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CONTENTS - SADRŽAJ

<i>Ljubinko Rakonjac, Mihailo Ratknić, Milorad Veselinović, Suzana Mitrović</i> PHYTOCENOLOGICAL CHARACTERISTICS OF SESSILE OAK AND TURKEY OAK ASSOCIATION (Ass. <i>Quercetum petraeae-cerris</i> Jovanović (1960) 1979) IN PEŠTER PLATEAU FITOCENOLOŠKE KARAKTERISTIKE ZAJEDNICE KITNJAKA I CERA (Ass. <i>Quercetum petraeae-cerris</i> Jovanović (1960) 1979) NA PEŠTERSKOJ VISORAVNI	7
<i>Mihailo Ratknić, Ljubinko Rakonjac, Milorad Veselinović, Biljana Nikolić</i> BIRCH FORESTS IN PEŠTER PLATEAU ŠUME BREZE NA PEŠTERSKOJ VISORAVNI	22
<i>Ljubinko Rakonjac, Mihailo Ratknić, Milutin Dražić, Milorad Veselinović</i> THE POSSIBILITY OF THE OCCURENCE OF ARID PERIODS OF THE ALTITUDINAL REGION OF SOUTHWEST SERBIA USING THE PEŠTER PLATEAU AS AN EXAMPLE MOGUĆNOST POJAVE SUŠNIH PERIODA VISINSKOG REGIONA JUGOZAPADNE SRBIJE NA PRIMERU PEŠTERSKE VISORAVNI	35
<i>Milorad Veselinović, Dragana Dražić, Mihailo Ratknić, Ljubinko Rakonjac, Vesna Golubović-Čurguz, Nevena Čule, Suzana Mitrović</i> THE CHANGES IN THE INTERNAL STRUCTURE OF <i>Pseudotsuga menziesii</i> (Mirb.) Franco NEEDLES UNDER THE INFLUENCE OF AIR- POLLUTION PROMENE U UNUTRAŠNJOJ STRUKTURI ČETINA <i>Pseudotsuga menziesii</i> (Mirb.) Franco POD UTICAJEM AEROZAGAĐENJA	50
<i>Miloš Koprivica, Bratislav Matović</i> DEPENDENCE OF HIGH BEECH STAND FORM FACTOR AND FORM HEIGHT ON SITE AND STAND FACTORS ZAVISNOST ZAPREMINSKOG KOEFICIJENA I OBLIKOVISINE VISOKIH SASTOJINA BUKVE OD STANIŠNIH I SASTOJINSKIH FAKTORA	60
<i>Vjačeslava Matic</i> THE ADVANTAGE OF USING GABIONS IN THE ANTIEROSION WORKS IN SERBIA PREDNOST PRIMENE GABIONA U PROTIVEROZIONIM RADOVIMA SRBIJE	74
<i>Pero Radonja</i> STEM PROFILE MODELING USING NEURAL NETWORKS MODELIRANJE PROFILNE FUNKCIJE DEBLA POMOĆU NEURONSKIH MREŽA	82
<i>Pero Radonja</i> GENERALIZED STEM PROFILE MODEL BASED ON NEURAL NETWORKS GENERALIZOVAN MODEL PROFILNE FUNKCIJE DEBLA BAZIRAN NA NEURONSKIM MREŽAMA	93

<i>Snežana Stajić, Ljubinko Rakonjac, Vlado Čokeša</i> PHYTOCENOLOGICAL CHARACTERISTICS OF HUNGARIAN OAK AND TURKEY OAK WITH HORNBEAM FOREST (<i>Carpino betuli- Quercetum farnetto-cerris</i>) IN THE AREA OF BOGOVAĐA FITOCENOLOŠKE KARAKTERISTIKE ŠUME SLADUNA I CERA SA GRABOM (<i>Carpino betuli-Quercetum farnetto-cerris</i>) NA PODRUČJU BOGOVAĐE	104
<i>Zlatan Radulović</i> THE MOST FREQUENT SWEET CHESTNUT DISEASES IN VRANJE AREA NAJČEŠĆE BOLESTI PITOMOG KESTENA NA PODRUČJU VRANJA	115
<i>Radovan Nevenić, Ljubinko Rakonjac, Zoran Poduška, Renata Gagić, Nenad Petrović, Denis Čokić</i> COLLISION BETWEEN FORESTRY AND ENVIRONMENTAL LEGISLATIVE RESEARCH - CASE STUDY AND STATEMENTS IN SERBIA STAVOVI PREMA REGULATIVI ŠUMARSTVA I ŽIVOTNE SREDINE - PRISTUP STUDIJE SLUČAJA U SRBIJI	124
<i>Makedonka Stojanovska, Nataša Lozanovska</i> INTEGRAL MANAGEMENT PLAT AS A TOOL FOR INTEGRAL PROTECTION OF NATIONAL PARK "MAVROVO" IN R. MACEDONIA	134
<i>Milijana Cvejić, Suzana Mitrović</i> POTENTIALS OF FOREST ZABRAN IN SAVA'S FORLAND NEAR OBRENOVAC FOR FUNCTION OF RECREATION PRIKAZ PLANA KORIŠĆENJA DELA ŠUME ZABRAN U FORLANDU SAVE KOD OBRENOVCA ZA PREUZIMANJE REKRACIONE FUNKCIJE	145
<i>Mihailo Ratknić, Svetlana Bilibajkić, Sonja Braunović</i> EROSION PROCESS IN LOCALITY MEDENOVAC-KARAVANSALIJA IN ROGOZNA EROZIONI PROCESI NA LOKACIJI MEDENOVAC - KARAVANSALIJA NA ROGOZNI	156

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**PHYTOCENOLOGICAL CHARACTERISTICS
OF SESSILE OAK AND TURKEY OAK ASSOCIATION
(Ass. *Quercetum petraeae-cerris* Jovanović (1960) 1979)
IN PEŠTER PLATEAU**

Ljubinko Rakonjac, Mihailo Ratknić, Milorad Veselinović, Suzana Mitrović¹

Abstract: Phytocenological characteristics of Sessile oak and Turkey oak association (Ass. *Quercetum petraeae-cerris* Jovanović (1960) 1979) in Pešterska Plateau are presented in this paper. Their percentage in the observed area, habitat properties, floristical composition and structure - biological specter, specter of floristic elements, layers, etc. are presented.

