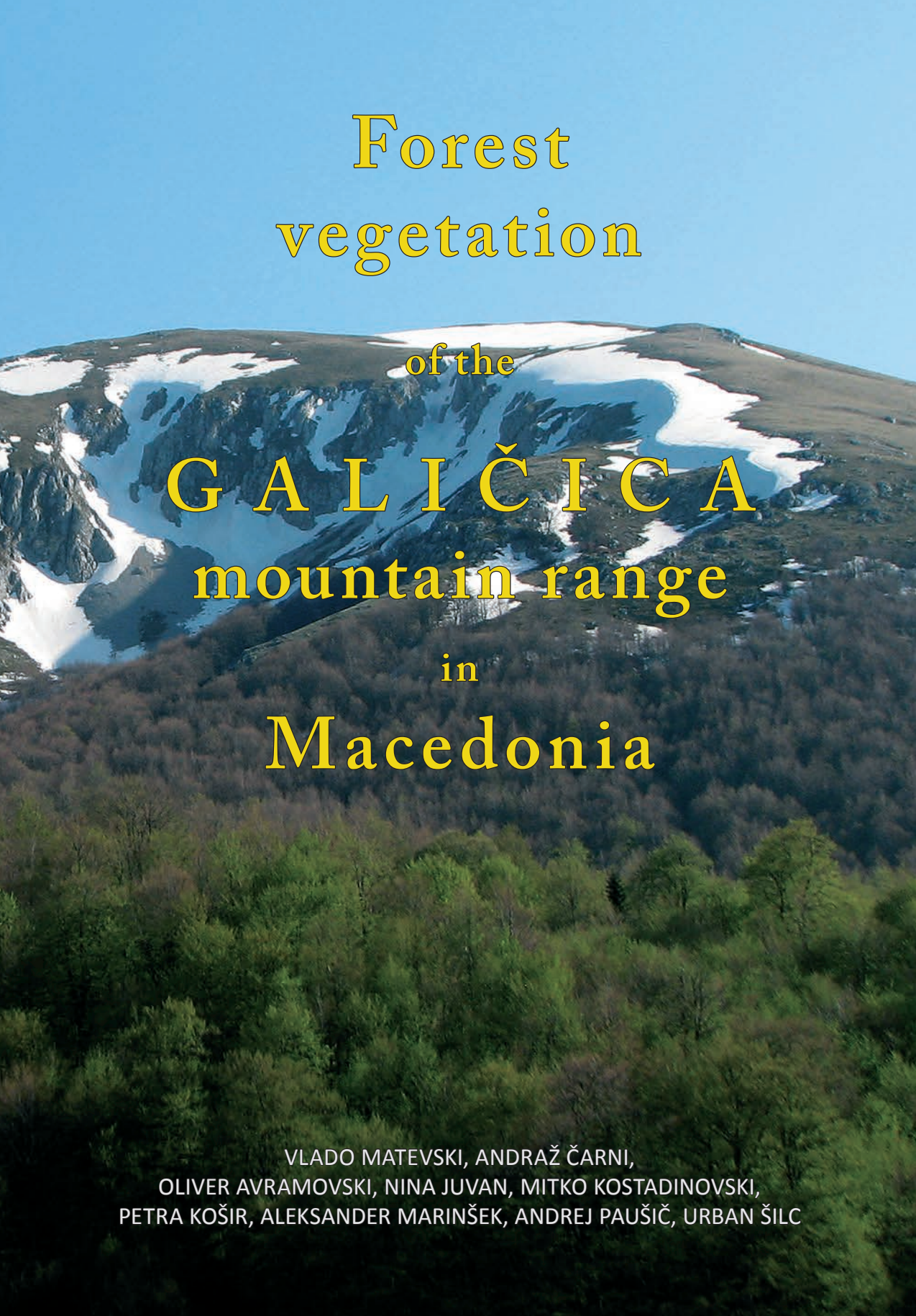

Forest vegetation of the GALIČICA mountain range in Macedonia

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Gozdna vegetacija gorovja Galičica v Makedoniji

ZALOŽBA
ZRC

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Izdajatelja Biološki inštitut Jovana Hadžija ZRC SAZU
Makedonska akademija na naukite i umetnostite
Za izdajatelja Matjaž Kuntner / Georgi Stardelov
Založnik Založba ZRC, ZRC SAZU
JU Nacionalen park Galičica
Za založnika Oto Luthar / Zoran Angeloski
Glavni urednik Založbe ZRC Aleš Pogačnik

Tisk Littera picta, d. o. o., Ljubljana
Naklada 1000 izvodov
Izdajo je finančno podprla Javna agencija za knjigo Republike Slovenije

CIP - Kataložni zapis o publikaciji
Narodna in univerzitetna knjižnica, Ljubljana

581.9(497.7Galičica)
630*18(497.7Galičica)

FOREST vegetation of the Galičica mountain range in Macedonia = Šumskata vegetacija na planinata Galičica vo Makedonija = Gozdna vegetacija gorovja Galičica v Makedoniji / Vlado Matevski ... [et al.] ; [kartografija Iztok Sajko ; avtorja fotografij Aleksander Marinšek, Vlado Matevski, Andrej Paušič].
- Ljubljana : Založba ZRC, ZRC SAZU, 2011

ISBN 978-961-254-313-6
1. Vzp. stv. nasl. 2. Matevski, Vlado
257982464

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Ljubljana 2011

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Шумската вегетација на планината Галичица во Македонија

Во оваа книга е презентиран детален опис на шумите на планината Галичица – една од природните бисери на Македонија, која последните неколку години привлече една група на македонски и словенечки истражувачи, кои вршеа детални истражувања на овој простор. Во книгата систематски се претставени сите типови шуми, кои се најдени на планината Галичица, проследени со вегетациски пописи, почвени примероци, хоролошки и еколошки анализи, како и со подготвена вегетациска карта на шумските заедници, кои на читателот му даваат информации за просторната распределба на шумите на теренот. Студијата нашироко ја отвора вратата на големата разновидност на овие шуми и ги повикува читателите да уживаат во тој прекрасен свет.

Планината Галичица се наоѓа во јужниот дел на Република Македонија, помеѓу Охридското и Преспанското Езеро. На север се граничи со пониски планини, на југ со државната граница со Албанија. Македонскиот дел од планината, поради уникатните растителни и животински видови, како и шуми прогласен е за национален парк.

Шумите на планината Галичица се доста разновидни. Тие можат да се поделат во две групи; во првата спаѓаат повеќе или помалку мезофилни шуми, во кои доминираат видовите *Fagus sylvatica*, *Carpinus betulus*, *Corylus colurna* и *Acer obtusatum*, додека во другата, термофилни листопадни шуми, во кои доминираат различни видови дабови (*Quercus cerris*, *Q. frainetto*, *Q. petraea*, *Q. pubescens*, *Q. trojana*), *Ostrya carpinifolia*, *Carpinus orientalis* и *Juniperus excelsa*. На Галичица се појавуваат исто така крајбрежни шуми, со доминантниот вид *Salix alba* (*Salicetum albae*), додека на карстните висорамнини, планинската грмушеста заедница со видот *Juniperus communis*, која претставува фаза на зараснување во појасот на буковите шуми.

Во рамките на групата на мезофилни шуми одделени се неколку групи: зонални букови шуми, каде што се приклучени субмонтанската заедница *Festuco heterophyllae-Fagetum* (на длабоки, свежи почви, богати со хранливи материи, на карбонатна и силикатна подлога), монтанската – *Calamintho grandiflorae-Fagetum* (на длабока и свежа почва), високопланинската – *Abieti--Fagetum* и субалпската заедница *Asyneumo-Fagetum* (на планината Галичица ја претставуваат шумската граница); термофилната азонална заедница *Aceri obtusati-Fagetum* (на стрмните јужни падини, на плитка почва, на карбонатна подлога); шумите во клисурите, каде што припаѓаат заедницата *Corylo colurnae-Aceretum obtusati* (на пониски надморски височини, на стрмни падини, каде што почвата е повеќе влажна и богата со хранливи материи), *Corylo colurnae-Ostryetum carpinifoliae* (на поголеми надморски височини, на граница помеѓу дабовите и буковите шуми, на засенчени места, на стрмни, влажни и каменливи почви богата со хумус) и во долините – *Corylo colurnae-Carpinetum betuli* (на длабоки и свежи почви).

Термофилните листопадни шуми можат да се поделат во две групи. Првата група се состои од шуми во кои доминираат дабовите, како што се *Quercus frainetto*, *Quercus cerris* и *Quercus petraea*. Овие шуми градат зонални заедници – *Quercetum frainetto-cerris* (се појавува на помали надморски височини, на длабоки почви, претежно на силикатна подлога), *Fraxino orni-Quercetum cerris* (на длабока почва, на силикатна подлога), *Ostryo carpinifoliae-Quercetum cerris* (на плитки почви, каде што карбонатните камењари се појавуваат на површината од почвата) и *Fraxino orni-Quercetum petraeae* (на горната граница на термофилните листопадни шуми).

Во втората група се вклучени некои од останатите термофилни шуми, главно со екстразонален карактер. Во близина на езерата, каде што локалните климатски прилики се поблаги поради близината со водните басени, успеваат шуми каде што доминира видот *Carpinus orientalis* (*Phillyreo-Carpinetum orientalis*). Над овие шуми се појавуваат шуми со доминантниот вид *Ostrya carpinifolia*; на стрмните јужните падини се развива ксерофилната заедница *Querco pubescentis-Ostryetum carpinifoliae*, додека на повисоките надморски височини или во умерено влажни подрачја се појавува заедницата *Seslerio-Ostryetum*. На екстремно топли, суви места, на доста длабока почва, се присутни шуми во кои доминира *Quercus trojana* (*Quercetum trojanae*), додека пак на најекстремно топли станишта, на плитки, скелетни почви, се појавуваат шуми, во кои доминираат *Juniperus excelsa* (*Pruno webii-Juniperetum excelsae* и *Querco trojanae-Juniperetum excelsae*).

Се надеваме, дека оваа книга, која покрај деталниот опис, истражуваните шуми ги сместува во поширокиот, југозападно-европски контекст, ќе ги привлече читателите да ја прочитаат книгата со интерес. Меѓутоа, доколку нејзината содржина го привлече нивниот интерес до тој степен, да притоа посакаат, некои од тие шуми и да ги погледаат, со тоа е постигната, можеби дури и надмината, нејзината намена.

Gozdna vegetacija gorovja Galičica v Makedoniji

Pričujoča knjiga prinaša podroben opis gozdov Galičice – enega od naravnih biserov Makedonije, ki so tako pritegnili skupino slovenskih in makedonskih raziskovalcev, da je v preteklih letih opravila obsežne raziskave na tem območju. V knjigi so sistematično predstavljeni vsi gozdni tipi, ki jih najdemo na pogorju Galičice, z vegetacijskimi popisi, talnimi vzorci, horološkimi in ekološkimi analizami, hkrati pa smo pripravili tudi vegetacijsko karto gozdnih združb, ki bralcu podaja informacijo o razporeditvi gozdov na terenu. Delo tako na široko odpira vrata v veliko pestrost teh gozdov in vabi bralce, da uživajo v tem čudovitem svetu.

Gorovje Galičica leži med Ohridskim in Prespanskim jezerom na južnem delu Republike Makedonije. Na severu meji na nižja gorovja, na jugu pa na državno mejo z Albanijo. Makedonski del gorovja je zaradi edinstvenih rastlinskih in živalskih vrst gozdnate pokrajine proglašen za Narodni park.

Gozdovi Galičice so precej raznoliki. Razdelimo jih lahko v dve skupini: v prvo sodijo bolj ali manj mezofilni gozdovi, v katerih prevladujejo vrste *Fagus sylvatica*, *Carpinus betulus*, *Corylus colurna* in *Acer obtusatum*, v drugo pa termofilni listnati gozdovi, v katerih prevladujejo različne vrste hrastov (*Quercus cerris*, Q. *frainetto*, *Q. petraea*, *Q. pubescens*, *Q. trojana*), in vrste *Ostrya carpinifolia*, *Carpinus orientalis* in *Juniperus excelsa*. Na območju Galičice se pojavljajo tudi obrežni gozdovi, s prevladujočo vrsto *Salix alba* (*Salicetum albae*), in na kraški planoti gorska grmiščna združba z vrsto *Juniperus communis*, ki predstavlja stadij zaraščanja na območju uspevanja bukovih gozdov.

Znotraj skupine mezofilnih gozdov ločimo več skupin: conalne bukove gozdove, kamor uvrščamo submontansko asociacijo *Festuco heterophyllae-Fagetum* (na globokih, svežih tleh, bogatih s hranili, na karbonatni in silikatni podlagi), montansko asociacijo *Calamintho grandiflorae-Fagetum* (na globokih in svežih tleh), altimontansko asociacijo *Abieti-Fagetum* in subalpinsko asociacijo *Asyneumo-Fagetum* (na Galičici predstavlja gozdno mejo); aconalne gozdove, kamor uvrščamo asociacijo *Aceri obtusati-Fagetum* (na strmih južnih pobočjih, na plitkih tleh, na karbonatni podlagi); gozdove v soteskah, kamor sodita asociacija *Corylo colurnae-Aceretum* obtusati (na nižjih nadmorskih višinah, na strmih pobočjih, tla so bolj vlažna in bogata s hranili) in asociacija *Corylo colurnae-Ostryetum* carpinifoliae (na višjih nadmorskih višinah na meji med hrastovimi in bukovimi gozdovi, na senčnih legah, na strmih, vlažnih in kamnitih tleh bogatih s humusom) in gozdove v dolinah, kamor sodi asociacija *Corylo colurnae-Carpinetum* betuli (na globokih in svežih tleh).

