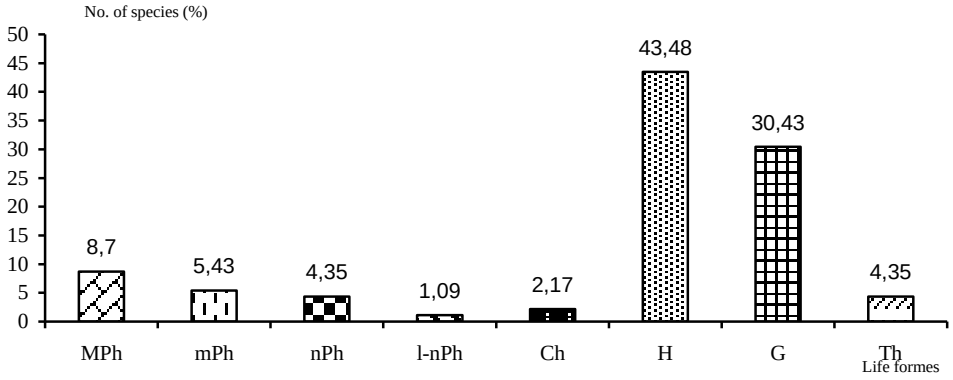

Fig. 1 The life forms spectrum of *Symphyto cordati-Fagetum* association Vida (1959) 1963

The life forms spectrum is dominated by the hemicryptophytes (43.48%), followed by geophytes (30.43%) and phanerophytes (18.48%), other life forms having a low representation (Fig. 1).

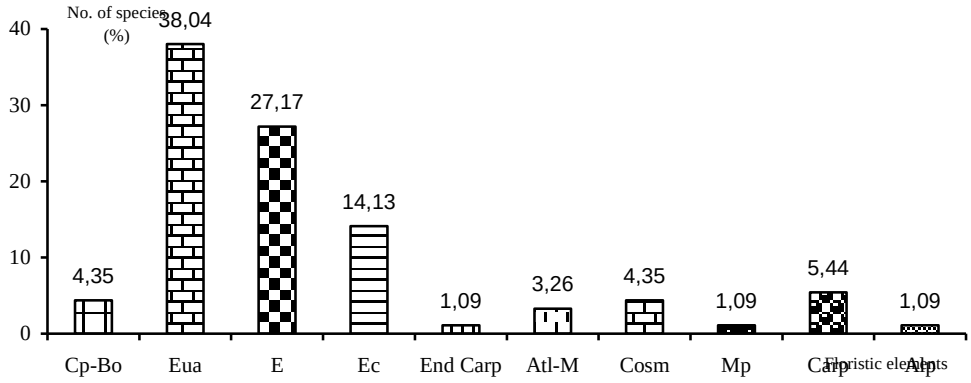

Fig. 2 Spectrum of floristic elements of the
Symphyto cordati-Fagetum association Vida (1959) 1963

In the phytocoenoses of the association, floristic elements with high percentage are the Eurasian species (38.04%), replaced by the European species (27.17%), central European (14.13) and Carpathian ones (5.44%) (Fig. 2)

Table 1

Symphyto cordati-Fagetum Vida (1959) 1963
- *dentarietosum glandulosae* subas. nova (rel. 1-7)