In this area Sessile oak and Turkey oak forests are located at the upper limit of altitudinal distribution, at two localities. Geological base are made of neogenic sediments, and the soil types are dystric cambisol and pseudogley. The plants adapted to the more extreme life conditions, i.e. plants which are low-temperature resistant and can survive high temperature amplitudes in a short vegetation period, i.e. xero-mesophilic plants are dominant in this association, since the area is located between Ilyrian and Mesian Provinces.

Key words: Sessile oak, Turkey oak, phytocenological characteristics, Pešterska Plateau, habitat.

FITOCENOLOŠKE KARAKTERISTIKE ZAJEDNICE KITNJAKA I CERA (Ass. *Quercetum petraeae-cerris* Jovanović (1960) 1979) NA PEŠTERSKOJ VISORAVNI

Izvod: U radu su prikazane fitocenološke karakteristike zajednice kitnjaka i cera (Ass. *Quercetum petraeae-cerris* Jovanović (1960) 1979) na području Pešterske visoravni. Prikazana je rasprostranjenost na području istraživanja, karakteristike staništa, floristički sastav i struktura - biološki spektar, spektar flonih elementa, spratovnost i dr. Na ovom području šume kitnjaka i cera nalaze se na gornjoj granici visinskog rasprostra-

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njenja, na dva nalazišta. Geološku podlogu čini neogeni sedimenti, a zemljišta su distrični kambisol i pseudoglej. U zajednici preovlađuju biljke prilagođene ne ekstremnije uslove života, tj. biljke koje podnose niske temperature i velike temperaturne amplitude i u kratkom vegetacionom periodu, odnosno biljke ksero-mezofilnog karaktera, pošto se nalazi na prelaznoj zoni između ilirske i mezijske provincije.

Ključne reči: kitnjak, cer, fitocenološke karakteristike, Pešterska visoravan, stanište.

1 INTRODUCTION

Sessile oak and Turkey oak associations in Serbia, Bosnia and Hercegovina, Montenegro and Macedonia are mainly described as *Quercetum montanum* subass. *cerretosum*, which implies the affiliation to the alliance *Quercion robori-petraeae* Br-Bl. 31. However, since there is a great number of xerotherm species (most usually from the order *Quercetalia pubescentis*), it was necessary to find some other solution (Tomić, 1988). Some authors (Horvat, Glavač, Ellemberg, 1974) tried to classify Mesian Sessile oak forests, as well as Sessile oak forests with Turkey oak as higher mountainous range climate-zonal Sessile oak and Turkey oak forest in the alliance *Quercion frainetto* Horv. 59. In accord with these notions, the Turkey oak forests with Sessile oak were classified as *Quercetum cerris moesiacum* Vuk. 66 *Quercetosum petraeae* Vuk. 76 in Serbia, but at a very wide interval of geological base and soil. The question of Sessile oak and Turkey oak forests was solved only by the formation of the new alliance of the continental Sessile oak and Turkey oak forests *Quercion petraeae-cerris* (Lakuš. 76) Lakuš. et. Jov. 80. V. Stefanović (1984) was the first to describe the association *Quercetum petraeae-cerris* Stef. 83, which contain several xero-mesophilic elements, since it is located in the transitional zone between Iliric and Mesian Provinces, as the dominant association in Eastern Bosnia (by Tomić, 1988).

2 WORK METHOD

The data by Federal Hydrometeorological Institute were used for the description of the climate properties. The general climate characteristics, air temperature, relative air humidity, cloudiness, the duration of sun-light, wind, precipitation, hydric sum, are presented. The sufficient number of the pedological profiles was taken for the determination of the soil properties in forest associations, in the places where phytocenological records were taken. The soil types were determined by the soil classification (Škorić et al, 1985). The standard laboratory methods were used for the determination of the soil samples.

The recent forest vegetation was studied by the principles and methods of the French-Swiss school Braun-Blanquet (Braun-Blanquet, 1928, 1921), typical and widely accepted in phytocenological research in our country. The floristically structural phytocenological tables were made by the phytocenological records. The specters of floristic elements (percentage of the groups of floristic elements and individual floristic elements) by the associations were made in accord with the systematisation of plant-geographic elements of Gajić (Gajić, 1989). The biological specters (percentage of some life forms) of plants were done by Kojić, M. et al., (1994), by the division in the types of life forms (Raunkiaer).

3 SUBJECT AND OBJECTIVE OF THE STUDY

The Sessile oak and Turkey oak stands in Pešter Plateau are the subject of the study. Since these stands are located in the upper limit of the altitudinal distribution, it was needed to study other habitat conditions, in order to determine the way in which they can be preserved, despite of numerous negative zoo-anthropogenic influences.

The objective of this study was to define habitat and phytocenological characteristics of these forests in a great detail, in order to determine all the peculiarities in which they develop, as well as the future directions of succession. Owing to their peculiarity, it is needed to emphasize the possibilities of the use of seedling material which is favourable to these conditions in the future reforestation of the deforested terrains with the similar habitat characteristics.

