PHYTOCENOLOGY RESEARCH ON PURE SESSILE OAK FORESTS IN CODRU-MOMA MOUNTAINS

Păşcuț Călin Gheorghe*, Burescu Petru

** University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048 Oradea; Romania, e-mail: pascutcalin@yahoo.com*

Abstract

Knowledge of vegetation in pure sessile oak forest Codru-Moma, whose geographical area rug plant has gone through profound transformations in the recent decades due to the influence of zooantrophyc factor, responding to current scientific and practical needs.

In the present work we carried out a study on phytocenosis belonging to phytocenology associations Genisto tinctoriae-Quercetum petraeae Klika 1932 and Cytiso nigricantis-Quercetum petraeae Paucă 1941.

Pure forest stands of sessile oak phytocenosis subordinated to these two associations were analyzed in terms of floristic composition (Tab. 1, Tab. 2) bioforms frequencies (Fig. 2, Fig. 5), floristic spectrum elements (Fig. 1, Fig. 4) , environment indicator diagram (Fig. 3, Fig. 6).

Pure forest stands of sessile oak phytocenosis Codru-Moma resemble in terms of floristic composition and ecological characterization the remaining sessile oak forests in the Carpathians.

Key words: plant association, pure oak, phytocenose, floristic elements, bioforms, ecological indices.

INTRODUCTION

After their name, the Codru-Moma Mountain group is formed of two distinct mountains - Codru and Moma, quite clearly separated by two diverging valleys Briheni Valley (in the east) and Valley Moneasa (in the west) (Bleahu M., 1978).

The *Genisto tinctoriae-Quercetum petraeae* association Klika 1932, can be found in the pure acidophyle sessile oak forests on slopes with varying slope, regardless of the exhibition, on poor soils, with acid-long skeleton (Sanda V. et al., 2008). The tree layer has a coverage of 60-90% in this association being dominated by *Quercus petraea* and the shrub layer has a coverage of 5-20% (Sanda V. et al., 2008).

The *Cytiso nigricantis-Quercetum petraeae* association Paucă 1941, develops on highly inclined land with sandy, loose, poor skeletal soils, to the South (Sanda V. et al., 2008).

MATERIAL AND METHODS

When studying the vegetation in Codru-Moma I used the plant association as the basic unit as it is defined by the Central European phytocenology School (Burescu P., 2003). Research methods of vegetation are those developed by J. Braun-Blanquet (1928) and adapted to the particularities of vegetation in our country. As regards the way reports were made and notations on the structure of the analyzed communities were realized both quantitative and qualitative criteria were taken into account as indicated by authors Borza et N. Boşcaiu (1965).

Identification of associations was based on floristic criteria, with characteristic or true species, without neglecting telling species, dominant and differential (Burescu P., 2003). Floristically and physionomically homogeneous sample areas were selected in the characteristic fragments of phytocenosis, their size being 400-1000 m.

Along with the recording species composition, in the report the abundance-dominance sample was introduced on the Braun-Blanquet scale (1928), the overall covering of vegetation was noted by summing the average abundance and percentage cover for each digit of the scale envisaged by the methods of Tüxen (1937) and Ellenberg (1974). The synthetic tables of association were structured on the methodology proposed by Braun-Blanquet (1928) and developed by Ellenberg (1974).

For the associations seen in the table column header the following data have been introduced: the town (settlement-the local name), the number of registered sample areas, altitude (m), tree height and composition (forest associations), herbaceous layer cover (%), display, slope (°) and size (meters). For the registration of the study of associations, special attention was given to analyzing bioforms, flora and environment indicator elements by presenting them graphically.

The articles will use the following abbreviations:

Floral elements: Cp=Circumpolar; Eua=Eurasian, E=European; Ec=Central-European; Atl-M=Atlantic-Mediterranean; DB=Daco-Balkan; M=Mediterranean; Mp=Mediterranean-Black Sea, P-Pan=Ponto-Pannonian.