Termofilne listnate gozdove lahko razdelimo v dve skupini. Prva skupina obsega gozdove v katerih prevladujejo hrasti, kot so *Quercus frainetto, Quercus cerris* in *Quercus petraea*. Ti gozdovi

gradijo conalne asociacije *Quercetum frainetto-cerris* (pojavlja se na nižjih nadmorskih višinah, tla so globoka, večinoma na silikatni podlagi), *Fraxino orni-Quercetum cerris* (na globljih tleh, na silikatni podlagi), *Ostryo carpinifoliae-Quercetum cerris* (na plitkih tleh, kjer so karbonatne kamnine vidne na površini) in *Fraxino orni-Quercetum petraeae* (na zgornji meji termofilnih listnatih gozdov).

V drugi skupini so nekateri drugi termofilni gozdovi z večinoma ekstraconalnim značajem. V bližini jezer, kjer je lokalna klima zaradi neposredne bližine vodnih teles blažja, uspevajo gozdovi, kjer prevladuje vrsta *Carpinus orientalis* (*Phillyreo-Carpinetum orientalis*). Nad temi gozdovi se pojavljajo gozdovi s prevladujočo vrsto *Ostrya carpinifolia*; na strmih južnih pobočjih najdemo kserofilno asociacijo *Querco pubescentis-Ostryetum carpinifoliae*, medtem ko se na višjih nadmorskih višinah ali na zmerno vlažnih področjih pojavlja asociacija *Seslerio-Ostryetum*. Na ekstremno toplih, suhih legah, na precej globokih tleh, najdemo gozdove, v katerih prevladuje vrsta *Quercus trojana* (asociacija *Quercetum trojanae*), na najbolj ekstremno toplih legah, na plitkih, skeletnih tleh, pa se pojavljajo gozdovi, v katerih prevladuje vrsta *Juniperus excelsa* (*Pruno webii-Juniperetum excelsae* in *Querco trojanae-Juniperetum excelsae*).

Želimo si, da bo pričujoča knjiga, ki poleg podrobnega opisa, umešča obravnavane gozdove v širši, jugovzhodno evropski kontekst, pritegnila bralce, da jo bodo z zanimanjem prebrali. Če pa bo vsebina pritegnila njihovo zanimanje do te mere, da si bodo nekatere od gozdov tudi ogledali, smo dosegli, mogoče celo presegli, svoj namen.

INTRODUCTION

This book gives a detailed description of forests of the Galičica mountain range. The limestone ridge offers shelter to diverse and endemic flora and fauna. The great natural value of the region has been recognized also by authorities. The National park Galičica was founded in 1958. It extends on a surface of 250 km^2 including practically the whole area. We can find also historical values in the region – Ohrid and St. Naum.

This natural beauty attracted the research interest of Macedonian and Slovenian researchers. They decided to prepare a monograph that would present the results of extensive investigations also to a broader public. The book systematically presents all forest types found on Galičica, the vegetation descriptions and analyses with special attention to soil, ecological and chorological factors. At the same time the vegetation map of the forest communities was prepared that provides information on location of forest types in the field. The book is designed to present these marvellous forests to readers and to make them enjoy in this beautiful part of the world.

The Galičica mountain range is situated in the southwestern part of the Republic of Macedonia, between two lakes: Lake Ohrid (Figure 1) and Lake Prespa. To the

Figure 1. The church of St. Jovan Kaneo above Lake Ohrid. Lake Ohrid is the deepest lake in the Balkans with a depth of 288 m. The water mass mitigates the climate of the whole region.

Figure 2. Geographical position of the Galičica National park. It lies in the southwestern part of the Republic of Macedonia, between two lakes, Lake Ohrid and Lake Prespa.

south it is limited by the state border with Albania and to the north by lower mountains (Figure 2).

The geomorphology of the mountain is divided into two parts. The southern part of the mountain to the south of the pass of Polce is known as Stara Galičica (Old Galičica). The area to the north is called Galičica (Galičica). The northernmost part of Galičica is called Planina Istok. All the peaks in the north-south direction form a continuous mountain range built of carbonate bedrock where various karstic features appear. The slopes to Lakes Ohrid and Prespa are steep, whereas the upper part is built as a karstic plateau where we can also find various karstic phenomena, such as dolinas and sink holes, and peaks rising above this plateau. The area, above all Galičica and Planina Istok, is poor in water. This karstic plateau at the altitude of 1600/1700 m was intensively grazed in the past and used to be covered by grasslands. After abandonment, a process of afforestation has begun that is rather slow because of the severe site conditions (drought, warmth). Further from Planina Istok is Petrinska Planina, which extends till the pass of Bukovik, where begins Plakenska planina to the northeast and Ilinska Planina. Only Galičica and Planina Istok are of carbonate origin, the others are of silicate bedrock. The silicate mountains are rounded at the top and covered by forests. Only Plakenska planina is higher, up to 1900 m, while the others are of lower altitude. On Galičica forests are found up to 1900 m (Figure 3); forests used to grow even higher, but the altitudinal extension was lowered by human impact such as grazing.

Figure 3. Timber line on Galičica mountain is at about 1900 m. In the past forests thrived even higher, but the timber line was lowered by human impact.

METHODS

The survey of forests of the mountain range was made in several steps and was done during three sequential years. First of all we made a non-supervised remote sensing map of forest communities of the region. We considered that this classification would match with the main forest types known from the literature sources. Then we located the sampling points randomly in the center of the polygons presenting the homogeneous forest patch. During field work we sampled the localities; beside the floristic inventory with estimated cover values of each plant and basic description of the site (the sample is called a relevé – see next paragraph), we also collected soil samples that would give additional information about the ecological circumstances, at depths from 0 to 10 cm. During the next season the map of forest vegetation was elaborated again by remote sensing; this time a supervised classification was used, in order to get better results. In the second year we sampled randomly in the homogeneous patches of individual association in order to obtain a representative number of relevés of each community.

The field sampling was done according to the standard method for vegetation elaboration (Braun-Blanquet 1964). In the area elaborated we have selected the homogeneous plots according to the already described procedure. On each plot of 100 m^2, we listed the species appearing and estimated the cover of individual plant taxa according to the scale (r – only one or a few plants, + – plants are rare and cover less than 5 % of surface; 1 – plants are common, but their cover is lower than 5 %; 2 – plants are common and cover 5–20 % of the surface; 3 – plants cover 25–50 % of the surface; 4 – plants cover 51–75 % of the surface; and 5 – plants cover 76–100 % of the surface). At the same time we also registered the basic geomorphological and other characteristics of the site and vegetation (altitude, aspect, slope, cover of bedrock, size of the plot, cover of vegetation (according to layers) etc.).

Mosses were not determined, except the most common ones (*Ctenidium molluscum*, *Dicranum scoparium*, *Hypnum cupressiforme*), but the cover of mosses on each plot is given in the tables.

Some plant samples, more complicated for determination, were collected and herbarized. After determination of plants and performed pedological analyses, we built up the final tables; one containing relevés (species x relevés), soil samples (soil samples x relevés), geomorphological and structural features (features x relevés) and proceeded with the elaboration.

The relevés were subject to the PC-ORD (McCune & Mefford 1999), run under the JUICE program (Tichý 2002). Sørensen (Bray-Curtis) distance measure and Ward's classification method were used. The relevés were divided into 20 clusters that are presented in Table 1. Expert based adjustments of some relevés have been made; however, because of the high human impact, the communities do not always show their ecological niche (e.g. cutting, grazing, and plantation of trees on sites of other communities). In this way we obtained a classification that is ecologically sound.

Then we elaborated clusters in the JUICE program, where we determined the diagnostic, constant, and dominant species (in the text they are arranged alphabetically, layers are separated by a semicolon). For this analysis we merged all layers (upper tree, lower tree, shrub, herb, and moss layer) into one single layer. The diagnostic species of 20 individual groups were determined by calculating species' fidelity (Chytrý et al. 2002). As a fidelity measure we used the phi coefficient in the JUICE program. In these calculations, each group of relevés was compared with the rest of the relevés in the data set, which were taken as a single undivided group. Each of the 20 groups was virtually adjusted to 1/20 of the size of the entire data set, while holding the percentage occurrences of a species within and outside a target group the same as in the original data set (Tichý & Chytrý 2006). We also calculated Fischer's exact test and gave zero fidelity value to the species with significance $P < 0.05$. In the results, a species is treated as diagnostic if the phi value multiplied by 100 meets the threshold of 30 (50 is indicated in bold and presented in the tables); constant, if it is presented in 100 % of relevés and dominant if it covers at least 25 % of the surface in 50 % of relevés (80 % is indicated in bold). At the same time we tried to classify these clusters into the existing syntaxonomical scheme and harmonize the nomenclature with the International Code of Phytosociological Nomeclature (Weber et al. 2000).

In order to understand better the distribution of communities in the field we compared clusters (communities) also by measured soil properties that have been analyzed using standard analytical techniques. The analyses were performed by the Pedological laboratory at the Biotechnical faculty University of Ljubljana. The samples were treated in accordance with ISO 11464 and the following characteristics were measured: pH ($CaCl_2$) (ISO 10390), organic carbon was determined in accordance with the Walkley-Black method (ISO 14235); total nitrogen (N) content according to the modified Kjeldahl method (ISO 11261); exchangable basic cations (Ca^{2+}, Mg^{2+}, K^+, Na^+) were analyzed using atomic absorption spectrophotometry.

Moreover we calculated the average bioindicator values for the relevés. There exists a list of species with settled bioindicator values (moisture, nutrient, temperature, continentality, light, soil reaction) that can be a useful aid to understanding the vegetation (Pignatti et al. 2005). According to this list we calculated the average bioindicator value for each relevé and made comparisons among them (clusters).

Similarly, we settled also the geoelemental structure of relevés. The species were divided into chorotypes according to various flora (Hegi 1946–2003, Jordanov 1963–1982, Josifović 1970–1977, Diklić 1986, Micevski 1985–2005, Strid & Tan 1997, 2002). Then the spectrum of each relevé was calculated and the spectra were compared and commented.

It has long been known that the conditions of the site are also reflected in the life form of species. We therefore determined the life forms according to Raunkiaer (1934) (phanerophytes, chamaephytes, hemicryptophytes, geophytes, and therophytes) for all species and calculated the spectrum of life forms of each community.

In the measurements and calculations we used the following units: organic matter, C, C/N, N, sand, clay, coarse silt, fine silt, total silt, life form, chorotypes are

indicated in percentage (%), whereas Ca, Mg, K, Na, total exchangeable acidity, sum of base cations, and cation exchange capacity are measured in mmol C+/100 g sample.

The main information layer used for remote sensing was the latest satelite image from the Landsat programe; Landsat 7 imaginary with attached TM (thematic mapper) sensor, that has a spatial resolution of 30 metres (for bands in visible spectra) and 15 m of resolution for panchromatic bands.

We choose the Erdas Imagine 2010 program package (Leica Geosystems GIS and Mapping 2009) to classify the various forest community categories of Galičica National park. The spectral signatures for each forest type were developed from training areas (supervised classification technique). The parametric rule used was maximum likelihood, which assigns each pixel in the image to the class to which it has the maximum likelihood of belonging. To make the results more accurate, we include in the analysis also other information layers that were extracted from the main satellite image and were used as an additional information source e.g. the Normalized Difference Vegetation Index layer (NDVI).

NDVI is one of the most widely used vegetation indexes, that calculates the plant biomass from the sensor's visible red (X_{red}) and near-infrared (X_{nir}) bands as follows:

$$NDVI = \frac{X_{nir} - X_{red}}{X_{nir} + X_{red}}$$

The result is a raster layer with calculated NDVI values per pixel with a range of -1 to 1 (Figure 4). The higher the index rate the more developed is the vegetation cover in the study area (Aranof 2005).

Live green plants absorb solar radiation in the photosynthetically active radiation (PAR) spectral region, which they use as a source of energy in the process of photosynthesis. Leaf cells have also evolved to scatter (i.e. reflect and transmit) solar radiation in the near-infrared spectral region (which carries approximately half of the total incoming solar energy). Live green plants appear relatively dark in the PAR and relatively bright in the near-infrared. By contrast, clouds and snow tend to be rather bright in the red (as well as other visible wavelengths) and quite dark in the near-infrared. The pigment in plant leaves, chlorophyll, strongly absorbs visible light (from 0.4 to 0.7 μm) for use in photosynthesis (Aranof 2005). The cell structure of the leaves, on the other hand, strongly reflects near-infrared light (from 0.7 to 1.1 μm). The more leaves a plant has, the more these wavelengths of light are affected, respectively.

The NDVI value is predominantly influenced by the chlorophyll sensitivity. Therefore the index is strongly correlated for vegetation productivity (Bai et al. 2008, Jong et. al 2011) and biomass capacity (Aranof 2005) and is a useful tool for studying the ecological response to global warming (Pettorelli et al. 2005), phenological changes (White et al. 2009), crop status (Tottrup & Rasmussen 2004), land cover change (Hüttich et al. 2007), desertification (Symeonakis & Drake 2004) or zonal vegetation interpretation, as in our case on Mt. Galičica.