4 RESEARCH RESULTS

Sessile oak and Turkey oak forests *Quercetum petraeae-cerris* Jovanović, 1960, 1979 (synonym *Quercetum cerris quecetosum petraeae* Vukićević 1976) are transitional forms between monodominant Sessile oak forests of the mountainous regions and zonal vegetation, most often Hungarian oak and Turkey oak forests in Serbia. Actually, they occupy the lower belt of Sessile oak forests – up to 600 m above sea level, in the greatest part of their area. Expositions are usually warm, and soils are brown and lessivied on very different bases. These forests are more mesophilic than monodominant Turkey oak forests – alongside xerophilic species of the order *Quercetalia pubescentis* there are also some more mesophilic elements of Sessile oak and even Turkey oak forests (Tomić, 1992). This association is more frequent and more extensive than the monodominant Turkey oak forests. In particular, it occupies great areas in Northwestern and Western Serbia, in Gučevo, Maljen, Cer, branches of Tara and Zlatibor (Vukićević), as well as in Eastern and Northeastern Bosnia. This association also occurs in Fruška gora, at somewhat lower altitudes, up to 400 meters above the sea level (Janković et Mišić; Jović et al.), whereas there are only fragments of it in Eastern Serbia (papers quoted by Tomić, 1992).

4.1 Range and position in the observed area

In Peštersko-Sjениčka Plateau and its lateral slopes, the Sessile and Turkey oak forests are situated in the upper limit of their altitudinal distribution. There are two localities. The first one is located in the open Sjenička plateau, in Babinjača, northwest of Sjenica. It spreads up to 1,200 meters above the sea level, up to karst Gradac. It covers a wide crest, flattened slopes Rašće and Plandište, from Tubića kuće in Donje Lopiže on the north exposition to Krmske valleys, west of Uvac Village. From Babinjača this association descends in the Uvac valley, and then it spreads upstream to Sumarača, to Mašovići Village, at 1,200 meters above the sea level. Uvac Village is located in the zone of the distribution of the former oak forests. In this area the oaks are localized in Uvac Gorge, from Čedovo to Lupoglav, where a few enclosed Sessile oak and Turkey oak forests of a high quality are located. In all parts of the area the Sessile oak and Turkey oak associations are frequently interspersed with hazel groves. Poplars and birches are frequent in them. In the lateral valleys of Peštersko-Sjenička Plateau Sessile oak and Turkey oak association is located at the other, important locality of Ljutska River

basin, on the south slopes of Golija, in direction of Novi Pazar. In this part of the plateau, alongside the degraded shrubs below Šarski karst, there are several private estates of a better quality. The Sessile oak and Turkey oak forests are renewable, below Duga Poljana. Sessile oak and Turkey oak forests are also located in Vrhovina, in piedmont mountain of Javor.

4.2 Properties of habitat

The main relief forms in which the association is located are long crests, but the gentle plateaus and long flattened ridges are present as well.

The altitudes in which the association is located in this area range from 800 and 1,200 meters above the sea level, but the forests are best preserved and developed at about 1,100 meters above the sea level. It is located at eastern, southeastern, southwestern and northwestern expositions. In regard with the inclination, the terrains range from the forms of plateaus to the greater inclinations, more than 20°.

The geological base in all parts of the area of this association is made of neogenic sediments; sandstones, gravels and clays, and only in the smaller area phillites are present. The soil area is void of the huge stones and rocks or is rocky to a small degree, since bedrock is prone to the process of physical decay. In the soil profile, the percentage of skeleton is not greatly expressed up to the level of geological base, where the transition is not abrupt, but gradual.

The most frequent soils which developed on such bedrocks and in this association are dystric cambisols, pseudogleys, as well as luvisol in the majority of the studied stands. The pedological studies which were conducted showed that the depth of the soil is over 70 cm. The thickness of forest floor ranges from 2 to 3 cm, and thickness of humus accumulative horizon ranges between 7 to 12 cm. The thickness of E horizon in luvisol ranges between 7 and 38 cm, and thickness (B) or g/Bt is from 29 to 62 cm. The other physical and chemical properties of soil are presented in the tables of the properties of soil by types of soil. Their texture classes range from the loams in the upper parts of the profile, to the clays in the lower parts of the profile. In regard to the acidity the majority of the soils are mainly acid at all depths of the profiles and pH value in the water ranges from 4.1 to 5.3, and in KCl from 3.3 to 4.6. The soil is rich in the total content of humus and nitrogen (nitrogen 0.35 %; humus 6.0–9.75%). In regard to the easily accessible phosphorous forms, the soil is poor (2.0 mg per 100g of soil), and it averages to well-supplied with kalium (15-34.28 mg per 100g of soil).

4.3 Floristic composition and structure

Floristic composition and structure are presented in phytocenological table 1 in 7 records. The phytocenological table contains 159 taxa: 7 tree species, 11 bush species and 141 species which are found in low-level flora layer. Among the low-level flora species are 3 fernery species and 138 flowering plant species. Certain phytocenological records contain from 41 to 63 plant species, 52 species in average. The Sessile oak and Turkey oak stands in Pešter are considerably degraded, somewhere the whole canopy is broken, so the plants from neighboring forest and meadow phytocenosis and cultures found favorable living conditions in the phyto-climate of the phytocenosis. The largest number of the records contains over 50 species, which is much more than in some other associations,

e.g. beech, which are also degraded and poorly preserved. Based on these data it can be concluded that Sessile oak and Turkey oak in Pešter belongs to the group of rich forest phytocenosis in the observed area. The floristic wealth is the consequence of the community itself and a property of stands where the studies were conducted.