Bioformes: Ph=phanerophyte; Ch=camephyte; H=hemicryptophyte; G=geophyte; T=terophyte; TH=hemiterophyte.

Ecological indices: - humidity (U) – 1-1,5 = xerophytes; 2-2,5 = xero-mezophyle; 3-3,5 = mezophyle; 4-4,5 = mezo-hygrophyle; 5-5,5 = higrophyl; 6 = hidrophyte; 0 = amphitolerante.

- temperature (T) – 1-1,5 = hechistotherm; 2-2,5 = microtherm; 3-3,5 = micro-mezotherm; 4-4,5 = moderately thermophyle; 5 = thermophyle; 0 = amphitolerante.

- chemical reaction of the soil (R) – 1-1,5 = very acidophyle; 2-2,5 = acidophyle; 3-3,5 = acido-neutrophyles; 4-4,5 = weak acid-neutrophyles; 5-5,5 = neutral-basiphyle; 0 = amphitolerante.

RESULTS AND DISCUSSION

In pure sessile oak forests from Codru-Moma the following forest associations were identified :

- *Genisto tinctoriae-Quercetum petraeae* Klika 1932;
- *Cytiso nigricantis-Quercetum petraeae* Paucă 1941.

Genisto tinctoriae-Quercetum petraeae Klika 1932

The association can be found on slopes with different inclination, between 10° and 40°, at altitudes of 400-570 m. The consistency of forests stands usually between 70% and 100%. Coverage of herbaceous layer varies between 80% and 90%.

Floristic inventory of the *Genista tinctoria* sessile oak forests consists of 68 species (Table 1).

From the species characteristic to alliance, order and class we mention: *Deschampsia flexuosa, Hieracium umbellatum, Luzula albida, glabra Crusader, Poa nemoralis.*

Table 1

Genisto tinctoriae-Quercetum petraeae Klika 1932

Bio.	E.f.	U	T	R	**The place**	1	2	3	4
					Number of sample areas recorded	1	1	1	1
					Altitude (m.s.m.)	400	450	400	570
					Exposition	SV	S	V	S
					Slope (°)	15	10	18	40
					Height of the trees (m)	23	22	20	20
					Consistencies (%)	70	80	80	100