L.f.	F.e.	U.	T.	R.	2n	Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	K
						Altitude (m.s.m.)	650	700	800	700	700	780	850	680	650	700	740	800	800	700	660	700	650	780	900	
						Exposition	NE	-	NE	NV	NE	NV	NV	N	NE	N	NE	NE	NV	NE	NE	N	NE	NV	N	
						Consistency of tree layer	0,9	0,9	0,8	0,9	0,9	0,8	0,9	0,9	0,9	0,8	0,8	0,9	0,8	0,8	0,9	0,9	0,8	0,9	0,9	
						Hight of the trees (m)	30	34	25	30	30	34	30	28	22	22	24	22	28	30	34	32	28	24	20	
						Diameter of the trees (cm)	80	60	90	60	80	80	74	100	90	70	80	60	60	120	120	100	60	40	80	
						The grass layer (%)	90	85	65	50	100	90	100	80	50	70	90	95	90	95	85	60	90	55	65	
						Slope (degree) (º)	5	-	5	5	10	5	10	10	5	10	5	5	5	5	5	5	10	5	10	
						Area (m²)	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	
H-G	Carp	3	2	3	D	As. *Symphytum cordatum*	1	1	+	+	3	3	1	2	1	1	+	1	+	1	+	1	1	+	1	V
MPh	E	3	3	0	D	As. *Fagus sylvatica*	5	5	4	5	5	4	5	5	5	4	4	5	4	4	5	5	4	5	5	V
G	End Carp	4	2,5	4	P	Subass. *Dentaria glandulosa*	4	4	3	+	3	3	4	1	1	1	1	1	+	1	1	1	1	3	3	V
G	E	3,5	3	4	P	Dif. *Anemone ranunculoides*	+	+	+	+	+	+	+	+	·	·	+	·	+	+	+	+	+	+	+	V
G	Ec	3,5	3,5	4	P	Dif. *Arum maculatum*	+	+	+	+	·	+	+	+	+	+	+	+	·	+	·	+	+	·	+	IV
H-G	E	3,5	3	4	P	Dif. *Mercurialis perennis*	+	+	+	1	·	·	1	+	·	·	1	+	+	+	+	+	+	·	+	IV
						Symphyto-Fagenion, Symphyto cordati-Fagion																				
MPh	Ec	3,5	3	3	P	*Acer pseudoplatanus*	+	+	2	+	·	2	+	+	+	·	·	·	2	2	+	+	1	+	·	IV
H	Carp	2,5	3	4	P	*Helleborus purpurascens*	+	·	·	·	·	·	+	+	+	·	+	+	·	+	·	+	+	·	+	III
H	Ec	4	2,5	4	D	*Aconitum vulparia* ssp. *vulparia*	+	·	+	·	·	·	·	·	+	·	·	·	+	+	·	·	·	·	·	II
MPh	Ec	4	3	0	D	*Abies alba*	·	·	·	·	·	·	·	·	·	1	2	+	·	·	·	·	·	·	·	I
G	Carp	3	1	2	D	*Crocus vernus*	·	·	·	·	·	1	·	·	·	·	·	·	·	·	+	·	·	·	·	I
G-H	Carp	4	2	3	D	*Festuca drymeja*	·	·	·	·	+	·	·	·	·	+	·	·	·	+	·	·	·	·	·	I
						Fagetalia sylvaticae																				
nPh	E	3	2,5	3	P	*Rubus hirtus*	+	+	+	+	+	+	1	+	+	2	·	+	+	+	+	1	+	+	·	V
G	E	3,5	3,5	4	D	*Allium ursinum*	+	+	1	2	·	+	·	3	2	+	1	1	2	1	1	+	+	+	+	V
G	Eua	3	3	3	P	*Galium odoratum*	+	+	+	+	+	+	1	+	·	+	+	1	+	+	+	+	·	·	+	V
G	Ec	3	3,5	3	D	*Isopyrum thalictroides*	+	+	1	+	·	+	+	+	·	+	+	·	+	+	+	·	+	+	1	V
H	Ec	3	0	4	D	*Lamium galeobdolon*	+	+	·	+	+	+	·	+	+	+	+	+	·	·	+	+	·	+	·	IV
G	Ec	4	3	3	D	*Leucojum vernum*	+	·	+	·	1	·	·	·	1	1	4	4	4	4	4	3	4	·	·	IV
H-G	Cp-Bo	4	3	3	D	*Oxalis acetosella*	+	+	·	+	+	·	1	·	+	1	+	+	+	+	·	·	+	·	·	IV
H	E	3,5	3	3	D	*Pulmonaria officinalis*	+	+	·	+	+	+	+	+	+	·	·	+	·	+	·	·	+	·	+	IV
H	Cosm	4	2,5	0	P	*Athyrium filix-femina*	+	+	·	·	·	·	·	·	+	1	+	+	·	+	·	·	·	·	+	III
G	E	3	3	0	D,P	*Corydalis solida*	+	+	+	+	·	+	+	+	·	·	·	·	·	·	+	+	+	+	·	III
Ch	E	3	3,5	4	D	*Euphorbia amygdaloides*	+	·	+	+	·	·	+	+	·	·	·	·	+	·	+	·	·	+	+	III
G	E	3,5	3	4	D	*Galanthus nivalis*	+	+	+	+	·	+	·	·	·	·	·	·	+	+	·	·	·	·	+	III
MPh	Eua	4	3	3	P	*Ulmus glabra*	+	+	+	·	·	·	·	·	·	1	+	·	·	·	·	·	·	+	·	II
nPh	Eua	3,5	3	3	D	*Daphne mezereum*	·	·	·	·	+	·	·	·	·	·	·	·	·	·	+	·	·	·	·	II
H	Eua	3,5	3	3	D	*Actaea spicata*	+	+	·	·	·	·	·	·	·	·	+	+	·	+	·	·	·	·	·	II