Life-form spectrum – biologic spectrum

The association **biologic spectrum** is presented in Table 1. The high presence of hemicryptophytes is recorded (58%), which is the consequence of plant life condition aggravation, mainly climatic in this altitude level. Plants accustomed to extremal life conditions dominate the association, i.e. plants surviving low temperatures and high temperature amplitudes during short vegetation period. The greatest percentage of hemicryptophytes shows, inter alia, that the grasses from *Poaceae* families dominate, which is understandable taking into consideration the stand state viewed as a whole. The relatively favorable geophytes (14%) percentage points to the appropriate soil conditions (humidity, structure and soil depth). The hemicryptophytes and chamaephytes percentages are increased (58% and 7%), pointing to the extreme habitat conditions, severe stand degradation and lower temperatures. The small number of terophytes adjusted to a longer vegetation period in some thermophilic associations, as well as adjustment to habitats with scorching summers, points to climate transition toward mountain climate.

Table 1 - Plant life-form spectrum in association Quercetum petraeae-cerris Jovanović (1960) 1979

Life forms							
p	np	wc	hc	h	g	t	th
9%	5%	3%	4%	58%	14%	4%	2%
14%		7%					

Legend: *p* - Phanerophytes; *np* - Nanophanerophytes; *wc* - Woody chamaephytes; *hc* - Herbaceous chamaephytes; *h* - Hemicryptophytes; *g* - Geophytes; *t* - terophytes; *th* - Terophytes/chamaephytes

Floral element spectrum

The association floral element spectrum is presented in table 2.

Table 2 - The spectrum of floral elements in association Quercetum petraeae-cerris Jovanović (1960) 1979

Floral element group	Plant number	Participation		Floral element	Plant number
NORTHERN REGION FLORAL ELEMENTS	2	2%	2%	Sub-boreal	2
MIDDLE EUROPEAN	31	33%	33%	Middle-European	10
				Sub Middle-European	21
SUB-ATLANTIC	3	4%	4%	Sub-Atlantic - sub-Mediterranean	3

Floral element group	Plant number	Participation		Floral element	Plant number
SUB-MEDITERRANEAN	3	3%	9%	Sub-Mediterranean	3
East sub-Mediterranean	4	4%		Eastern Sub-Mediterranean	4
Balkan and Balkan-Apennine	2	2%		Mesian	1
				Middle Balkan	1
PONTIC – CENTRAL ASIAN	3	3%	13%	Subpontic - sub-Central Asian - sub-Mediterranean	1
				Subpontic - sub-Central Asian	2
Pontic	9	10%		Pontic	2
				Sub-pontic	4
				Pontic - sub-Mediterranean	1
Sub-Pontic - sub-Mediterranean	2				
DESERT REGION FLORAL ELEMENTS	1	1%	1%	Iran - euxinian	1
EURO-ASIAN FLORAL ELE- MENTS	30	33%	33%	Sub - south Siberian	4
				Euro-Asian	15
				Sub Euro-Asian	11
CIRCUMPOLAR AND CO- SMOPOLITE	5	5%	5%	Circumpolar	3
				Sub-circumpolar	1
				Cosmopolite	1
TOTAL:	93	100%	100%	TOTAL:	93

The spectrum of the floral elements of association can provide us with a good picture on structure, character and origin. The Euro-Asian floral elements are mostly found in this type of floral element spectrum 33%, as well as middle-European floral elements 33% forming the most of the spectrum pointing to middle-European and Euro-Asian influences. The sub-Mediterranean floral elements comprise 9% of the total, sub-Mediterranean (in a narrowed sense) 3%, east sub-Mediterranean 4% and 2% of Balkan and Balkan-Apennine elements. There is a considerable 5% percentage of circumpolar and cosmopolite, due to higher altitudes in which this community is found on Pester. The smaller part is comprised of sub-Atlantic floral elements 4%, northern region floral elements 2% and desert region floral elements 1%. The mesophilic plants (middle-European and sub-Atlantic floral elements) participate with 37%, and xerophilic type plants (pontic, sub-Mediterranean, Balkan, and desert region floral elements) account for 23%, while the wide ecologic amplitude plants (Euro-Asian and cosmopolite floral element) account for 34%. Frigoripyric plants account for 6%

The sub-middle-European (21), Euro-Asian (15), sub Euro-Asian (11) and middle-European (10) are the most frequent individual floral elements. Less frequent are sub-pontic (4), eastern sub-Mediterranean (4), sub-south Siberian (4) and with three species each sub-Mediterranean, sub Atlantic - sub-Mediterranean and circumpolar.

The Sessile oak and Turkey oak association (*Quercetum petraeae-cerris*) is dominated by xerophilic character plants, since the association is located in the border zone

between Illyrian and Mesian Provinces. This Sessile and Turkey oak association is almost identical to the one in Voloder (Tomić, 1988) and with the community of Eastern and Southeastern Bosnia described and recorded in vegetation charts.