					Coverage state grassy (%)	80	80	90	90
					Area (m²)	400	400	400	400
Ch	DB	2,5	3	3	*Genista tinctoria*	2	+	1	1
Ph	E	2,5	3	0	*Quercus petraea*	4	5	5	5
					Genisto germanicae-Quercion				
H	Cp	2	0	1	*Deschampsia flexuosa*	+	+	·	+
H	Cp	2,5	3	2,5	*Hieracium umbellatum*	+	+	+	·
H	Ec	2,5	3	3	*Lathyrus niger*	·	·	+	·
H	Pan	3	3	0	*Trifolium medium*	·	·	+	·
					Quercetalia roboris				
H	Eua	2,5	3	2	*Calamagrostis arundinacea*	+	+	·	+
H	E	2,5	2,5	2	*Luzula albida*	+	+	+	·
					Querco-Fagetea				
G	Eua	3,5	3	4	*Anemone ranunculoides*	+	·	·	·
H	Ec	3	2,5	3,5	*Aposeris foetida*	+	·	+	·
H	Eua	3	3	4	*Brachypodium sylvaticum*	·	·	·	+
Ph	E	3	3	3	*Carpinus betulus*	·	·	+	·
Ph	Eua	2,5	3	3	*Crataegus monogyna*	·	·	+	·
H	Eua	3	2	0	*Campanula rapunculoides*	·	·	+	·
G	Ec	3	3	4	*Cardamine bulbifera*	+	·	·	·
G	Eua	2,5	3	4	*Cephalanthera damasonium*	·	·	+	·
Ph	Ec	3	3,5	4	*Cornus mas*	·	·	+	·
H	Eua	3	2	2	*Cruciata glabra*	+	+	+	+
H	Eua	2,5	3	3	*Cruciata laevipes*	·	·	+	·
H	E	3	3	3	*Carex digitata*	·	·	+	·
H	Eua	2,5	3	3	*Carex pilosa*	·	+	+	·
Ph	Eua	3,5	3	3	*Daphne mezereum*	·	·	+	·
H	Ec	2,5	3	3	*Dactylis polygama*	+	+	+	+
G	Ec	3	2	0	*Erythronium dens-canis*	·	·	+	·
Ch	E	3	3,5	4	*Euphorbia amygdaloides*	+	·	+	·
Ph	E	3	3	0	*Fagus sylvatica*	·	·	+	·
H	E	4	2	3	*Festuca drymeja*	·	+	+	·
G	Ec	3,5	3	4	*Galanthus nivalis*	·	·	+	·
G	Eua	2,5	3	3	*Galium schultesii*	·	+	+	·
H	Mp	2,5	3	4	*Glechoma hirsuta*	·	·	·	+
H	Eua	3	0	3	*Hieracium murorum*	+	+	+	+
H	Eua	3	3	0	*Hypericum perforatum*	+	+	·	+
Ph	Atl-M	3	3	3	*Hedera helix*	·	·	+	·
H	E	2,5	2,5	2	*Luzula albida*	·	·	·	+
H	E	2,5	3	4	*Melica uniflora*	·	·	+	·
T	DB	2,5	3	3	*Melampyrum bihariense*	1	+	+	·
H	E	3	3	0	*Mycelis muralis*	+	+	·	+
H	Eua	3	3	0	*Poa nemoralis*	+	+	+	4
Ph	E	3	3	3	*Prunus avium*	·	·	+	·
H	Eua	3	2	5	*Primula veris*	·	·	·	+
H	E	3,5	3	3	*Pulmonaria officinalis*	+	·	+	·
Ph	Eua	3	2,5	3	*Rubus hirtus*	+	+	+	+
H	Eua	3,5	3	4	*Sanicula europaea*	+	·	·	·
H	Eua	3	3	0	*Stellaria holostea*	·	·	·	+
H	Eua	3	3	3	*Symphytum tuberosum*	·	·	·	+
Ph	M-Ec	2,5	3	4,5	*Viburnum lantana*	·	·	+	·
H	Eua	3	3	3,5	*Viola reichenbachiana*	+	+	·	+
H	Atl-M	2,5	3,5	4	*Viola odorata*	·	·	+	·
					Quercetea pubescenti-Petraeae				
Ph	M	2	3,5	3	*Quercus cerris*	·	·	+	·
G	M	2,5	4	2	*Ruscus aculeatus*	·	·	+	·
H	Ec	2,5	3,5	5	*Calamintha sylvatica*	·	+	+	+
H	Eua	2,5	3	5	*Melittis melissophyllum*	·	+	·	·
H	M	2,5	3,5	3,5	*Potentilla micrantha*	·	·	+	·
Ph	Ec	2	3,5	4	*Chamaecytisus hirsutus*	+	+	+	·
G	M	3	3,5	4	*Tamus communis*	·	+	·	·
H	Eua	2	4	4	*Vincetoxicum hirundinaria*	·	·	+	·

Ph	Ec	2,5	3	0	*Cytisus nigricans*	+	+	·	·
Ph	E	2,5	3	4	*Sorbus torminalis*	·	·	+	·
H	Eua	3	0	3	*Silene italica*	·	+	·	·
					Accompanying				
H	Eua	3	3	4	*Astragalus glycyphyllos*	·	·	·	+
H	Eua	3	3	0	*Campanula persicifolia*	·	·	+	·
TH	E	3	3	4	*Crepis biennis*	·	·	+	·
H	Eua	3	2,5	0	*Fragaria vesca*	+	+	·	·
Ph	E	2	3	3	*Rosa canina*	+	+	+	·
H	Cp	2,5	3	3	*Solidago virgaurea*	·	+	+	·
H	Eua	3	3	0	*Tanacetum vulgare*	·	·	+	·
H	Eua	3	0	0	*Veronica chamaedrys*	·	·	+	+
Ch	Eua	2	2	2	*Veronica officinalis*	·	·	+	·

1 – Top of Suliță (Bihor county); 2 – Valley of Boului (Bihor county); 3 – Valley of Ormanu (Bihor county); 4 – Valley of Tărcăița (Bihor county).