H	E	3,5	3	4	P	*Carex sylvatica*	·	+	·	·	·	·	·	·	+	+	·	+	·	·	·	·	·	·	II
H	Cp-Bo	4	2	4	P	*Chrysosplenium alternifolium*	+	+	·	+	+	·	·	·	+	·	·	·	+	·	·	·	+	·	·	II
G	Eua	3,5	3	4	D	*Circaea lutetiana*	+	+	·	·	·	·	·	·	+	+	·	·	·	·	·	·	·	·	·	II
H	Ec	4	3	3	D,P	*Geranium phaeum*	·	·	1	+	+	·	·	·	·	·	+	·	+	·	·	·	+	·	·	II
H	E	3,5	0	4	D	*Lamium maculatum*	·	·	·	·	+	·	+	·	+	·	+	·	·	·	·	·	+	·	·	II
H	Eua	3,5	3	3	D	*Myosotis sylvatica*	·	·	·	·	+	·	·	·	·	1	·	·	·	·	·	·	+	·	+	II
H	Eua	3,5	0	4	P	*Paris quadrifolia*	·	·	·	·	·	+	+	·	·	·	+	+	·	·	·	·	·	·	+	II
H	E	3,5	3,5	3,5	P	*Polystichum aculeatum*	+	+	+	·	+	·	·	+	·	+	·	+	·	·	·	·	·	·	·	II
H	Eua	3,5	3	4	D	*Salvia glutinosa*	+	·	·	·	+	·	+	·	·	·	·	·	·	+	·	+	·	+	+	II
H	Atl-M	3,5	3	4	D	*Sanicula europaea*	+	+	·	+	·	·	+	·	+	·	·	+	·	·	·	·	·	·	+	II
H	Eua	3,5	0	0	P	*Stachys sylvatica*	·	+	·	·	·	·	+	·	·	+	·	·	·	·	·	·	·	·	+	II
nPh	Cp-Bo	3	3	3	D,P	*Rubus idaeus*	·	·	·	·	·	·	·	·	·	+	·	·	·	·	·	·	·	·	·	I
H-G	Eua	3,5	3	4	D	*Asarum europaeum*	·	·	+	+	·	·	·	·	+	·	·	·	·	·	·	·	·	·	·	I
G	Eua	3	3	3	P	*Epipactis helleborine*	·	·	·	·	·	·	+	·	·	·	·	·	·	·	·	·	·	·	·	I
G	Eua	3,5	0	3	P	*Gagea lutea*	+	·	·	·	·	+	·	·	·	·	·	·	·	·	·	·	·	·	·	I
Th	Eua	4	3	4	D,P	*Impatiens noli-tangere*	+	+	·	·	·	·	·	·	+	·	·	·	·	·	·	·	·	·	·	I
G	Eua	3	3	3	P	*Lathraea squamaria*	·	·	·	·	+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	I
H	Eua	3	3	3	D	*Lathyrus vernus*	+	·	·	·	·	·	·	·	·	·	·	·	·	+	·	·	·	·	·	I
G	Eua	3	0	4	D	*Lilium martagon*	+	·	·	·	·	·	·	+	·	·	·	·	·	·	·	·	·	·	·	I
G	Eua	3,5	3	3	P	*Neottia nidus-avis*	·	·	·	·	·	·	+	·	·	·	·	+	·	·	·	·	·	·	·	I