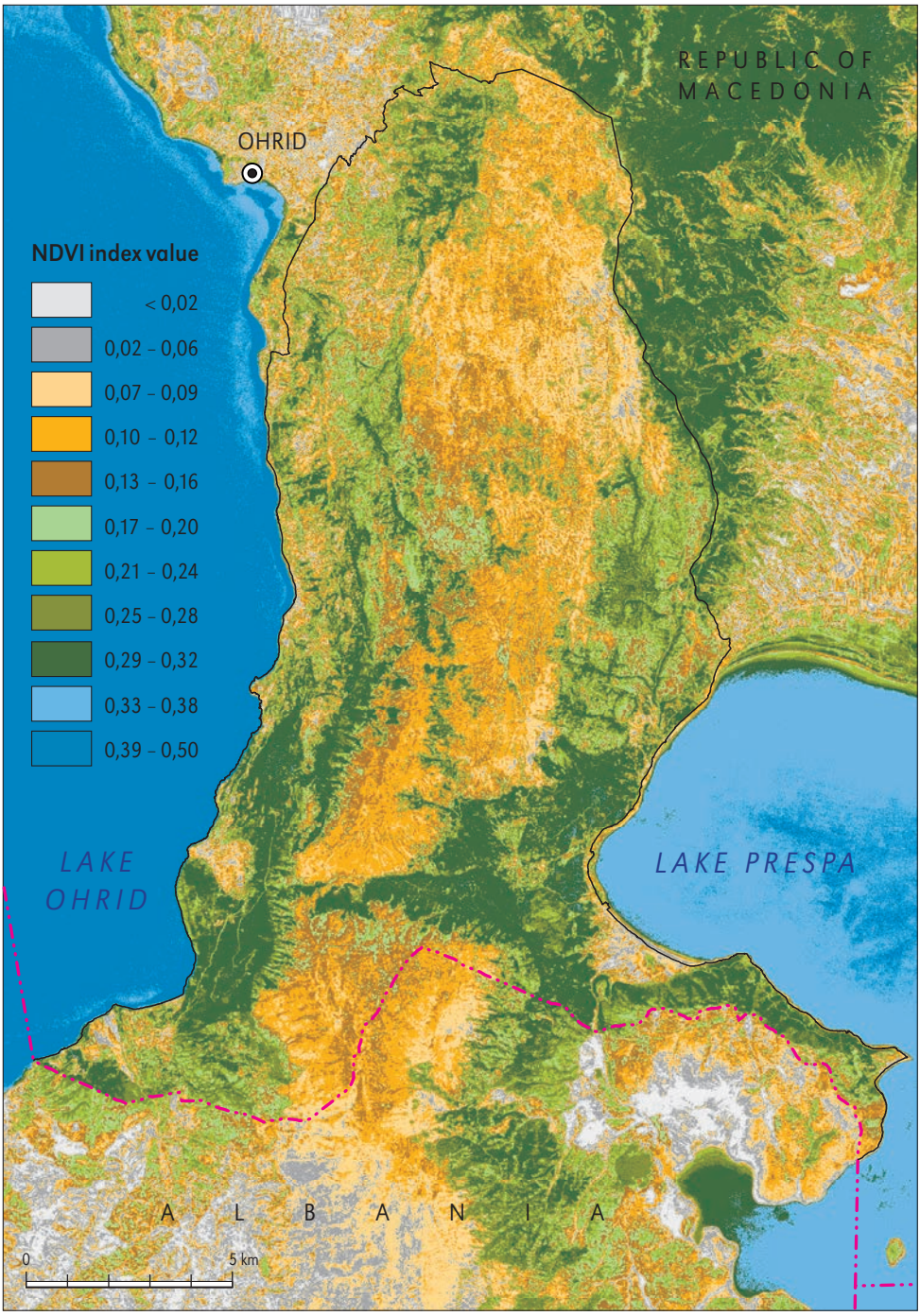
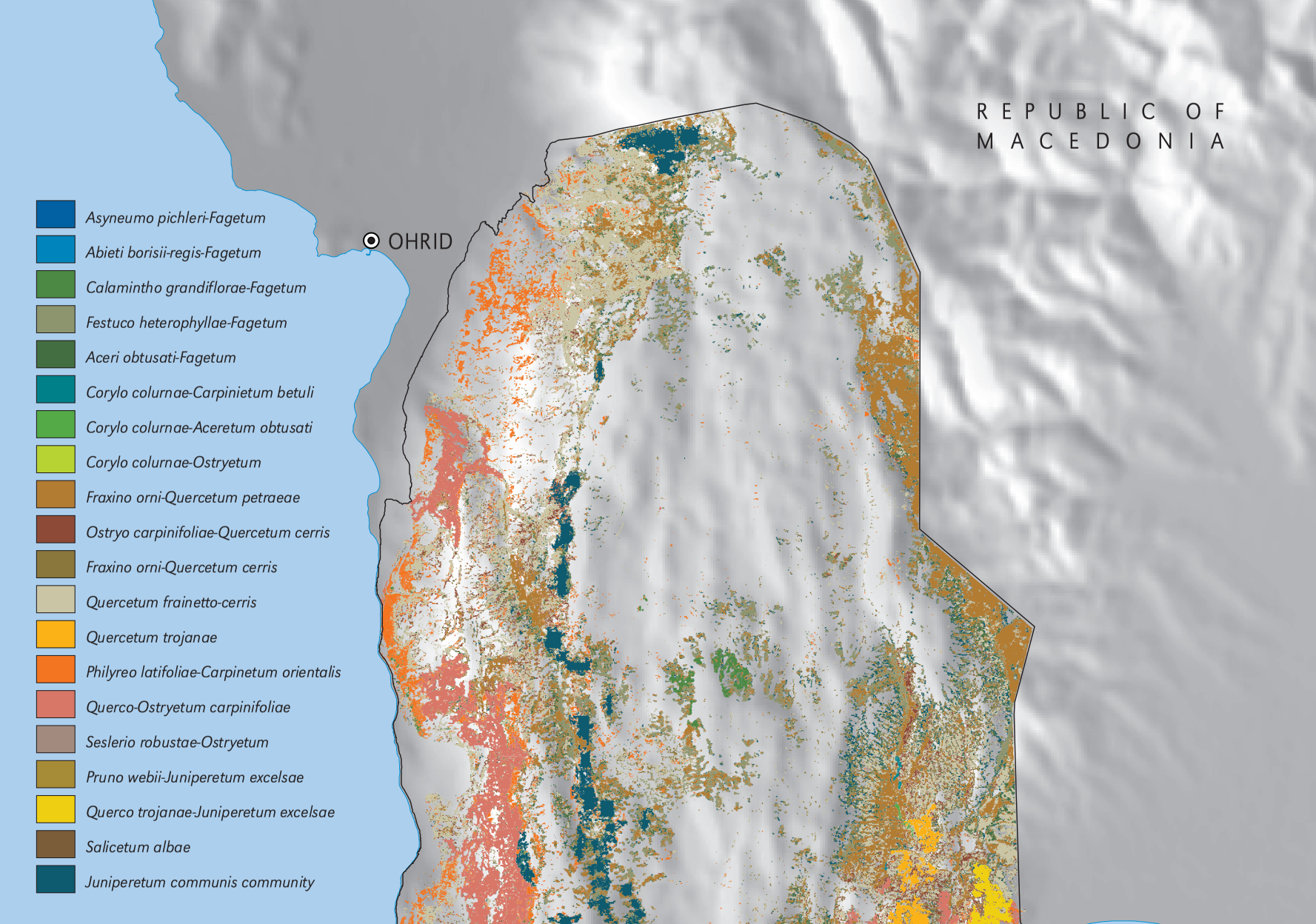


Figure 4. Plant biomass calculated with NDVI. The higher the index rate the more developed is the vegetation cover in study area.


REPUBLIC OF MACEDONIA
OHRID
Asyneumo pichleri-Fagetum
Abieti borisii-regis-Fagetum
Calamintho grandiflorae-Fagetum
Festuco heterophyllae-Fagetum
Aceri obtusati-Fagetum
Corylo colurnae-Carpinietum betuli
Corylo colurnae-Aceretum obtusati
Corylo colurnae-Ostryetum
Fraxino orni-Quercetum petraeae
Ostryo carpinifoliae-Quercetum cerris
Fraxino orni-Quercetum cerris
Quercetum frainetto-cerris
Quercetum trojanae
Philyreo latifoliae-Carpinetum orientalis
Querco-Ostryetum carpinifoliae
Seslerio robustae-Ostryetum
Pruno webii-Juniperetum excelsae
Querco trojanae-Juniperetum excelsae
Salicetum albae
Juniperetum communis community

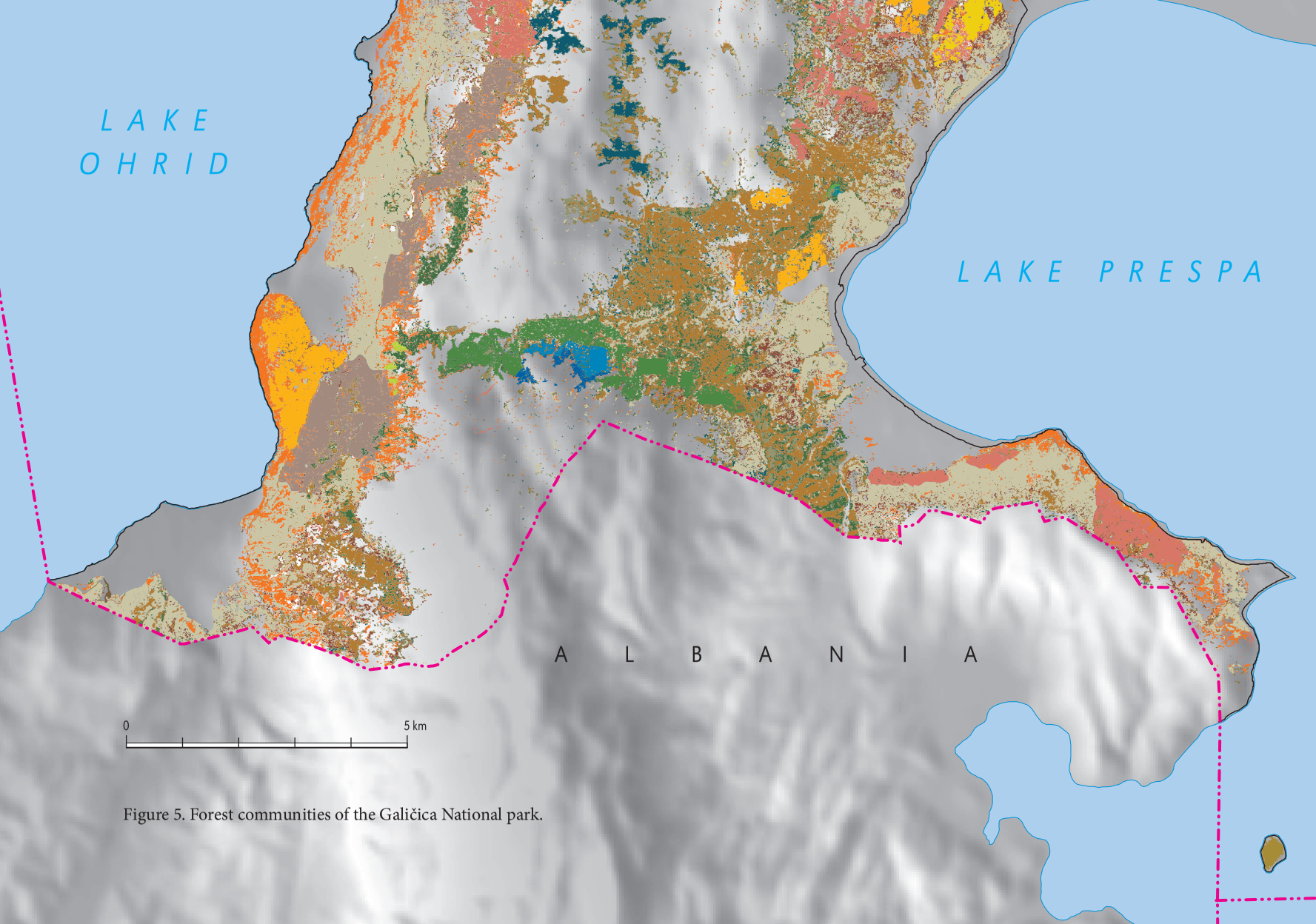


Figure 5. Forest communities of the Galičica National park.

To compare the results, derived from classification technique in the Erdas program with current state (2010), we used ArcGIS 9.3 package (ESRI 2008).

The next step was to generalize the visualized result. For that purpose the Majority Filter from ArcGIS Generalization tools was used, until the stage at which we got the result with minimum patch size of 300 m^2.

The field observation with randomly selected reference plots show that the obtained level of accuracy for the remote sensing classification was 86 %.

The results of the procedure are shown in Figure 5, that was later generalised in order to ensure that the distribution of forests would be clearer (Figure 6).