Analyzing the flower elements (fig. 1), one can see the eurasians predominance (42,4%), followed by the europeans (22,7%) and central europeans (15,1%).

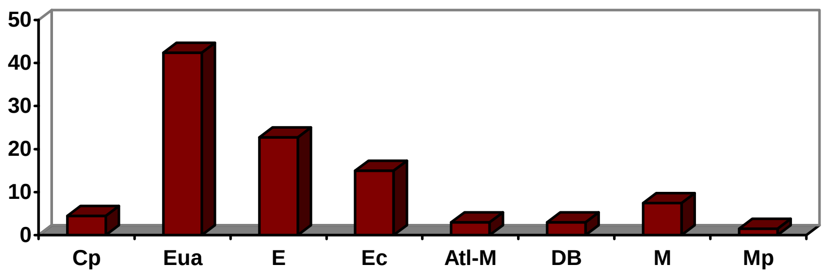

Fig. 1 Spectrum of floristic elements of the
Genisto tinctoriae-Quercetum petraeae association Klika 1932

The spectrum of the bioforms (fig. 2), highlights the numerical predominance of the hemicryptophytes (58,8%), followed by phanerophytes (22%) and geophytes (11,7%).

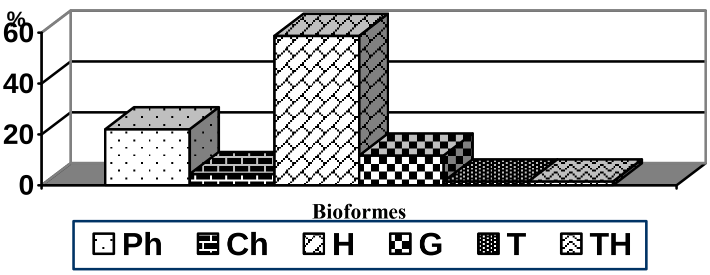

Fig. 2 The bioforms spectrum of
Genisto tinctoriae-Quercetum petraeae association Klika 1932

The spectrum of the ecological indices (Fig. 3) shows that most species of the association are mezophyles in terms of humidity (53%), followed by xero-mezophyles (31%). If analyzed thermically one can see the apparent dominance of the micro-mezotherms (51%), followed by microtherms (11%). Compared to the chemical reaction of the soil most species are acido-neutrophyles (37%) and weak acid- neutrophyles (26%).

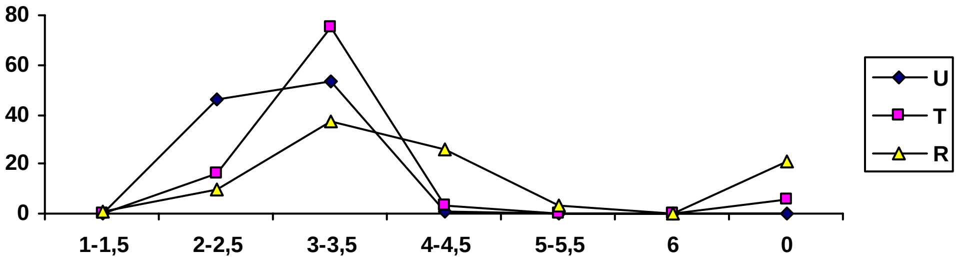

Fig. 3 Diagram of ecological indices for
Genisto tinctoriae-Quercetum petraeae association Klika 1932

Cytiso nigricantis-Quercetum petraeae Paucă 1941

The association can be seen on sunny slopes with inclination between 15° and 40°, at altitudes of 460-780 m. The consistency of forest is usually between 50% and 90%. Coverage of herbaceous layer varies between 5% and 80%.