4.4 Layers

The vertical structure of this association is differentiated by layers of: trees, bushes and low-level flora. This is a bi-dominant community as the most Sessile oak and Turkey oak associations in Serbia are; the tree layer is dominated by Sessile oak and Turkey oak. The canopy cover in the first layer varies ranging from 0.3-0.8, the average being 0.6. The tree height differs depending on stand preservation degree ranging from 9-25m, mostly around 15m. The average diameter of the first layer trees in the observed stands is 25cm, ranging from 8cm on Strmac slopes to 30cm in Babinjača. The Sessile oak and Turkey oak stands are less preserved in lower altitude belt, with smaller trees than these in upper altitude zone, which are also better preserved. The least preserved stands are near village meadows and pastures, because they are exposed to the influence of villagers. The middle parts between villages contain slightly more preserved stands, where Turkey oak is more exploited and there is less of it now. Going up toward the ridges and saddles, stands have lower values of average tree height and thickness which are 9m high and 15cm thick. The upper border of these stands is not gradual, which might have been expected in the form of bush forest, but it directly passes into pasture, which is the consequence of the mass felling, since these forests have been easily available for exploiting. The stands of this association are almost destroyed on lateral slopes around rivers and brooks where forest has not managed to significantly regenerate, due to erosion. The two records show that there is no Sessile oak in the first layer, only stunted and old Turkey oak trees have remained, which often do not reach the tree layer height, although they are very old. The stands commonly found in forest enclosures and on remote parts of country roads are dominated by Sessile oak and Sessile oak achieves considerable dimensions despite the habitat conditions. Alongside the *Quercus petraea*, *Quercus cerris*, in tree layer *Populus tremula* are also found, whereas *Fagus moesiaca*, *Prunus avium*, *Pyrus pyraeaster*, *Tilia parvifolia* are rarely found.

Sessile oak and Turkey oak are less found in the **shrub layer** in comparison with hazel tree (*Corylus avellana*) and wild pear (*Pyrus pyraeaster*) which is found in almost all records. *Crataegus monogyna* and *Juniperus communis* are more frequently found having the III presence degree, which points to stand devastation. *Betula pendula*, *Carpinus betulus*, *Evonymus latifolius*, *Populus tremula*, *Prunus avium*, *Prunus spinosa* and *Salix capreae* are found in smaller numbers. *Crataegus calycina*, *Evonymus europaeus*, *Rosa agrestis* and *Viburnum lantana* are found individually.

The low-level flora layer is significantly lush and the soil cover ranges from 40 to 90 percent. The highest canopy cover is found in stand records in which devastation is expressed on steep slopes toward Uvac where it is 0.9. It is understandable that the lowest canopy cover is found in densely connected stands on northern slopes and gentle plains, which are less subjected to light where canopy is mostly 0.4. In the third layer the most dominant species are: *Campanula persicifolia*, *Prunella vulgaris*. *Ajuga reptans*, *Dactylis glomerata*, *Trifolium montanum* are also frequently present, but in a lower number and lower canopy cover, and with reduced sociability. *Viola silvestris*, *Aegopodium podagraria*, *Anemone nemorosa*, *Aremonia agrimonioides*, *Brachypodium silvaticum*,

Cirsium acaule, *Danaa cornubiensis*, *Euphorbia amygdaloides*, *Festuca heterophylla*, *Galium cruciata*, *Galium silvaticum*, *Genista ovata*, *Geranium sanguineum*, *Helleborus odorus*, *Helianthemum nummularium*, *Hieracium bauhinia*, etc. are also found but there is a lower percentage of them.

5 CONCLUSION

1) The altitudes in which the association is located in this area range from 800 and 1,200 meters above the sea level, but the forests are best preserved and developed at about 1,100 meters above the sea level. It is located at eastern, southeastern, southwestern and northwestern expositions. In regard with the inclination, the terrains range from the forms of plateaus to the greater inclinations, more than 20°.

2) The geological base in all parts of the area of this association is made of neogenic sediments; sandstones, gravels and clays, and only on the smaller area phillites are present. The soil area is void of the huge stones and rocks or is rocky to a small degree, since bedrock is prone to the process of physical decay. In the soil profile, the percentage of skeleton is not greatly expressed up to the level of geological base, where the transition is not abrupt, but gradual.

3) The most frequent soils which developed on such bedrocks and in this association are dystric cambisols, pseudogleys, as well as luvisol in the majority of the studied stands. The pedological studies which were conducted showed that the depth of the soil is over 70 cm.

4) The sub-middle-European (21), Euro-Asian (15), sub Euro-Asian (11) and middle-European (10) are the most frequent individual floral elements. Less frequent are subpontic (4), eastern sub-Mediterranean (4), sub-south Siberian (4) and with three species each sub-Mediterranean, sub Atlantic - sub Mediterranean and circumpolar. The Sessile oak and Turkey oak association (*Quercetum petraeae-cerris*) is dominated by xerophilic plants, since the community is located in the border zone between Illyrian and Mesian Provinces.

5) Floristic composition and structure are presented in phytocenological table 1 in 7 records. The community contains 159 taxa: 7 tree species, 11 bush species and 141 species which are found in low-level flora layer. Among the low-level flora species are 3 fernery species and 138 flowering plant species.

6) The Sessile oak and Turkey oak stands in Pešter are considerably degraded, somewhere the whole canopy is broken, so the plants from neighboring forest and meadow phytocenosis and cultures found favorable living conditions in the phyto-climate of the phytocenosis. According to these data it can be concluded that Sessile oak and Turkey oak association in Pešter belongs to the group of rich forest phytocenosis in the observed area. The floristic wealth is the consequence of the community itself and a characteristic of stands where the studies were conducted.

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PHYTOCENOLOGICAL CHARACTERISTICS OF SESSILE OAK AND TURKEY OAK ASSOCIATION (*Ass. Quercetum petraeae-cerris* Jovanović (1960) 1979) IN PEŠTER PLATEAU

Ljubinko Rakonjac, Mihailo Ratknić, Milorad Veselinović, Suzana Mitrović

Summary

The altitudes in which the association is located in this area range from 800 and 1,200 meters above the sea level, but the forests are best preserved and developed at about 1,100 meters above the sea level. It is located at eastern, southeastern, southwestern and northwestern expositions. In regard with the inclination, the terrains range from the forms of plateaus to the greater inclinations, more than 20°.