Legend to figure 6:

- *Asyneumo pichleri-Fagetum*
- *Abieti borisii-regis-Fagetum*
- *Calamintho grandiflorae-Fagetum*
- *Festuco heterophyllae-Fagetum*
- *Aceri obtusati-Fagetum*
- *Corylo colurnae-Carpinietum betuli*
- *Corylo colurnae-Aceretum obtusati*
- *Corylo colurnae-Ostryetum*
- *Fraxino orni-Quercetum petraeae*
- *Ostryo carpinifoliae-Quercetum cerris*
- *Fraxino orni-Quercetum cerris*
- *Quercetum frainetto-cerris*
- *Quercetum trojanae*
- *Philyreo latifoliae-Carpinetum orientalis*
- *Querco-Ostryetum carpinifoliae*
- *Seslerio robustae-Ostryetum*
- *Pruno webii-Juniperetum excelsae*
- *Querco trojanae-Juniperetum excelsae*
- *Salicetum albae*
- *Juniperetum communis community*

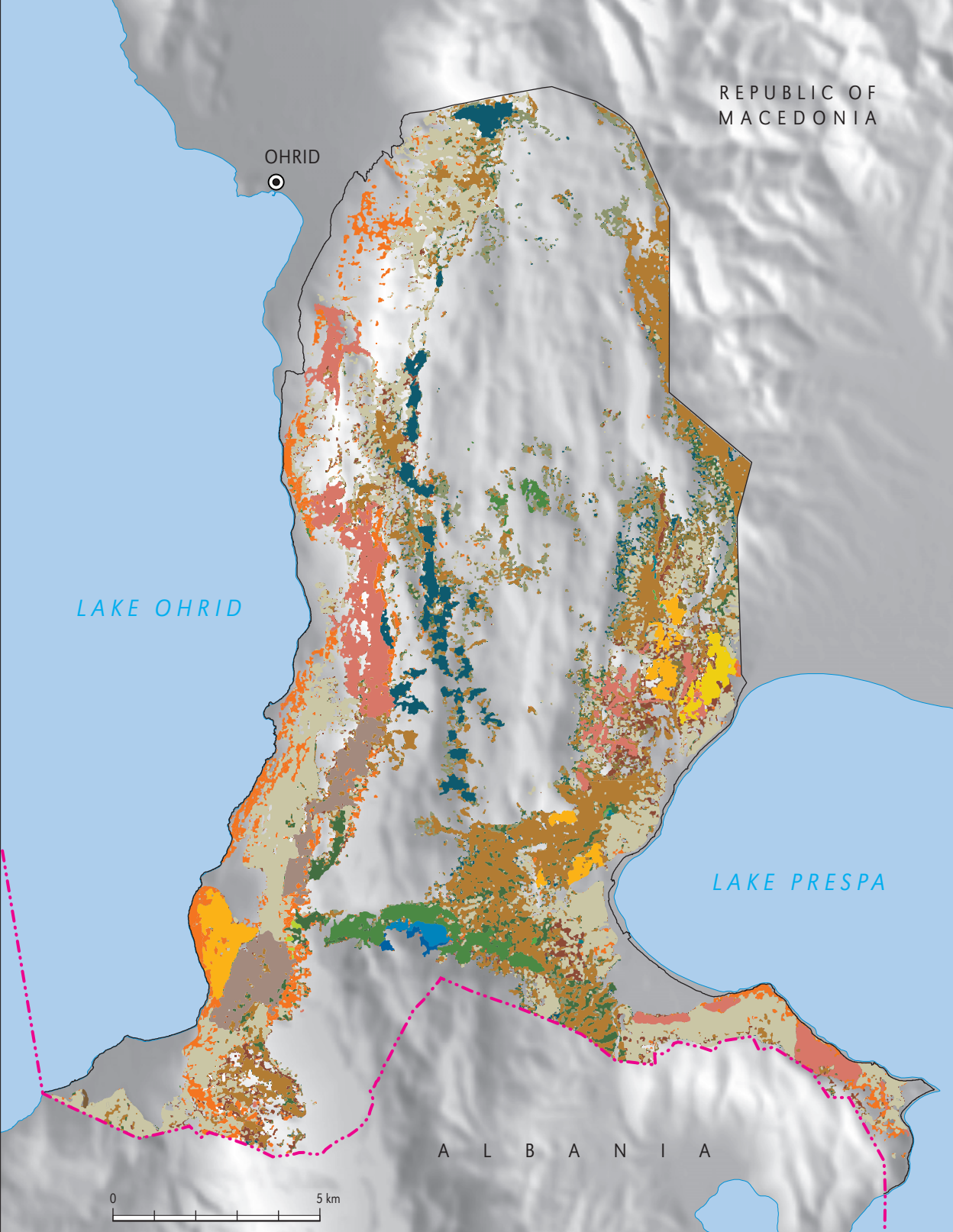


Figure 6. Generalized map of forest communities of the Galičica National park.

NOMENCLATURAL REMARKS

The nomenclature of higher plants is according to Flora Europaea (Tutin 1964–1993) except for species *Arenaria leptoclados* var. *viscidula*, *Dorycnium herbaceum* var. *macedonicum*, *Echinops bannaticus* var. *acutilobus*, *Euonymus europaeus* var. *europaeus*, *Hypericum perforatum* var. *angustifolium*, *Chaerophyllum aromaticum* var. *brevipilum*, *Lathyrus laxiflorus* var. *glabratus*, *Potentilla detommasii* var. *holosericea*, *Potentilla laci-nosa* var. *subsericea*, *Rubus sanguineus* var. *alnifolius*, *Sorbus aucuparia* var. *lanuginosa*, *Thymus longicaulis* var. *intermedia* that are according to Macedonian flora (Micevski 1985–2005). Mosses are according to Cekova (2005).

Since the nomenclatural status of *Fagus moesiaca* is still under taxonomic evaluation, we use the name *Fagus sylvatica* for this taxon throughout the whole text (Figure 7).

Figure 7. *Fagus sylvatica* in the region is often considered as a subspecies or variety *moesica*.

GENERAL VIEW OF THE FORESTS OF GALIČICA

The forests of Galičica have been exploited for a long time and natural sites have been completely altered; so nowadays site conditions are severe and rejuvenation has become difficult. The forests of Galičica are quite diverse. In the lowland we can find thermophilous deciduous forests that are composed of various oak species (*Quercus cerris*, *Q. frainetto*, *Q. petraea*, *Q. trojana*). These forests reach an altitude up to 1200/1400 m. Above them there appear beech forests that thrive up to a timber line at the altitude of 1900 m. We can find also some other forest types: *Carpinus betulus* dominated forest in the valleys, *Corylus colurna* (Figure 8), *Acer obtusatum*, and *Ostrya carpinifolia* dominated forests in ravines, *Salix alba* dominated forest along the rivers and streams. In the analysis we include also the *Juniperus communis*

Figure 8. *Corylus colurna* is a species that is distributed in southeastern Europe and northwestern Asia. In the region, it can be found in ravines.

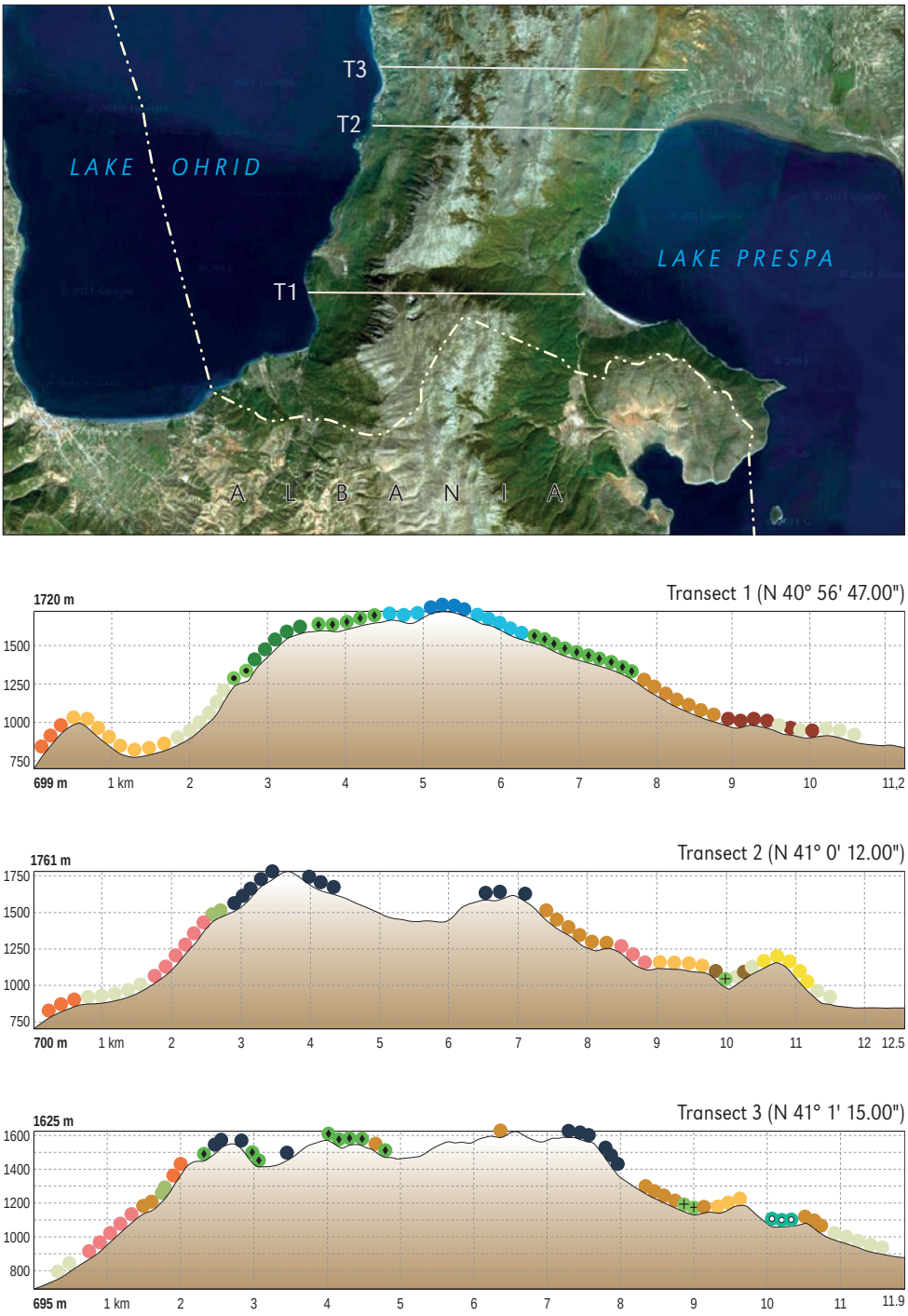


Figure 9: Vertical forest zonation of Galičica mountain range

dominated shrub community that is a stage of afforestation in the area of beech forests (Figure 9).

In the lowland we can find *Quercus frainetto* dominated forests (*Quercetum frainetto-cerris*) that occupy deep and propitious sites. The vegetation belt above the *Quercus frainetto* forests is built by *Quercus cerris*, that can be divided into two associations, one on the deeper soil horizon over silicate bedrock (*Fraxino orni-Quercetum cerris*) and the other on shallow soils, where the carbonate outcrops are visible on the surface (*Ostryo-Quercetum cerris*). Above *Quercus cerris* dominated forests, in contact with the beech forest, we can find a very fragmented belt of *Quercus petraea* dominated forests (*Fraxino orni-Quercetum petraeae*).

There exist also some other thermophilous forests mainly with non-zonal character (azonal, extrazonal or intrazonal). *Carpinus orientalis* dominated forests can be found next to the lakes, where the local climate is mitigated by the proximity of a water body (*Phillyreo-Carpinetum orientalis*). Above these forests we can find *Ostrya carpinifolia* dominated forests: in the upper part of a belt of thermophilous forests, on the steep southern slopes, *Ostrya* is mixed by *Quercus pubescens* (*Querco pubescentis-Ostryetum*), whereas the pure *Ostrya carpinifolia* dominated forests (*Seslerio-Ostryetum*) appear in the zone of beech forests. *Quercus trojana* dominated forests (*Quercetum trojanae*) can be found on extreme warm sites in the vegetation belt of oak forests. However on the most extreme sites in the region, in the sense of thermicity, we can find *Juniperus excelsa* dominated forests (*Pruno webii-Juniperetum excelsae* and *Querco trojanae-Juniperetum excelsae*). Along the rivers, *Salix* dominated forests can be found (*Salicetum albae*); in the ravines, *Acer obtusatum* dominated forests (*Corylo colurnae-Aceretum*) can be found at lower altitude, whereas at higher altitude, partly already in the zone of beech forets, *Ostrya carpinifolia* dominated forests (*Corylo colurnae-Ostryetum*) appear, and in the valleys *Carpinus betulus* dominated forests (*Corylo colurnae-Carpinetum betuli*).

In the zone of beech forests, the most widespread is the montane beech forest *Calamintho grandiflorae-Fagetum sylvaticae*. In the lower part of this zone, there exists a thermophilous beech forest *Festuco heterophyllae-Fagetum sylvaticae*. It seems that *Festuco heteropyllae-Fagetum* is more a stage of succession than a forest type forming the submontane belt of beech forests. Above *Calamintho grandiflorae-Fagetum*, there appear altimontane beech forests that are codominated by *Abies borisii-regis* (*Abieti borisii-regis-Fagetum sylvaticae*), and on the upper sites *Asyneumo pichleri-Fagetum sylvaticae* that form the timber line in the region. Within these forests we can find the ravine forests (*Corylo colurnae-Ostryetum*) and thermophilous beech forests (*Aceri obtusati-Fagetum*) on the steep, southern slopes.