The floristic inventory of the *Cytisus nigricans* sessile oak forests totaling 33 species (Table 2).

From the species characteristic to alliance, order and class we mention: *Genista ovata, Fagus sylvatica, Hieracium umbelatum, Luzula albida, Pteridium aquilinum.*

Table 2

Cytiso nigricantis-Quercetum petraeae Paucă 1941

Bio.	E.f.	U	T	R	The place	1	2	3	4
					Number of sample areas recorded	2	1	1	2
					Altitude (m.s.m.)	650	780	460	580
					Exposition	S	S	S	SV
					Slope (°)	20	40	15	20
					Height of the trees (m)	16	12	10	18
					Consistencies (%)	90	50	50	80
					Coverage state grassy (%)	80	70	5	70
					Area (m²)	400	400	400	400
Ph	E	2,5	3	0	*Quercus petraea*	5	4	4	5
Ph	Ec	2,5	3	0	*Cytisus nigricans*	+	1	2	1
					Fraxino orni-Cotinetalia, Quercetea pubescenti-petraeae				
H	M	2	3,5	4,5	*Piptatherum virescens*	+	·	·	·
Ch	DB	2,5	3	3	*Genista ovata*	+	·	+	+
					Querco-Fagetea				
H	Eua	3	3	4	*Brachypodium sylvaticum*	·	·	·	+
M	Eua	3	2	2	*Betula pendula*	+	·	·	+
H	Eua	2,5	3	2	*Calamagrostis arundinacea*	+	·	·	+
H	Eua	2,5	3	3	*Carex pilosa*	·	·	+	+
H	E	3,5	3	4	*Carex sylvatica*	+	·	·	·
Ph	E	3	3	3	*Carpinus betulus*	+	·	·	·
H	Eua	3	2	2	*Cruciata glabra*	·	·	+	+
Ph	E	3	3	0	*Fagus sylvatica*	+	+	+	·
G	Eua	2,5	3	3	*Galium schultesii*	·	·	·	+
T	Cosm	3,5	3	3	*Geranium robertianum*	·	·	·	+
H	Mp	2,5	3	4	*Glechoma hirsuta*	·	·	·	+
H	Eua	3	0	3	*Hieracium murorum*	+	·	·	+
H	Eua / Cp	2,5 / 3	3	2 / 0,5	*Hieracium umbelatum / Poa nemoralis*	+	+	+	+
H	DB / Eua	1,5 / 3	2 / 3	3 / 3,5	*Pulmonaria rubra / Hieracium bauhinii*	·	·	·	+
Ch-Ph / G	Cosm / E	3	3 / 3,5	0	*Pteridium aquilinum / Lonicera xylosteum*	+	+	+	+
Ph / H	E / Eua	2,5 / 3	2,5	2 / 3	*Rubus hirtus / Luzula albida*	+	+	+	+

H	Eua	3	3	3	*Symphytum tuberosum*	·	·	·	+
H	Eua	3	3	0	*Stellaria holostea*	·	·	·	+
H	Eua	3	3	3,5	*Viola reichenbachiana*	·	·	·	+
					Accompanying				
H	Eua	3	3	4	*Astragalus glycyphyllos*	·	·	·	+
H	Cp	2	0	1	*Deschampsia flexuosa*	+	1	1	4
H	Ec	4	2	4	*Gentiana asclepiadea*	+	·	·	·
H	P-Pan	1,5	3,5	4	*Inula ensifolia*	·	+	·	·
Ph	Cp	0	2	1	*Vaccinium myrtillus*	1	1	·	·
H	Eua	3	0	0	*Veronica chamaedrys*	·	·	·	+

1 - Valley of Botfei (Arad county); 2 – Vălaielor peak (Bihor county); 3 – Valley of Visag (Bihor county); 4 – Valley of Tărcăița (Bihor county).