H	Atl-M	3	3	3	D	*Primula acaulis*	·	+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	I
H	Eua	3,5	3	0	P	*Scrophularia nodosa*	+	+	·	·	·	·	·	·	·	+	·	·	·	·	·	·	·	·	·	I
H-G	Ec	3	3	3	D,P	*Symphytum tuberosum* ssp. *nodosum*	·	·	·	·	+	·	·	·	·	+	·	·	·	·	·	·	·	·	·	I
						Querco-Fagetea																				
G	Ec	3	3	4	P	*Dentaria bulbifera*	+	+	+	1	1	+	+	1	+	+	+	+	+	+	+	+	+	+	1	V
G	E	3,5	4	0	P	*Anemone nemorosa*	·	+	·	2	+	+	+	·	+	+	+	·	+	+	·	·	+	1	·	IV
H	Cosm	4	3	0	P	*Dryopteris filix-mas*	·	+	+	·	+	+	+	+	·	+	+	+	+	·	+	+	+	+	·	IV
G	Ec	3	3	0	D	*Corydalis cava*	·	·	·	·	+	+	·	+	·	·	+	+	+	+	+	·	+	·	·	III
G	Eua	3,5	3,5	4	D	*Erythronium dens-canis*	+	·	·	+	·	+	+	·	·	+	+	+	+	·	·	+	·	+	·	III
Th	Cosm	3,5	3	3	P	*Geranium robertianum*	+	+	+	·	+	·	1	+	·	+	+	+	·	·	+	·	+	·	·	III
H-Ch	Mp	2,5	3	4	P	*Glechoma hirsuta*	+	+	+	+	+	·	+	+	+	+	·	·	·	·	·	·	·	·	+	III
H-G	Eua	3,5	3	3	P	*Ranunculus ficaria*	+	+	·	·	+	·	·	1	1	·	+	·	+	+	·	·	+	·	·	III
G	E	3,5	3	4	D,P	*Scilla bifolia*	+	·	+	+	·	+	·	·	+	·	+	·	·	·	+	·	·	1	+	III
H	E	3,5	3	3	D	*Stellaria nemorum*	+	+	·	·	+	·	·	·	+	+	·	·	·	·	·	·	·	·	·	II
MPh	Eua	3	2	2	P	*Betula pendula*	+	·	·	·	·	+	·	·	+	1	+	·	·	·	·	·	·	·	·	II
G	Eua	2	3	4	D	*Polygonatum odoratum*	·	·	+	·	+	·	+	·	·	·	+	+	+	·	·	·	·	+	·	II
MPh	Eua	3	3	3	D,P	*Acer platanoides*	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	+	·	I
MPh	E	3	3	4	D	*Fraxinus excelsior*	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	I
MPh	Eua	3	2	2	D,P	*Populus tremula*	+	·	·	·	·	·	·	·	·	·	+	+	·	·	·	·	·	·	·	I