Legend to figure 6:

- *Asyneumo pichleri-Fagetum*
- *Abieti borisii-regis-Fagetum*
- *Calamintho grandiflorae-Fagetum*
- *Festuco heterophyllae-Fagetum*
- *Aceri obtusati-Fagetum*
- *Corylo colurnae-Carpinetum betuli*
- *Corylo colurnae-Aceretum obtusati*
- *Corylo colurnae-Ostryetum*
- *Fraxino orni-Quercetum petraeae*
- *Ostryo carpinifoliae-Quercetum cerris*
- *Quercetum frainetto-cerris*
- *Quercetum trojanae*
- *Philyreo latifoliae-Carpinetum orientalis*
- *Querco-Ostryetum carpinifoliae*
- *Querco trojanae-Juniperetum excelsae*
- *Juniperetum communis community*

Syntaxonomical scheme

Querco-Fagetea Br.-Bl. et Vlieger in Vlieger 1928
- *Fagetalia sylvaticae* Pawłowski et al. 1928
  - *Doronico orientalis-Fagion* (Raus ex Bergmeier 1990) Dierschke 1997
    - *Doronico columnae-Fagenion* Dzwonko et al. 1999
      - *Asyneumo pichleri-Fagetum* (Em 1961) Dzwonko et al. 1999 corr. Matevski et al. nom. corr. hoc loco
      - *Abieti borisii-regis-Fagetum* (Em 1985) Matevski et al. ass. nova
      - *Calamintho grandiflorae-Fagetum* (Em 1965) Rizovski & Džekov ex Matevski et al. ass. nova
      - *Festuco heterophyllae-Fagetum* (Em 1965) Rizovski & Džekov ex Matevski et al. ass. nova
      - *Aceri obtusati-Fagetum* Fabijanić, Fukarek et Sefanović ex Fukarek, Stefanović et Fabijanić 1967
  - *Erythronio-Carpinion betuli* Marinček in Wallnöfer et al. 1993
    - *Corylo colurnae-Carpinetum betuli* Matevski et al. ass. nova
  - *Tilio-Acerion* Klika 1955
    - *Ostryo-Tilienion* P. Košir et al. 2008
      - *Corylo colurnae-Aceretum obtusati* Matevski et al. ass. nova
      - *Corylo colurnae-Ostryetum* Blečić 1958
- *Quercetalia pubescenti-petraeae* Klika 1933
  - *Quercion petraeae-cerris* (Lakušić et Jovanović 1980) Čarni et al. 2009
    - *Fraxino orni-Quercetum petraeae* Em 1968
    - *Ostryo carpinifoliae-Quercetum cerris* Redžepi et Ružić ex Matevski et al. ass. nova
    - *Fraxino orni-Quercetum cerris* Stefanović 1968
  - *Quercion frainetto* Horvat 1954
    - *Quercetum frainetto-cerris* Horvat 1954
  - *Carpinion orientalis* Horvat 1954
    - *Quercetum trojanae* Horvat 1959
    - *Phillyreo-Carpinetum orientalis* Bergmeier et al. 2008
    - *Querco-Ostryetum carpinifoliae* Horvat 1938
  - *Fraxino orni-Ostryion* Tomažič 1940
    - *Seslerio robustae-Ostryetum* Matevski et al. ass. nova
  - *Juniperion excelsae-foetidissimae* Matevski et al. 2010
    - *Pruno webii-Juniperetum excelsae* Em 1962 n. nud.
    - *Querco trojanae-Juniperetum excelsae* Matevski et al. 2010

Salicetea purpureae Moor 1958
- *Salicetalia albae* Moor 1958
  - *Salicion albae* Soó 1930
    - *Salicetum albae* s. lat.

Juniperus communis community [*Vaccinio-Piceetea*]

Overlook of the forest vegetation

The overlook shows all forest communities of the Galičica mountain in the form of a synthetic table (Table 1). The layers are merged and the presence of each species in each cluster is given in percentage. An asterisk indicates if the species' fidelity meets the threshold of 30.

Ecological conditions

In order to better understand the distribution of forests in the area, we have made topological and structural measurements in the field, calculated the ecological factors by means of bioindicator values and defined functional plant traits and geoelements. All this is reflected in the forests of the region. In the following section only some results are illustrated and commented.

Table 1. Synoptic table with percentage frequency and modified fidelity index (phi coefficient). Diagnostic species are indicated by asterisk: ** phi > 0.8; * phi > 0.5. Legend: 1 – *Asyneumo pichleri-Fagetum*, 2 – *Abieti borisii-regis-Fagetum*, 3 – *Calamintho grandiflorae-Fagetum*, 4 – *Festuco heterophyllae-Fagetum*, 5 – *Aceri obtusati-Fagetum*, 6 – *Corylo colurnae-Carpinetum betuli*, 7 – *Corylo colurnae-Aceretum obtusati*, 8 – *Corylo*

Group No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
No. of relevés	**5**	**6**	**7**	**10**	**5**	**5**	**4**
Diagnostic species of the associations							
Polystichum lonchitis	100**	33	29	.	.	.	.
Asyneuma pichleri	80**	33	.	.	.	.	.
Polystichum aculeatum	60**	17	.	.	.	.	.
Doronicum austriacum	40**	17	.	.	.	.	.
Sorbus aucuparia	40*	17	.	20	.	.	.
Taraxacum officinale	40*	.	.	10	20	.	.
Lonicera xylosteum	40*	17	14	10	20	.	.
Hieracium murorum	40*	17	14	10	20	.	.
Sorbus aucuparia ssp. *aucuparia*	20	33*	.	.	.	.	.
Sedum magellense	.	33*	.	.	.	.	.
Asplenium trichomanes	.	33*	.	10	.	.	.
Cotoneaster nebrodensis	.	33*	.	.	20	.	.
Pulmonaria officinalis	.	.	29*	10	.	.	.
Neottia nidus-avis	.	.	43*	20	20	20	.
Dryopteris filix-mas	20	.	29*	.	.	.	.
Milium effusum	.	17	29*	.	.	20	.
Corylus avellana	.	.	.	30*	.	.	.
Anemone nemorosa	.	.	.	30*	.	20	.
Arabis muralis	.	.	.	.	40*	.	.
Campanula trachelium	.	.	.	.	40*	.	25
Vicia incana	20	.	.	20	60*	.	25
Geranium reflexum	.	.	.	.	.	60**	.
Moehringia trinervia	.	.	.	.	.	60**	.
Tilia cordata	.	.	.	20	.	40*	.
Carex depauperata	.	.	.	10	.	40*	25
Sedum cepea	.	.	.	.	20	40*	25
Lathyrus venetus	.	.	43	40	.	80*	25
Stellaria media	.	.	.	.	.	40*	.
Viola reichenbachiana	20	17	57	10	.	60*	.
Lamium maculatum	.	.	.	10	.	40	75**
Arum maculatum	.	.	.	20	.	20	75**
Acer campestre	.	.	.	.	.	40	75**
Asperula taurina	.	.	.	.	.	40	50*
Scutellaria columnae	.	.	.	10	.	40	75*
Mercurialis ovata	.	.	.	.	20	.	.
Lunaria rediviva	.	.	.	.	.	.	25
Festuca drymeia	40	50	29	20	.	.	.

colurnae-Ostryetum, 9 – *Fraxino orni-Quercetum petraeae*, 10 – *Ostryo carpinifoliae-Quercetum cerris*, 11 – *Fraxino orni-Quercetum cerris*, 12 – *Quercetum frainetto-cerris*, 13 – *Quercetum trojanae*, 14 – *Phillyreo-Carpinetum orientalis*, 15 – *Querco-Ostryetum carpinifoliae*, 16 – *Seslerio robustae-Ostryetum*, 17 – *Pruno webii-Juniperetum excelsae*, 18 – *Querco trojanae-Juniperetum excelsae*, 19 – *Salicetum albae*, 20 – *Juniperus communis* community.

8	9	10	11	12	13	14	15	16	17	18	19	20
2	4	5	6	9	6	15	6	4	2	4	6	3
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.	25	20	33	11	17	13	.	.	.	.	.	.
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.	.	.	17	.	.	7	.	.	.	.	17	33
.	.	20	17	22	17	7	.	.	.	.	.	.
.	.	.	33	33	.	.	.	.	.	.	.	.
50	.	20	50	33	50	.	17	.	.	.	.	.
100**	.	.	.	.	.	.	.	.	.	.	.	.
100**	.	.	.	.	.	.	.	.	.	.	.	.
100**	.	.	.	.	.	.	.	.	.	.	.	.

Group No.	1	2	3	4	5	6	7
Galium pseudaristatum	.	.	.	30	20	40	.
Cystopteris fragilis	40	50	14	20	.	40	25
Convallaria majalis	.	.	.	40	20	20	50
Mycelis muralis	.	50	29	10	20	60	50
Cephalanthera damasonium	.	.	29	30	40	60	25
Chamaecytisus tommasinii	.	.	.	.	.	.	.
Quercus petraea	.	.	.	.	.	.	.
Trifolium patulum	.	.	.	.	20	.	.
Orlaya daucoides	.	.	.	.	.	.	.
Festuca heterophylla	.	.	.	80	40	20	.
Trifolium pignantii	.	.	.	.	.	.	.
Knautia drymeia	.	17	.	.	20	.	.
Ptilostemon strictus	.	.	.	.	.	.	.
Prunus avium	.	.	.	10	.	20	.
Cornus mas	.	.	.	50	20	60	50
Viola alba ssp. *denhardtii*	20	17	14	10	.	60	75
Geranium sanguineum	.	.	.	.	20	.	25
Buglossoides purpurocaerulea	.	.	.	.	.	.	25
Luzula forsteri	.	.	.	10	.	20	.
Fragaria vesca	.	.	.	30	.	20	50
Quercus frainetto	.	.	.	.	.	20	.
Crataegus heldreichii	.	.	.	.	20	.	.
Lathyrus niger	.	.	.	10	.	.	.
Lathyrus laxiflorus var. *laxiflorus*	.	.	14	30	20	40	50
Campanula sparsa	.	.	.	.	.	.	.
Viola alba ssp. *thessala*	.	.	.	.	.	40	.
Agrimonia eupatoria	.	.	.	.	.	.	.
Origanum vulgare	.	.	.	.	.	20	.
Asphodeline lutea	.	.	.	.	.	.	.
Vicia grandiflora	.	.	.	.	.	.	.
Crepis vesicaria	.	.	.	.	.	.	.
Ononis pusilla	.	.	.	.	.	.	.
Medicago lupulina	.	.	.	.	20	.	.
Acanthus balcanicus	.	.	.	.	.	.	.
Bellis perennis	.	.	.	.	.	.	.
Anthoxanthum odoratum	.	.	.	.	.	.	.
Carpinus orientalis	.	.	.	10	.	.	.
Buxus sempervirens	.	.	.	.	.	.	.
Phillyrea latifolia	.	.	.	.	.	.	.
Coronilla emerus ssp. *emeroides*	.	.	.	10	20	.	.
Colutea arborescens	.	.	.	.	.	.	.
Pistacia terebinthus	.	.	.	.	.	.	.
Clematis flammula	.	.	.	.	.	.	.
Geranium purpureum	.	.	.	.	.	20	.
Vicia loiseleurii	.	.	.	.	.	.	.
Ruscus aculeatus	.	.	.	.	.	.	.

8	9	10	11	12	13	14	15	16	17	18	19	20
100**	25	.	17	.	.	7	33	.	.	.	.	.
100**	.	.	17	.	.	.	.	.	.	.	.	.
100**	.	.	17	.	.	.	17	50	.	.	.	.
100**	.	.	17	.	.	.	.	.	.	.	.	.
100*	.	20	17	11	33	13	.	.	.	.	.	.
.	75**	.	17	.	.	7	.	.	.	.	.	.
.	100**	20	17	33	.	.	.	25	.	.	.	.
.	50*	.	17	.	.	7	.	.	.	.	.	.
.	50*	.	.	.	.	7	.	25	.	25	.	.
.	100*	60	83	78	33	27	17	50	.	.	.	.
.	25	80**	17	11	.	.	17	.	.	.	.	.
.	.	60*	33	11	.	.	.	.	.	.	.	.
.	.	40*	17	22	17	.	.	.	.	.	.	.
.	25	40*	.	11	.	.	.	.	.	.	.	.
.	.	100*	83	44	67	7	17	.	50	25	.	33
50	.	80*	33	.	33	40	.	.	.	.	.	.
.	.	40*	17	.	33	.	.	.	.	.	.	.
.	.	20	50*	.	17	.	.	.	.	.	.	.
.	50	20	67*	44	17	7	17	.	.	.	.	.
.	25	80	83*	56	17	20	17	.	.	25	.	67
.	.	.	33	100**	33	.	.	.	.	50	.	.
.	.	.	17	44*	.	.	.	.	.	.	.	.
.	25	.	33	44*	.	.	.	.	.	.	.	.
.	25	40	33	78*	.	20	17	.	.	.	.	.
.	.	.	.	22*	.	.	17	.	.	.	.	.
.	.	.	.	44*	33	7	17	.	.	.	.	.
.	.	.	17	33*	.	.	.	.	.	.	.	33
.	.	.	17	44*	33	.	33	.	.	.	.	.
.	.	40	33	44*	33	.	.	.	.	.	.	.
.	25	.	.	22*	.	.	.	.	.	.	.	.
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.	.	60	.	11	17	87*	50	50	.	.	17	.
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.	.	.	.	11	17	27*	.	.	.	.	.	.
.	.	.	17	.	17	27*	.	.	.	.	.	.