The geological base in all parts of the area of this association is made of neogenic sediments; sandstones, gravels and clays, and only on the smaller area phillites are present. The soil area is void of the huge stones and rocks or is rocky to a small degree, since bedrock is prone to the process of physical decay. In the soil profile, the percentage of skeleton is not greatly expressed up to the level of geological base, where the transition is not abrupt, but gradual.

The most frequent soils which developed on such bedrocks and in this association are dystric cambisols, pseudogleys, as well as luvisol in the majority of the studied stands. The pedological studies which were conducted showed that the depth of the soil is over 70 cm.

The sub-middle-European (21), Euro-Asian (15), sub Euro-Asian (11) and middle-European (10) are found as the most frequent individual floral elements. Less frequent are subpontic (4), eastern sub-Mediterranean (4), sub- south Siberian (4) and with three species each sub-Mediterranean, sub Atlantic- sub Mediterranean and circumpolar. The Sessile oak and Turkey oak association (*Quercetum petraeae-cerris*) is dominated by xerophilic plants, since the community is located in the border zone between Illyrian and Mesian Provinces.

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The Sessile and Turkey oak stands in Pešter are considerably degraded, somewhere the whole canopy is broken, so the plants from neighboring forest and meadow phytocenosis and cultures found favorable living conditions in the phyto-climate of the phytocenosis. According to these data, it can be concluded that Sessile oak and Turkey oak association in Pešter belongs to the group of rich forest phytocenosis in the studied area. The floristic wealth is the consequence of the community itself and a characteristic of stands where the studies were conducted

FITOCENOLOŠKE KARAKTERISTIKE ZAJEDNICE KITNJAKA I CERA (Ass. *Quercetum petraeae-cerris* Jovanović (1960) 1979) NA PEŠTERSKOJ VISORAVNI

Ljubinko Rakonjac, Mihailo Ratknić, Milorad Veselinović, Suzana Mitrović

Rezime

Nadmorska visina na kojima se javlja zajednica na ovom području je od 900–1200 mnv, ali su šume najbolje očuvane i razvijene na terenima od oko 1100 mnv. Ekspozicije na kojima se ona javlja su istočne, jugoistočne, jugozapadne, severozapadne i dr. U pogledu nagiba, to su tereni od oblika zaravni do većih nagiba od preko 20°.

Geološku podlogu u čitavom arealu ove zajednice čine neogeni sedimenti; peščari, šljunkovi i gline, a samo na manjoj površini prisutni su filiti. Površina zemljišta je bez krupnog kamenja i stena ili je neznatno kamenita, jer je matični supstrat podložan procesu fizičkog raspadanja. U profilu zemljišta skeletnost nije mnogo izražena sve do nivoa geološke podloge, gde taj prelaz nije nagao nego postepen.

Najčešća zemljišta koja su se razvila na ovakvim matičnim supstratima i u ovoj zajednici su distrični kambisoli, psudoglejevi, na većini istraživanih sastojina i luvisol. Prema izvršenim pedološkim istraživanjima zemljišta su dubine preko 70 cm.

Kao pojedinačni florni elementi najzastupljeniji su subsrednjeevropski (21), evroazijski (15), subevroazijski (11) i srednjeevropski (10). Manje su zastupljeni subpontski (4), istočno-submediteranski (4), subjužnosibirski (4) i sa po 3 vrste submediteranski, subatlantsko-submediteranski i cirkumpolarni.

U zajednici kitnjaka i cera (*Quercetum petraeae-cerris*) prevladavaju biljke kseromezofilnog karaktera, pošto se nalazi na prelaznoj zoni između ilirske i mezijske provincije.

Floristički sastav i struktura predstavljen je fitocenološkom tabelom 1 sa 7 snimaka. Zajednica sadrži 159 taksona: 7 vrsta drveća, 11 vrsta grmova i 141 vrsta koje se javljaju u sloju prizemne flore. Među vrstama u spratu prizemne flore su 3 paprati i 138 cvetnica.

Sastojine kitnjaka i cera su na Pešteru dosta degradirane, negde i potpuno raskinutog sklopa, tako da su biljke iz susednih šumskih i livadskih fitocenoza i kultura našle povoljne uslove za život u fitoklimatu ove fitocenoze. Na osnovu ovih podataka može se konstatovati da zajednica kitnjaka i cera na Pešteru spada u red bogatih šumskih fitocenoza za područje istraživanja. Florističko bogatstvo je posledica osobina same zajednice i karakteristika sastojina u kojima su vršena istraživanja.

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Phytocenological table - Association *QUERCETUM PETRAEAE-CERRIS Jovanović (1960)1979*

The ordinal number of the record	1	2	3	4	5	6	7	The degree of the presence
Number of the record (field mark)	sVIII	s37	136	s36	s38	s38a	s39	
Date of the record	21.07.96	23.06.96	07.07.97	23.06.96	27.06.96	28.06.96	28.06.96	
Locality	Strmac	Babinjača	Uvac	Babinjača				
Size p. p. (m2)	900							
Altitude (m)		1,140	1,180	1,140	1,180	1,190	1,160	
Exposition (°)	I	J-JI	J-JZ	JZ	S-SZ	S-SZ	I-JI	
Inclination	15	20	15	20	0	18	15	
Geological base	Phillites		Sandstones, clays, hornstones and marls					
Soil		Dystric cambisol			luvisol		pseudogley	
I LAYER								
Canopy	0.8	0.5	0.7	0.3	0.6	0.6	0.7	
Height -mean (m)	11	10	14	9	20	25	22	
Diameter - (cm)	8-20	20	16	20	30	25	25	
Distance (m)	1-3	5	0.5-4	11	1-4	2-4	2-5	
Quercus petraea	4.5		1.1		4.4	4.4	4.4	V
Quercus cerris		3.3	3.3	2.3				III
Populus tremula					+1	+1		III
Betula pendula					+1			I
Fagus moesiaca	+1							I
Prunus avium					+1			I
Pyrus piraster		1.1						I
Tilia parvifolia							+1	I
II LAYER								
Canopy	0.3	0.3	0.3	0.2	0.2	0.3	0.2	
Height (m)	2	3	2.5	2.5	1.5	1.5	2	
Corylus avellana	+1	2.2	+1	2.3		1.1	1.1	V
Pyrus piraster	+1	1.1	+1	+1	+1		+1	V