mPh	E	3	3	4	-	*Evonymus latifolius*	·	·	·	·	·	·	·	·	·	·	·	+	·	+	·	·	·	·	·	I
l-nPh	Atl-M	3	3	3	P	*Hedera helix*	+	·	·	·	·	·	·	·	·	·	·	+	·	1	·	·	·	·	·	I
Th-TH	Eua	3	3	4	P	*Alliaria petiolata*	·	·	·	·	+	·	·	+	·	·	·	·	·	·	·	·	·	·	+	I
G	Cp-Bo	3,5	3	5	D	*Asplenium scolopendrium*	+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	+	I
H	E	3	3	3	P	*Carex digitata*	·	·	·	+	·	·	·	·	·	·	·	·	·	·	·	·	·	+	·	I
H	Eua	2,5	3	3	P	*Carex pilosa*	·	·	·	·	+	·	·	·	·	+	·	·	·	·	·	·	·	·	·	I
G	E	3	3	4	D	*Hepatica nobilis*	·	·	·	+	·	·	·	·	·	·	·	+	·	·	·	·	·	·	·	I
Ch	E	4	3	0	P	*Lysimachia nummularia*	+	+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	I
H	E	3	3	0	D	*Mycelis muralis*	·	+	·	·	+	·	·	·	·	+	·	·	·	·	·	·	·	·	·	I
G	Eua	3,5	0	3	P	*Platanthera bifolia*	+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	I
H-Ch	Eua	3	3	0	D	*Stellaria holostea*	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	+	I
H	Eua	3	3	3,5	P	*Viola reichenbachiana*	+	+	·	·	·	·	·	·	·	+	·	·	·	·	·	·	·	·	·	I
						Rhamno-Prunetea																				
mPh	E	3	3	3	P	*Sambucus nigra*	+	+	+	·	+	1	+	·	·	+	·	·	1	+	+	+	+	+	·	IV
mPh	E	3	3	3	D	*Corylus avellana*	·	·	·	·	+	·	·	+	+	+	·	·	·	·	·	·	·	·	·	II
mPh	Eua	3	2	3	P	*Sambucus racemosa*	·	·	·	·	·	+	·	·	·	+	·	·	·	·	·	+	·	+	·	II
mPh	Eua	3	3	3	D,P	*Salix capraea*	·	·	·	·	+	·	·	·	·	+	·	·	·	·	·	·	·	·	·	I
nPh	E	2	3	3	P	*Rosa canina*	+	·	·	·	·	·	·	·	·	+	·	·	·	·	·	·	·	·	·	I
						Variae syntaxa																				
H	Ec	3,5	2	3	P	*Doronicum austriacum*	+	·	·	·	+	·	·	·	·	+	·	·	·	·	·	·	·	+	+	II
Th	Eua-C	3	2	0	D	*Galeopsis speciosa*	·	·	·	·	+	·	·	·	+	·	·	+	·	·	·	·	·	·	+	II
H-G	Cosm	3	3	4	P	*Urtica dioica*	+	+	·	·	+	+	·	·	+	+	·	·	·	·	·	·	+	·	·	II
G	Eua	4	2,5	4	D	*Veratrum album*	+	·	·	·	·	+	·	·	·	·	+	·	·	+	·	·	1	·	+	II
H	Eua	3	3	4	D	*Anthriscus sylvestris*	+	+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	+	·	·	I
H	Eua	5	0	0	D,P	*Cardamine amara*	·	·	·	·	+	·	·	·	·	·	·	·	·	·	·	·	+	·	·	I
G	E	2,5	3	4	P	*Cephalanthera damasonium*	+	+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	I
H	Alp	3,5	2	3,5	P	*Doronicum columnae*	·	+	·	·	·	·	·	·	·	·	·	·	·	·	·	+	·	·	·	I
H-G	Ec	4	3	4	P	*Lunaria rediviva*	+	·	·	·	+	+	·	·	·	·	·	·	·	·	·	·	·	·	·	I
H	Carp	4	2	0	D	*Telekia speciosa*	+	+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	I