Group No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Polypodium vulgare	.	.	.	20	.	.	.
Dianthus cruentus ssp. *cruentus*	.	.	.	.	.	.	.
Sedum album	.	.	.	.	.	.	.
Helictotrichon convolutum	.	.	.	.	.	.	.
Rhamnus saxatilis	.	.	.	.	.	.	.
Frangula rupestris	.	.	.	.	.	.	.
Juniperus foetidissima	.	.	.	.	.	.	.
Laserpitium orchidanum	.	.	.	.	.	.	.
Koeleria splendens	.	.	.	.	.	.	.
Quercus pubescens	.	.	.	.	20	.	.
Trinia glauca	.	.	.	.	.	.	.
Campanula lingulata	.	.	.	.	.	.	.
Sorbus aria	.	50	.	10	40	.	.
Asyneuma limonifolium	.	.	.	.	20	.	.
Vincetoxicum hirundinaria	.	.	.	.	.	.	.
Polygonatum odoratum	.	.	14	.	.	.	25
Coronilla varia	.	.	.	.	.	.	.
Juniperus oxycedrus	.	.	.	.	80	.	25
Allium guttatum	.	.	.	.	.	.	.
Viola odorata	.	.	.	.	.	.	.
Physospermum cornubiense	.	.	.	.	20	40	.
Elymus repens	.	.	.	.	.	.	.
Sedum ochroleucum	.	.	.	.	.	.	.
Iris sintenisii	.	.	.	.	.	.	.
Teucrium chamaedrys	.	.	.	.	20	.	25
Silene vulgaris	.	.	.	10	20	.	.
Mercurialis perennis	.	.	14	.	40	.	25
Geranium lucidum	.	.	.	.	.	.	.
Bromus sterilis	.	.	.	.	.	.	.
Hedera helix	.	.	.	10	.	40	50
Arabis pseudoturritis	.	.	.	.	.	.	.
Lonicera etrusca	.	.	.	10	.	.	25
Crucianella angustifolia	.	.	.	.	.	.	.
Medicago minima	.	.	.	.	.	.	.
Crupina vulgaris	.	.	.	.	.	.	.
Trifolium campestre	.	.	.	.	20	.	.
Trifolium scabrum	.	.	.	.	.	.	.
Potentilla laciniosa	.	.	.	.	.	.	.
Scabiosa fumarioides	.	.	.	.	.	.	.
Cerastium brachypetalum	.	.	.	.	.	.	.
Medicago rigidula	.	.	.	.	.	.	.
Arenaria leptoclados var. *viscidula*	.	.	.	.	.	.	.
Anthyllis vulneraria ssp. *polyphylla*	.	.	.	.	.	.	.
Eryngium campestre	.	.	.	.	.	.	.
Rhamnus rhodopeus	.	17	.	.	.	.	.
Poa bulbosa	.	.	.	.	.	.	.

8	9	10	11	12	13	14	15	16	17	18	19	20
50	.	.	.	.	.	40*	.	25	.	.	.	.
.	.	.	.	.	.	.	50**	.	.	.	.	.
.	.	.	.	.	.	7	67**	.	.	.	.	33
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.	25	.	.	.	17	7	67*	50	.	25	.	33
.	.	60	17	44	67	80	100*	25	.	75	.	.
.	.	.	.	.	17	7	50*	25	.	.	.	33
.	.	.	.	.	.	7	33*	25	.	.	.	.
.	.	.	.	.	17	7	67*	50	.	.	.	.
.	.	.	.	.	33	13	50*	25	.	.	.	.
.	.	.	.	.	.	.	33*	.	.	.	.	33
.	.	.	.	.	.	.	33*	.	.	.	.	.
.	25	.	.	11	33	.	50*	25	.	.	.	33
.	50	60	33	56	83	87	100*	50	.	75	.	.
.	.	.	.	.	17	.	.	50**	.	.	.	.
.	.	.	17	.	.	.	.	50**	.	.	.	.
.	.	20	17	11	.	.	17	75**	.	.	.	.
.	25	.	.	11	17	7	.	75*	50	.	.	33
.	.	.	.	.	.	13	33	50*	.	.	.	33
.	.	.	33	33	.	7	17	50*	.	25	.	.
.	.	20	67	44	67	40	83	100*	.	75	.	67
.	25	.	17	22	50	53	67	75*	.	25	.	.
50	.	.	.	.	.	.	.	50*	.	.	.	.
.	.	.	.	.	33	13	17	.	100**	50	17	.
.	.	.	.	.	17	13	.	.	100**	50	50	.
.	.	60	17	11	33	20	.	.	100**	.	17	.
.	.	.	.	.	.	.	.	.	.	75**	.	.
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.	25	.	.	11	17	7	.	.	.	75**	.	.
.	.	.	.	.	17	7	.	.	.	50**	.	.
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.	25	.	.	.	.	.	17	.	.	50*	.	.
.	25	.	.	11	.	33	17	.	50	75*	.	.
.	.	.	.	.	.	.	.	.	50	50*	.	.
.	.	.	.	.	.	.	.	.	50	50*	.	.
.	.	.	.	.	33	.	.	.	.	50*	.	33
.	.	.	.	.	.	.	.	.	50	50*	.	33
.	.	20	.	.	.	7	17	25	.	50*	.	33
.	50	.	17	33	67	47	17	.	.	75*	.	67

Group No.	1	2	3	4	5	6	7
Urtica dioica	.	.	.	.	.	.	.
Parietaria officinalis	.	.	.	.	.	.	.
Salix alba	.	.	.	.	.	.	.
Humulus lupulus	.	.	.	.	.	.	.
Silene alba	.	.	.	.	.	.	.
Rubus sanguineus var. *alnifolius*	.	.	.	.	.	.	.
Sambucus nigra	.	.	.	.	.	.	.
Aegopodium podagraria	.	.	.	.	.	.	.
Poa trivialis ssp. *trivialis*	.	.	.	.	.	.	.
Chelidonium majus	.	.	.	.	.	20	.
Cornus sanguinea	.	.	.	.	.	.	.
Chaerophyllum aromaticum var. *brevipilum*	.	.	.	.	.	.	.
Rumex conglomeratus	.	.	.	.	.	.	.
Ballota nigra	.	.	.	.	.	.	.
Saponaria officinalis	.	.	.	.	.	.	.
Artemisia vulgaris	.	.	.	.	.	.	.
Lapsana communis	.	.	.	.	.	20	25
Prunus domestica	.	.	.	.	.	.	.
Juglans regia	.	.	.	10	.	20	25
Elymus caninus	.	.	.	.	.	.	25
Brachypodium sylvaticum	40	.	29	50	.	40	25
Tamus communis	.	.	.	.	.	.	.
Festuca hirtovaginata	.	.	.	.	.	.	.
Campanula patula	.	.	.	.	.	.	.
Trisetum flavescens	.	.	.	.	.	.	.
Thymus ciliatopubescens	.	.	.	.	.	.	.
Minuartia verna	.	.	.	.	.	.	.
Hieracium hoppeanum	.	.	.	.	.	.	.
Arabis surculosa	.	.	.	.	.	.	.
Frangula alnus	.	.	.	.	.	.	.
Centaurea grisebachii	.	.	.	.	.	.	.
Thalictrum minus	.	.	.	10	20	.	.
Juniperus communis	20	.	.	20	20	.	.
Linaria peloponnesiaca	.	.	.	.	.	.	.
Diagnostic species of the alliances							
Sanicula europaea	100**	50*	29	10	.	.	.
Actaea spicata	60*	33	43*	10	.	.	.
Prenanthes purpurea	60*	67**	29	.	.	.	.
Orthilia secunda	60*	67*	14	10	20	.	.
Daphne mezereum	40*	50*	.	10	.	.	.
Hieracium bifidum	40*	50*	.	.	20	.	.
Saxifraga rotundifolia	60*	33	.	10	.	40	.
Lonicera alpigena ssp. *formanekiana*	40*	33	.	.	60*	.	.
Abies borisii-regis	40	100**	14	10	.	.	.
Cardamine bulbifera	80	50	86*	30	.	100*	75

8	9	10	11	12	13	14	15	16	17	18	19	20
.	.	.	.	.	.	.	.	.	.	.	100**	.
.	.	.	.	.	.	.	.	.	.	.	100**	.
.	.	.	.	.	.	.	.	.	.	.	100**	.
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.	.	40	.	.	.	.	.	.	.	.	50*	.
.	.	.	.	.	.	.	17	.	.	.	33*	.
.	.	60	17	33	33	20	.	.	.	.	83*	33
.	.	.	.	11	.	.	.	.	50	.	33*	.
.	.	.	.	.	.	.	.	.	.	.	.	100**
.	.	.	.	.	17	.	.	.	.	.	.	100**
.	25	.	.	.	.	7	.	.	.	.	.	100**
.	.	.	.	.	.	.	17	.	.	.	.	67**
.	.	.	.	.	17	.	.	.	.	.	.	67**
.	.	.	.	.	.	.	.	.	.	25	.	67**
.	.	.	.	.	.	.	.	.	.	25	.	67**
.	.	.	.	.	.	.	33	.	.	.	.	67**
.	.	.	.	11	.	.	.	.	.	25	.	67**
.	.	.	.	.	.	.	17	.	.	.	.	67**
.	50	.	33	.	.	13	.	25	.	.	.	100**
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100**	.	.	.	.	.	.	33	.	.	.	.	.
100	.	.	.	.	.	.	.	.	.	.	.	.

Group No.	1	2	3	4	5	6	7
Acer platanoides	.	.	29	30	80*	.	25
Daphne oleoides	.	.	.	.	40*	.	.
Carpinus betulus	.	.	.	.	.	100**	50*
Chaerophyllum temulum	20	17	.	.	.	80**	50
Primula vulgaris	.	.	.	20	.	80*	25
Symphytum tuberosum ssp. *angustifolia*	.	.	14	50	.	100*	75
Prunella vulgaris	.	.	.	.	.	40*	.
Alliaria petiolata	.	.	.	10	.	.	50*
Euonymus latifolius	.	.	.	10	40	.	50*
Polygonatum multiflorum	.	.	.	.	.	20	.
Clematis vitalba	.	.	.	.	.	.	25
Campanula spatulata ssp. *spruneriana*	20	17	.	.	.	.	.
Juniperus oxycedrus ssp. *macrocarpa*	.	.	.	.	.	.	.
Quercus cerris	.	.	.	30	.	60	75
Quercus trojana	.	.	.	.	.	.	.
Galium rigidifolium	.	.	.	.	60	20	.
Trifolium physodes	.	.	.	.	20	.	.
Asparagus acutifolius	.	.	.	.	.	.	.
Iberis sempervirens	.	.	.	10	.	.	.
Melampyrum heraleoticum	.	.	.	.	.	.	.
Achillea holosericea	.	.	.	.	.	.	.
Leontodon crispus ssp. *crispus*	.	.	.	.	20	.	.
Erysimum diffusum	.	.	.	.	.	.	.
Pimpinella tragium ssp. *lithophila*	.	.	.	.	40	.	.
Peucedanum austriacum	.	.	.	20	40	.	.
Juniperus excelsa	.	.	.	.	.	.	.
Sanguisorba minor ssp. *muricata*	.	.	.	.	.	.	.
Myosotis arvensis	.	.	.	.	.	.	.
Melica ciliata	.	.	.	.	.	.	.
Acinos alpinus ssp. *meridionalis*	.	.	.	.	.	.	.
Diagnostic species of the orders							
Calamintha grandiflora	80*	83*	.	20	.	.	.
Galium odoratum	80*	100**	86*	.	.	.	.
Fagus sylvatica	100*	100*	100*	100*	100*	20	.
Sesleria robusta	.	.	.	.	100**	.	.
Corylus colurna	.	.	14	10	.	80*	100*
Ostrya carpinifolia	.	.	.	10	20	.	75
Sedum acre	.	.	.	.	.	.	.
Other species							
Rhamnus alpinus ssp. *fallax*	20	50	.	10	20	.	.
Lathyrus laxiflorus var. *glabratus*	.	.	.	.	20	20	.
Coronilla scorpioides	.	.	.	.	.	.	.
Sonchus oleraceus	20	.	14	.	.	20	.
Arabis sagittata	.	.	.	.	20	.	50
Euphorbia myrsinites	.	.	.	.	.	.	.