The ordinal number of the record	1	2	3	4	5	6	7	The degree of the presence
<i>Quercus petraea</i>	2.2		1.1	+1	+1	1.1	1.1	V
<i>Crataegus monogyna</i>	+1		+1	1.1			2.2	III
<i>Juniperus communis</i>	+1	1.1		1.1				III
<i>Quercus cerris</i>		2.3	2.2	+1				III
<i>Betula pendula</i>						+1	+1	II
<i>Carpinus betulus</i>		1.1				+1		II
<i>Evonymus latifolius</i>					+1		+1	II
<i>Populus tremula</i>			+1			1.1		II
<i>Prunus avium</i>						+1	+1	II
<i>Prunus spinosa</i>			2.1	1.1				II
<i>Salix capreae</i>		+1					+1	II
<i>Crataegus calycina</i>					+1			I
<i>Evonymus europaeus</i>								I
<i>Rosa agrestis</i>				1.1				I
<i>Tilia parvifolia</i>							+1	I
<i>Viburnum lantana</i>							+1	I
III LAYER								
Canopy	0.4	0.6	0.4	0.4	0.4	0.4	0.4	
<i>Campanula persicifolia</i>	+1	+1	+1	+1	+1	+1	+1	V
<i>Fragaria vesca</i>	+1	+1	1.1	+1		+1	1.1	V
<i>Prunella vulgaris</i>		+1	1.1	+1	+1	+1	+1	V
<i>Ajuga reptans</i>	+1	+1		+1	+1		+1	IV
<i>Dactylis glomerata</i>	+1		1.1			1.1	1.1	IV
<i>Trifolium montanum</i>	+1	1.1		2.2			+1	IV
<i>Viola silvestris</i>	+1	+1	+1		+1		+1	IV
<i>Aegopodium podagraria</i>	+1				+1		+1	III
<i>Anemone nemorosa</i>	1.1				2.2	1.2	2.2	III
<i>Aremonia agrimonioides</i>	1.1		+1				1.1	III
<i>Brachypodium silvaticum</i>		1.1	1.2	+1	+1			III

The ordinal number of the record	1	2	3	4	5	6	7	The degree of the presence
<i>Carex praecox</i>					+1	1.1	1.1	III
<i>Cirsium acule</i>		+1	+1	1.2				III
<i>Danae cornubiensis</i>	+1	+1	+1					III
<i>Euphorbia amygdaloides</i>	+1					+1	+1	III
<i>Festuca heterophylla</i>			1.2			1.2	1.2	III
<i>Filipendula hexapetala</i>			+1			+1	+1	III
<i>Galium cruciata</i>		+1		1.1			1.1	III
<i>Galium silvaticum</i>	+1			1.1			1.2	III
<i>Genista ovata</i>	+1			1.1			+1	III
<i>Geranium sanguineum</i>			+1			+1	+1	III
<i>Helleborus odorus</i>					+1	+1	+1	III
<i>Helianthemum nummularium</i>		+1		1.1	+1			III
<i>Hieracium bauhini</i>		1.1		1.1	+1		1.1	III
<i>Hieracium pilosella</i>		+1		1.1	+1	+1		III
<i>Hypericum perforatum</i>	+1		+1				+1	III
<i>Inula hirta</i>		1.1		1.1			+1	III
<i>Polygonatum odoratum</i>	+1					+1	1.2	III
<i>Primula veris</i>	+1			+1			+1	III
<i>Silene nutans</i>		+1		1.1	+1		1.1	III
<i>Stachys officinalis</i>		1.1	+1	1.1				III
<i>Stelaria holostea</i>	1.1				1.1	1.1	1.1	III
<i>Teucrium chamaedrys</i>		1.1	+1	1.2				III
<i>Trifolium alpestre</i>		1.1		1.1			1.1	III
<i>Veronica officinalis</i>		+1		+1	+1	+1		III
<i>Asarum europaeum</i>					+1		1.1	II
<i>Astrantia major</i>		1.1		1.1	1.1	+1		II
<i>Briza media</i>								II
<i>Campanula patula</i>		+1		+1				II
<i>Carex montana</i>	+1		+1					II