where: L.f. - life forms; MPh - Megaphanerophytes; mPh - Mezophanerophytes; nPh - Nanophanerophytes; l-nPh - Climbing plants; Ch - Camephytes; H - Hemicryptophytes; G - Geophytes; Th - Annual terophytes.

F.e. - floristic elements; Cp-Bo –Circumpolar boreal; Eua-Eurasian; E-European; Ec-Central European; End Carp - Carpathian endemism; Atl-M-Atlantic-Mediterranean; Ppn-Ponto-Pannonian; Cosm-Cosmopolitan; Mp - Mediterano-Pontic; Alp - Alpine; Carp - Carpathian.

U - humidity, T - temperature, R - the chemical reaction of the soil; K – constancy.

Species that occur in a single relevé: *Ajuga reptans* (9); *Calamagrostis arundinacea* (9); *Caltha palustris* ssp. *laeta* (13); *Cardamine pratensis* (5); *Fragaria vesca* (9); *Juncus effusus* (15); *Lamium purpureum* (13); *Petasites albus* (2); *Picea abies* (9); *Poa nemoralis* (9); *Sorbus aucuparia* (9); *Stellaria media* (1); *Urtica urens* (6).

Place and date of mapping: 1 – Brook of Lacu (Arad county) 17.04.2010; 2 – Between the Tinoasa field and Brătcoaia field (Arad county) 17.04.2010; 3 – Peak of Izoiu (Arad county) 17.04.2010; 4 – Valley of Zugău (Arad county) 18.04.2010; 5 – Valley of Tărcăița (Bihor county) 24.04.2010; 6 – Brook of Ponoraş (Arad county) 07.04.2011; 7 – Peak of Bălăteasa (Arad county) 25.04.2010; 8 – Peak of Caprei (Bihor county) 24.05.2010; 9 – Valley of Băilor (Arad county) 30.05.2010; 10 – 11 Valley of Şesuța (Bihor county) 09.05.2010; 12 – Măgurii hill (Bihor county) 09.05.2010; 13 – Trei Holumburi (Arad county) 24.04.2010; 14 – Dealul Mare (Bihor county) 24.04.2010; 15 – 16 Valley of Luştilor (Arad county) 07.04.2011; 17 – 18 Valley of Cerbului (Arad county) 15.04.2011; 19 – Ronțaru hill (Bihor county) 30.04.2011.

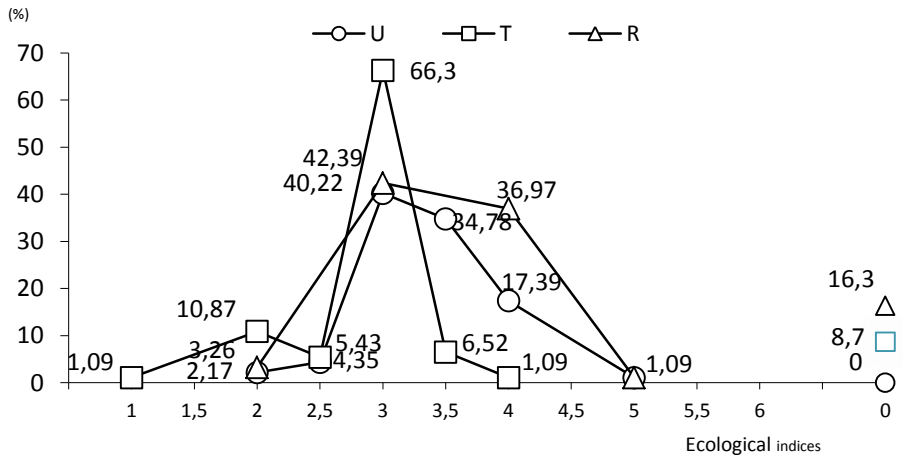

Fig. 3 Diagram of ecological indices for the
Symphyto cordati-Fagetum association Vida (1959) 1963

The diagram of ecological indices (Fig. 3), highlights the predominance of mezophyles species (75%), followed by mezo-hygrophyles (17.39%). It can be seen that, in terms of temperature, the majority of species are micro-mesothermophilous (72.82%). The chemical reaction reveals a fairly high percentage of acid-netrophyle species (42.39%) and weakly acid-netrophyle species (36.97%).

CONCLUSIONS

Within the association I separated a new subassociation called *Symphyto cordati-Fagetum* Vida (1959) 1963 *dentarietosum glandulosae* subas. nova (rel. 1-7).

Economically, this association is valuable due to the superior quality and large quantity of timber provided by the dominant woody species. European beech forests belonging to these phytocoenoses are among the most productive, being considered first class production.

In the grassy layer there are species with various economic uses, of which we can mention the melliferous ones (*Dentaria glandulosa*, *Anemone ranunculoides*, *Helleborus purpurascens*, *Allium ursinum*, *Myosotis sylvatica*, *Corydalis solida*, *Galanthus nivalis*, *Lilium martagon*, *Anemone nemorosa*, *Corydalis cava*, *Erythronium dens-canis*) and toxic ones (*Aconitum vulparia* ssp. *vulparia*, *Actaea spicata*, *Arum maculatum*, *Mercurialis perennis*, *Paris quadrifolia*, *Alliaria petiolata*).

Considering the ecological aspect, the researched forest provides basic environmental services in critical situations, erosion control, watershed protection.

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