8	9	10	11	12	13	14	15	16	17	18	19	20
100**	.	.	.	.	.	.	17	.	.	.	.	.
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100**	.	20	33	.	.	13	.	.	.	.	.	.
.	25	40	83*	67	17	7	.	.	.	.	.	.
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.	25	.	.	11	17	7	.	.	.	.	67*	.
100**	.	.	.	.	.	.	.	.	.	.	.	.
100**	.	.	.	.	.	.	50	100**	.	.	.	.
100*	.	20	17	11	17	13	.	25	.	25	100*	67
.	75*	60*	33	.	33	13	.	.	.	25	.	.
.	.	40*	33*	.	17	.	.	.	.	.	.	.
.	75	100*	100*	89	17	27	.	25	.	25	.	33
.	.	40	17	44	100*	33	.	50	.	100*	.	.
.	75	60	67	67	100*	40	50	100*	.	.	.	33
.	25	.	.	.	50*	20	.	.	.	50*	.	33
.	.	.	.	.	.	53*	.	.	100**	.	.	.
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.	.	.	.	.	.	.	50*	50*	.	25	.	33
.	.	.	.	.	.	.	67*	50	.	50	.	100**
50	.	20	33	.	17	.	67*	75*	.	.	.	.
.	.	.	.	.	.	.	33	.	100**	100**	.	.
.	.	.	.	.	17	.	.	.	.	75**	.	67*
.	.	.	.	.	.	.	.	.	50	75**	.	67*
.	.	.	.	.	.	.	.	.	.	50**	.	67**
.	25	.	.	.	17	40	67	50	.	75*	.	100*

100**	.	.	.	.	.	.	.	.	.	.	.	.
50	.	.	.	.	.	.	.	.	.	.	.	.
.	50	20	17	.	.	.	.	25	.	.	.	.
.	25	.	.	.	.	.	83*	100**	.	.	.	.
100*	.	40	17	.	.	.	.	.	.	.	.	.
100	.	100*	.	.	33	46	100*	100*	.	.	33	.
.	.	.	.	.	.	.	67*	50*	.	50*	.	.

50	.	.	.	.	.	.	17	50	.	.	.	.
.	25	40	33	.	17	7	.	.	.	.	.	.
.	.	.	.	.	.	13	.	.	.	25	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.
50	25	.	.	.	33	7	50	.	.	.	.	33
.	.	.	.	.	17	.	.	.	.	25	.	33

Group No.	1	2	3	4	5	6	7
Poa nemoralis	40	33	.	50	40	100	75
Acer obtusatum	.	.	29	60	60	60	100
Trifolium alpestre	.	.	.	.	.	.	.
Poa chaixii	.	.	14	10	.	.	.
Arabis turrita	.	.	.	.	.	.	25
Ornithogalum pyrenaicum	.	.	.	.	.	.	.
Acer monspessulanum	.	.	.	.	.	.	.
Hieracium bauhinii	.	.	.	.	20	.	.
Thymus longicaulis var. *longicaulis*	.	.	.	.	40	.	25
Cyclamen hederifolium	.	.	.	.	.	.	.
Brachypodium pinnatum	.	.	.	10	.	.	.
Thalictrum aquilegiifolium	.	.	.	.	.	20	25
Aremonia agrimonoides	100	83	43	80	60	100	75
Epipactis helleborine	.	.	29	.	.	20	25
Geum urbanum	.	.	.	10	.	60	25
Sorbus torminalis	.	.	.	20	20	20	25
Rosa arvensis	20	17	14	30	60	100	50
Lathyrus aphaca	.	.	.	.	.	.	.
Lathyrus sphaericus	.	.	.	.	.	.	.
Prunus cerasifera	.	.	.	.	.	20	.
Orchis purpurea	.	.	.	.	.	.	.
Dorycnium herbaceum var. *macedonicum*	.	.	.	.	20	.	.
Dianthus cruentus	.	.	.	.	.	.	.
Rubus canescens	20	.	.	10	.	.	.
Veronica chamaedrys	.	33	.	60	60	80	50
Arrhenatherum elatius	.	.	.	.	20	.	.
Eryngium palmatum	.	.	.	10	.	.	25
Asphodelus albus	.	.	.	10	.	.	.
Ctenidium molluscum	.	17	.	.	20	.	.
Galium tricornutum	.	.	.	.	.	20	.
Alyssum trichostachyum	.	.	.	.	.	.	.
Minuartia verna ssp. *collina*	.	.	.	.	.	.	.
Cardamine hirsuta	.	.	.	.	.	.	.
Lamium garganicum	.	.	.	.	.	20	.
Poa angustifolia	.	.	.	10	.	.	.
Fraxinus ornus	.	.	.	60	20	60	75
Acer pseudoplatanus	.	17	14	30	20	20	25
Aethionema saxatile	.	.	.	.	20	.	.
Astragalus glycyphyllos	.	.	.	.	.	.	.
Cruciata laevipes	.	.	.	.	.	.	25
Carex divulsa	.	.	.	10	.	.	.
Euonymus europaeus	.	.	.	.	.	20	.
Ranunculus psilostachys	.	.	.	.	.	.	.
Asperula purpurea	.	.	.	.	.	.	.
Cephalanthera longifolia	.	.	.	10	.	20	.
Pteridium aquilinum	.	.	14	.	.	20	.

8	9	10	11	12	13	14	15	16	17	18	19	20
100	75	40	33	33	50	33	17	50	.	.	17	.
100	25	100	50	11	17	.	67	75	.	.	.	.
.	50	40	17	44	33	.	17	50	.	.	.	.
.	.	20	.	.	.	.	.	.	.	.	.	.
50	.	40	.	.	.	40	17	.	.	.	.	.
.	.	.	17	22	.	7	.	25	.	.	.	.
.	50	.	50	22	50	40	50	25	.	.	.	33
.	25	.	.	.	33	7	.	.	.	25	.	33
.	50	.	50	11	17	47	50	75	.	50	.	33
50	.	20	17	.	.	.	33	.	.	.	.	.
.	25	60	50	44	17	13	33	.	.	50	.	.
.	.	.	.	.	.	.	.	25	.	.	.	.
50	.	100	83	11	67	7	.	.	.	25	17	.
.	.	40	33	.	.	13	33	.	.	.	.	.
.	.	40	50	11	33	.	17	25	.	50	50	67
.	.	20	33	11	17	27	.	.	.	.	.	.
50	.	100	83	11	67	13	17	25	50	50	50	.
.	.	.	17	22	33	20	.	.	50	.	.	.
.	.	.	17	11	.	7	.	.	.	25	.	.
.	25	40	17	.	17	13	.	25	.	25	33	.
.	.	.	17	11	.	13	.	.	.	.	.	.
.	25	.	33	11	33	13	.	.	.	.	.	.
.	25	.	.	.	.	.	.	25	.	.	.	33
.	.	20	17	22	.	.	.	.	.	.	.	.
.	75	100	100	78	83	53	33	25	.	50	.	.
.	25	.	33	11	17	7	17	.	.	25	.	.
.	.	.	17	.	.	.	33	25	.	.	.	.
.	.	20	.	.	17	.	33	.	.	.	.	33
.	.	20	.	.	.	.	.	.	.	.	.	.
.	25	.	33	.	33	.	.	25	.	25	33	.
.	.	.	.	.	.	.	.	25	.	25	.	33
.	.	.	.	.	17	.	17	25	.	25	.	.
.	25	20	17	22	17	20	17	.	.	.	.	.
.	.	.	.	.	.	.	.	25	50	.	.	.
.	100	20	33	22	67	27	.	25	.	25	.	.
100	25	60	67	44	100	100	100	100	.	50	.	33
50	.	.	17	.	17	.	.	.	.	.	17	.
.	25	.	.	.	17	.	.	.	.	25	.	33
.	25	20	17	11	17	7	.	.	.	.	.	.
.	25	40	33	33	33	7	.	25	.	.	33	.
.	.	20	.	.	17	7	.	.	.	.	.	.
.	.	20	33	.	17	.	.	25	.	.	17	.
.	25	.	17	.	17	.	.	.	.	25	.	.
.	.	.	.	.	17	.	17	.	.	25	.	33
.	.	20	.	.	.	7	.	.	.	.	.	.
.	.	.	.	11	.	.	.	.	.	.	.	.

Group No.	1	2	3	4	5	6	7
Galium oreophilum	.	.	.	.	.	.	.
Cephalanthera rubra	.	.	.	20	40	.	.
Helianthemum nummularium	.	.	.	.	.	.	.
Galium aparine	.	.	14	.	.	60	50
Hypericum rumeliacum	.	.	.	.	.	.	.
Poa trivialis ssp. *sylvicola*	.	.	.	.	.	20	.
Hypericum perforatum	.	.	.	.	.	.	.
Hypnum cupressiforme	.	.	.	.	.	.	25
Melittis melissophyllum	.	.	.	30	.	20	50
Geranium robertianum	.	.	14	10	.	.	25
Potentilla micrantha	.	.	.	20	20	20	.
Phleum phleoides	.	.	.	.	.	.	.
Asplenium ceterach	.	.	.	10	.	20	25
Festuca galicicae	20	.	.	.	20	.	.
Doronicum columnae	40	33	14	30	40	40	25
Trifolium medium ssp. *balcanicum*	.	.	.	.	.	20	.
Lilium martagon	20	17	.	20	40	20	25
Melica uniflora	.	.	57	40	.	60	75
Epipactis microphylla	.	.	14	.	20	.	.
Echinops banaticus	.	.	.	.	.	.	.
Silene italica	.	.	.	.	.	20	25
Carex hallerana	.	.	.	.	60	.	.
Helleborus odorus	.	.	43	60	40	80	50
Fragaria moschata	.	.	14	20	.	20	.
Euonymus verrucosus	.	.	14	50	40	40	50
Clinopodium vulgare	.	.	.	20	20	20	50
Festuca valesiaca	.	.	.	.	.	.	.
Platanthera chlorantha	.	.	.	.	20	.	.
Cynosurus echinatus	.	.	.	.	.	.	.
Dactylis glomerata	40	33	43	40	.	40	25
Lathyrus digitatus	.	.	.	.	.	.	.
Euphorbia amygdaloides	80	67	43	40	60	60	.
Prunus spinosa	.	.	.	10	20	.	.
Chamaecytisus heuffellii	.	.	.	.	.	.	.
Chaerophyllum hirsutum	.	.	.	10	.	20	.
Valerianella turgida	.	.	.	.	.	.	.
Primula veris ssp. *columnae*	20	.	.	.	20	20	.

8	9	10	11	12	13	14	15	16	17	18	19	20
.	.	.	17	.	.	.	17	.	.	.	.	33
.	.	20	33	33	33	.	17	.	.	.	.	.
.	25	.	.	.	50	13	50	50	.	25	.	.
.	25	20	17	33	17	27	17	.	.	50	67	.
.	.	.	.	.	17	13	.	.	.	25	.	.
.	.	.	33	22	.	.	.	.	.	25	.	.
.	25	.	.	.	17	.	.	.	.	25	.	33
.	.	20	17	.	.	.	17	.	.	.	.	.
50	25	20	33	.	.	.	.	.	.	.	.	.
.	.	.	.	11	17	7	17	25	.	25	17	.
.	25	20	33	11	17	.	17	25	.	.	.	.
.	25	.	.	22	.	7	.	25	.	25	.	.
.	.	.	.	.	.	20	33	.	.	.	.	.
.	25	.	.	.	.	.	.	25	.	.	.	33
100	50	40	17	22	.	7	17	50	.	.	.	33
.	50	40	33	22	.	20	.	.	.	.	.	.
50	.	20	.	.	.	.	33	50	.	.	.	.
100	25	60	33	11	50	47	17	25	.	.	.	.
.	.	.	.	.	17	13	.	.	.	.	.	.
.	.	.	17	22	.	.	.	.	.	.	.	33
.	75	20	67	78	67	53	67	.	50	50	.	67
.	25	20	33	11	67	27	50	25	.	25	.	67
100	25	60	50	33	67	40	17	25	.	25	.	.
.	.	.	.	.	17	.	.	25	.	.	.	.
.	.	40	17	.	17	20	50	50	.	.	.	.
.	.	60	50	33	17	20	17	25	.	25	.	.
.	25	20	.	22	17	13	.	25	.	.	.	.
.	.	20	.	11	.	7	.	.	.	.	.	.
.	25	.	.	11	.	13	.	.	50	.	.	.
.	75	100	83	89	83	73	33	75	.	75	33	67
.	25	.	.	22	17	.	.	.	.	.	.	.
50	.	80	33	44	33	.	.	.	.	.	.	.
.	.	20	50	33	17	7	.	.	.	25	17	33
.	25	.	.	11	17	7	.	.	.	.	.	.
.	.	20	.	.	17	.	.	.	.	.	.	.
.	25	.	.	.	.	7	.	.	.	25	.	.
.	.	20	.	.	.	.	17	25	.	.	.	.

Nutrients

Nutrients are one of the most important ecological factors that enable the life of plants. Figure 10 shows that the most nutrient rich sites are in beech forests. The best site conditions are within the *Calamintho grandiflorae-Fagetum* that present the optimal beech stands. We can detect good site conditions also within other beech dominated stands, except *Aceri-Fagetum* that is found on steep slopes over a shallow soil horizon. We can clearly see propitious sites also in hornbeam (*Corylo colurnae-Carpinetum*) and ravine forests (*Corylo colurnae-Aceretum obtusati* and *Corylo colurnae-Ostryetum*). The intermediate position is found with the zonal oak forest (*Quercetum frainetto-cerris*, *Fraxino orni-Quercetum cerris*, *Ostryo carpinifoliae-Quercetum cerris*, *Fraxino orni-Quercetum petraeae*). The most severe is the situation within a group of non-zonal forests, *Aceri obtusati-Fagetum*, *Phillyreo-Carpinetum orientalis*, *Quercetum trojanae*, and both *Juniperus excelsa and Ostrya carpinifolia* dominated forests. In *Pruno webii-Juniperetum excelsae*, found on the island on Lake Prespa, there is a settlement of cormorants (*Phalacrocorax carbo*) that import some nutrients to the site (Figure 89). It is obvious that *Salicetum albae* with periodical floods has a high nutrient status. The montane *Juniperus communis* stand is rather poor in nutrients.