The ordinal number of the record	1	2	3	4	5	6	7	The degree of the presence
<i>Cerastium brachypetalum</i>		+1		+1				II
<i>Chamaecytisus rochelii</i>					+1		1.1	II
<i>Cytisus scoparius</i>		2.3		+1				II
<i>Dactylorhiza incarnata</i>					+1	+1		II
<i>Dianthus armeria</i>					+1	+1		II
<i>Digitalis ambigua</i>					+1	+1		II
<i>Dorycnium herbaceum</i>		1.1		1.1				II
<i>Festuca vallesiaca</i>	1.2						2.1	II
<i>Filipendula hexapetala</i>			+1	1.1				II
<i>Galium vernum</i>		+1	+1					II
<i>Galium verum</i>						1.1	1.1	II
<i>Hypericum montanum</i>					+1	+1		II
<i>Koeleria pyramidata</i>		+1						II
<i>Lathyrus niger</i>				1.1	+1			II
<i>Leontodon hispidus</i>				+1				II
<i>Leucanthemum vulgare</i>		1.1		1.1				II
<i>Lilium martagon</i>	+1					+1		II
<i>Lolium perenne</i>		1.1		1.1				II
<i>Luzula campestris</i>				+1				II
<i>Luzula luzuloides</i>						2.2	1.1	II
<i>Melampyrum pratense</i>						1.2	1.1	II
<i>Melampyrum sylvaticum</i>					+1	+1		II
<i>Melittis melissophyllum</i>	1.1				+1			II
<i>Phleum montanum</i>					+1	+1		II
<i>Plantago altissima</i>		+1		1.1				II
<i>Poa nemoralis</i>		1.1	+1					II
<i>Polygala comosa</i>				1.1	+1			II
<i>Potentilla erecta</i>						1.1	+1	II
<i>Ranunculus steveni</i>				+1			+1	II

The ordinal number of the record	1	2	3	4	5	6	7	The degree of the presence
<i>Rumex acetosa</i>		+1		1.1				II
<i>Serratula tinctoria</i>					+1		+1	II
<i>Silene vulgaris</i>					+1	+1		II
<i>Tanacetum corymbosum</i>		+1		1.2				II
Woody species in III layer								
<i>Pyrus pyraeaster</i>		+1	+1	+1				IV
<i>Quercus petraea</i>		+1	+1					II
<i>Prunus spinosa</i>			1.1					I
<i>Quercus cerris</i>			1.1					I
<i>Rubus canescens</i>			+1					I

In the individual phytocenological records the following species are reported:

Alchemilla vulgaris 1.1 (s38), *Anthriscus sylvestris* +1 (s38), *Avena pubescens* 1.1 (136), *Calamagrostis epigeios* 1.2 (s38a), *Campanula patula* (+1), *Carex hordeistichos* +1 (s38a), *Centaurea nyssana* +1 (s38a), *Cephalanthera longifolia* +1 (sVIII), *Cephalanthera rubra* +1 (sVIII), *Cerastium brachypetalum* +1 (s38) *Chamaecytisus supinus* 1.1 (s39), *Cynosurus cristatus* +1 (s37), *Coronilla varia* +1 (sVIII), *Crepis viscidula* +1 (s38a), *Cytisus scoparius* +1 (136), *Danthonia provincialis* 1.2 (s37), *Deschampsia flexuosa* 1.2 (s38a), *Digitalis ferruginea* +1 (s39), *Dorycnium herbaceum* +2 (s39), *Festuca amethystina* 1.1 (s37), *Galium aparine* +1 (sVIII), *Galium kitaibelianum* +1 (sVIII), *Galium rubioides* +1 (s38a), *Geum rivale* +1 (s38a), *Hieracium cymosum* +1 (s38a), *Hieracium murorum* +1 (s39), *Hieracium panosum* +1 (s38), *Hieracium transsilvanicum* +1 (sVIII), *Hipericum maculatum* +1 (s37), *Inula salicina* +1 (s38a), *Knautia arvensis* +1 (s36), *Koeleria gracilis* +1 (s38a), *Koeleria pyramidata* +1 (s37), *Lamium galeobdolon* +1 (s39), *Lathyrus hallersteinii* +1 (sVIII), *Lathyrus venetus* +1 (sVIII), *Latiurus transilvanicus* +1 (s38), *Leontodon hispidus* +1 (s38), *Leucanthemum vulgare* +1 (s38), *Linum hirsutum* +1 (s38), *Luzula campestris* +1 (s36), *Luzula pilosa* 1.1 (s38), *Lysimachia vulgaris* +1 (s39), *Melica nutans* 1.1 (s39), *Mercurialis perennis* +1 (136), *Myosotis arvensis* +1 (s37), *Myosotis versicolor* +1 (s37), *Ononis spinosa* 1.1 (s36), *Peucedanum palustre* +1 (s38a), *Phyteuma spicatum* +1 (s38), *Plantago argentea* +1 (s38), *Plantago major* +1 (s39), *Poa pratensis* 1.1 (s37), *Polystichum lobatum* +1 (s37), *Potentilla australis* +2 (s38), *Potentilla heptaphylla* +1 (s39), *Primula acaulis* +1 (s39), *Primula vulgaris* +1 (sVIII), *Pteridium aquilinum* +1 (136), *Pulmonaria officinalis* +1 (sVIII), *Scabiosa triniaefolia* +1 (136), *Selinum carvifolia* +1 (s37), *Silene italica* +1 (sVIII), *Silene roemerii* subsp. *sendtneri* +1 (s38a), *Solidago virga-aurea* +1 (sVIII), *Stelaria graminea* +1 (s38), *Teledkia speciosa* +1 (136), *Thalictrum minus* +1 (s38a), *Thymus longicaulis* +1 (136), *Thymus serpyllum* +2 (s39), *Torilis arvensis* +1 (s38), *Trifolium hybridum* 1.1 (s39), *Trifolium medium* 1.1 (sVIII), *Trifolium pratense* 1.1 (s38), *Trifolium rubens* 1.1 (s37), *Verbascum lanatum* +1 (s39), *Veronica chamaedrys* +1 (s38a), *Veronica paecox* +1 (s37), *Veronica teucrium* +1 (s38), *Vicia cassubica* +1 (136) i *Vicia cracca* 1.1 (s39). *Chamaespartium sagyttale* +2 (136).