Analyzing the flower elements (fig. 4),one can observe the predominance of the eurasians (44%), followed by europeans (21%) and circumpolars (9%).

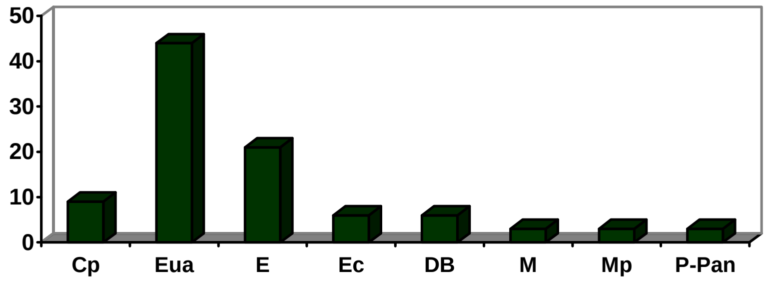

Fig. 4 Spectrum of floristic elements of the
Cytiso nigricantis-Quercetum petraeae association Paucă 1941

The spectrum of the bioforms (fig. 5), highlights the numerical predominance of hemicryptophytes (67%), followed by phanerophytes (18%) and geophytes (6%).

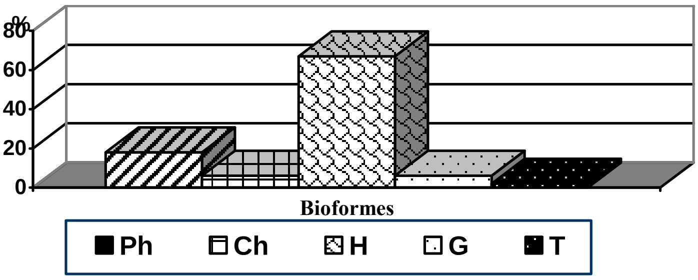

Fig. 5 The spectrum of bioforms in the
Cytiso nigricantis-Quercetum petraeae association Paucă 1941

The diagram of ecological indices (fig. 6) shows that most species of the association in terms of humidity are mezophyles (55%), followed by xero-mezophyles (3 %). If analyzed thermically one can see the apparent dominance of the micro-mezotherms (70%), followed by microtherms (21%). Compared to the chemical reaction of the soil most species are acido-neutrophyles (33%) and chemical amphitolerante (24%).

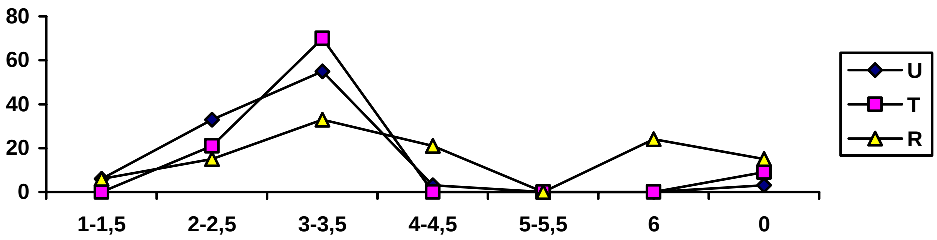

Fig. 6 Diagram of ecological indices for
Cytiso nigricantis-Quercetum petraeae association Paucă 1941

CONCLUSIONS

Human interventions in natural biocenoses by deforestation and intensive grazing in the forest, led to changes in the floristic composition of pure sessile oak forests in Codru-Moma Mountains.

By studying the floral elements one can see that in these two associations the european and the eurasian species are in a larger number, which shows that the area is part of the Central European region. Analysis of bioforms revealed the predominance of hemicryptophytes, which are major components of the herbaceous layer of the forest.

Analysis of ecological indices for the associations found in the pure sessile oak forests in Codru-Moma highlight in terms of humidity the highest weight among mezophyles species, in terms of temperature the micro-mezotherms species and in terms of acid soil reaction the predominant species are the acido-neutrophyles.

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