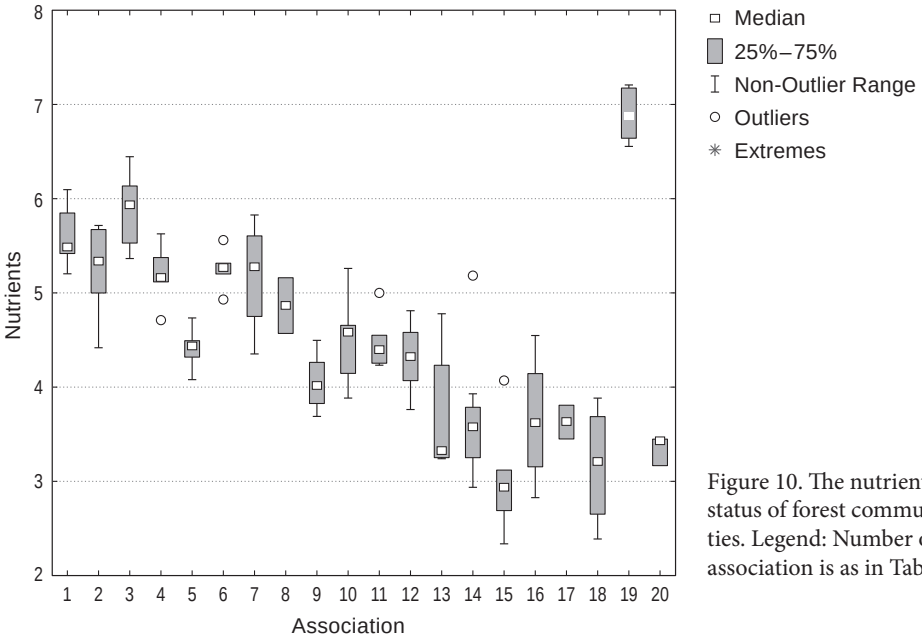


Figure 10. The nutrient status of forest communities. Legend: Number of association is as in Table 1.

Moisture

Moisture is also an important factor, especially for communities that thrive on carbonate bedrock where water courses are below ground. Figure 11 shows a similar feature to the previous one. The best moisture status is within the zonal beech

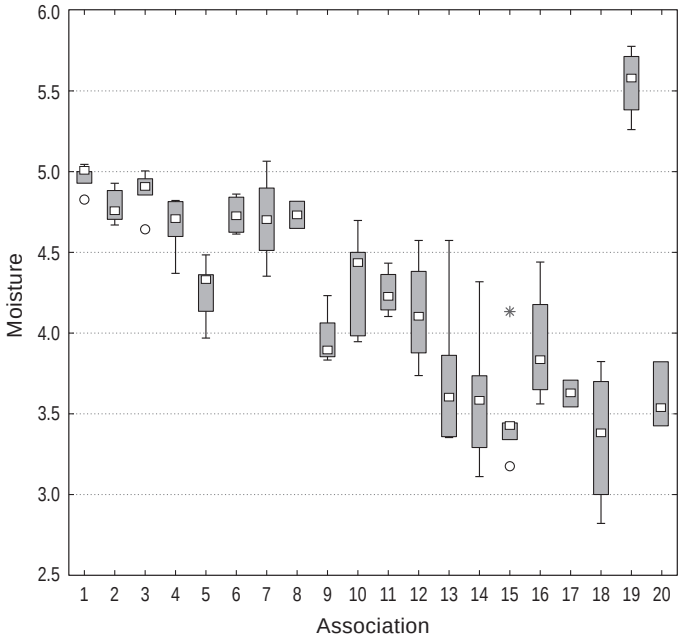


Figure 11. The moisture status of forest communities. Legend: Number of association is as in Table 1.

forests (*Festuco-Fagetum*, *Calamintho-Fagetum*, *Abieti-Fagetum*, and *Asyneumo-Fagetum*), within *Carpinus betulus* dominated forest (*Corylo-Carpinetum betuli*) and ravine forests (*Corylo colurnae-Aceretum obtusati* and *Corylo colurnae-Ostryetum*); *Aceri obtusati-Fagetum* is an exception again, with a rather low moisture status. Then there is a group of zonal oak forest (*Quercetum frainetto-cerris*, *Fraxino-Quercetum petraeae*, and *Fraxino-Quercetum cerris*, *Ostryo-Quercetum cerris*); the non-zonal thermophilous deciduous forests possess less humid conditions; *Querco pubescentis-Ostryetum carpinifoliae* and *Querco trojanae-Juniperetum excelsae* have the worst situation of all forest communities. The riverine forests dominated by *Salix alba* are well supplied with humidity, while the montane *Juniperus communis* shrub is rather poorly supplied.

Temperature

Temperature is a complex factor that influences the forest in various directions. We can see in Figure 12 that the communities are arranged in a practically vertical gradient. At the bottom of the diagram we can find beech forest (*Asyneumo-Fagetum*, *Abieti-Fagetum*, *Calamintho-Fagetum*, *Festuco-Fagetum*, and *Aceri-Fagetum*), then there appear *Carpinus* dominated forest (*Corylo colurnae-Carpinetum betuli*), ravine forest (*Corylo colurnae-Aceretum obtusati*) and, whereas the conditions are less propitious in *Corylo colurnae-Ostryetum and Seslerio-Ostryetum*, that is the "azonal" thermophilous forest of the belt of beech forests; a higher temperature is found within zonal oak forests (*Fraxino-Quercetum petraeae*, *Fraxino-Quercetum cerris*, *Ostryo-Quercetum cerris*, and *Quercetum frainetto-cerris*); the extreme situation occurs within the *Phillyreo-*

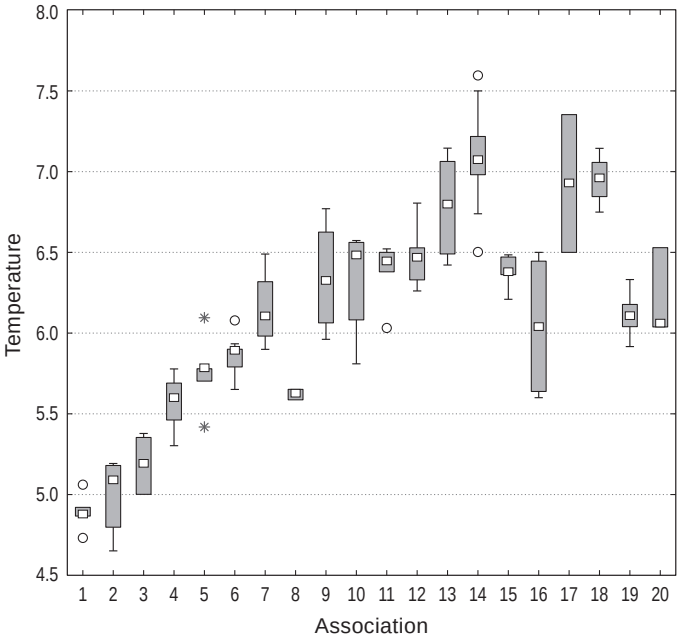


Figure 12. The temperature status of forest communities. Legend: Number of association is as in Table 1.

Carpinetum orientalis, and slightly less pronounced with other non-zonal oak forests, such as *Quercetum trojanae*, *Pruno webii-Juniperetum excelsae*, and *Querco trojanae-Juniperetum excelsae*. *Salicetum albae* and *Juniperus communis* community grow in average conditions.

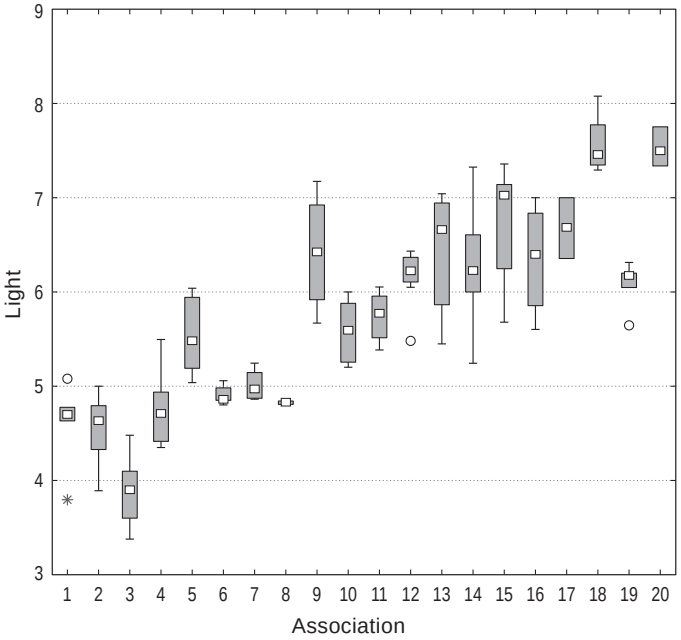


Figure 13. The light status of forest communities. Legend: Number of association is as in Table 1.

Light

Figure 13 presents the light conditions in the communities. These are estimated at the herb layer, and from these data we can estimate the cover of a canopy. This depends also on the habitus of the tree species themselves, for instance beech forests have a closer canopy than oak. The densest canopy is within the mesophilous montane beech forests (*Calamintho-Fagetum*), then there are other beech forests (*Abieti-Fagetum*, *Asyneumo-Fagetum*, *Festuco heterophyllae-Fagetum*, and *Aceri-Fagetum*) and *Carpinus betulus* dominated forest (*Corylo colurnae-Carpinetum*); ravine forests (*Corylo colurnae-Aceretum obtusati* and *Corylo colurnae-Ostryetum*); next is the group of zonal oak forest *(Quercetum frainetto-cerris*, *Fraxino-Quercetum petraeae*, and *Fraxino-Quercetum cerris*, *Ostryo-Quercetum cerris*) and non-zonal thermophilous deciduous forests (*Querco-Ostryetum*, *Seslerio-Ostryetum*, *Phillyreo-Carpinetum orientalis*, *Quercetum trojanae*, and *Pruno webii-Juniperetum*); the extreme light conditions are found in the *Querco trojanae-Juniperetum excelsae* and *Juniperetum communis* community.

Continentality

Continentality gives the information on how the forests are adapted to the continental ecological conditions – i.e. hot summers and cold winters (Figure 14). As *Fagus sylvatica* is a subatlantic species, its communities do not support the continental conditions. Having the lowest values are montane, altimontane, and subalpine beech forests (*Calamintho-Fagetum*, *Abieti-Fagetum*, and *Asyneumo-Fagetum*). The

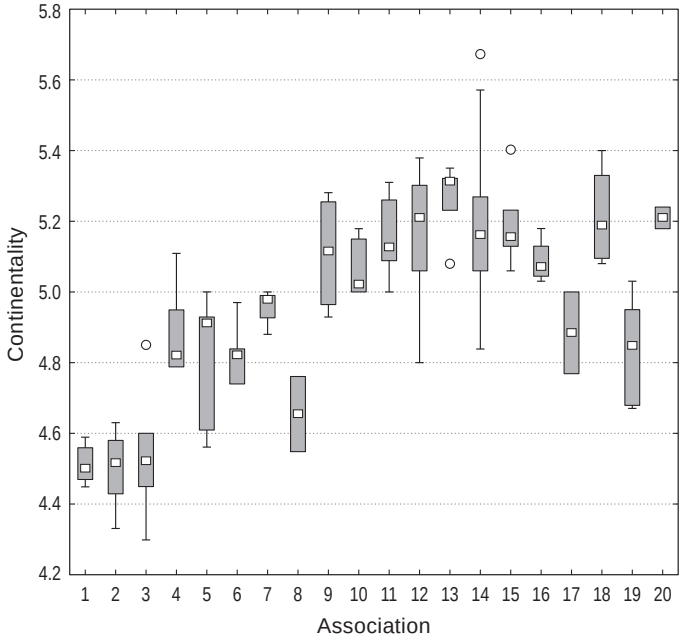


Figure 14. Adaption of forests to continental conditions. Legend: Number of association is as in Table 1.

intermediate position is held by thermophilous beech forests (*Festuco heterophyllae-Fagetum* and *Aceri obtusati-Fagetum*), *Carpinus betulus* dominated forests (*Corylo colurnae-Carpinetum betuli*), and ravine forests (*Corylo colurnae-Aceretum obtusati* and *Corylo colurnae-Ostryetum*). The most continental are *Quercetum trojanae* and *Quercetum frainetto-cerris*; the other thermophilous forests are less continental, due to the higher altitude (*Fraxino-Quercetum cerris* and *Fraxino-Quercetum petraeae*) or due to mitigation of the continental climate by the influence of lakes (*Phillyreo-Carpinetum orientalis*, *Querco-Ostryetum*, *Seslerio-Ostryetum*, *Pruno webii-Juniperetum*, *Querco-Juniperetum*). Continentality is not pronounced in riverine forest dominated by *Salix alba* (*Salicetum albae*), whereas it is strongly pronounced within the *Juniperus communis* community.

Altitude

Altitude was measured in the field and corresponds, to some extent, with the temperature that has already been discussed. This is an important factor since it indirectly influences the vegetation: with altitude the temperature changes, the air becomes more dense, precipitations are more abundant, snow lies longer, etc. The range of the altitude is presented in Figure 15.

At the highest altitude we find subalpine beech forests (*Asyneumo-Fagetum*) then altimontane *Abieti borisii-regis-Fagetum*, *Calamintho grandiflorae-Fagetum*, and *Festuco heterophyllae-Fagetum*; there exist also *Aceri obtusati-Fagetum* (Figure 16) and

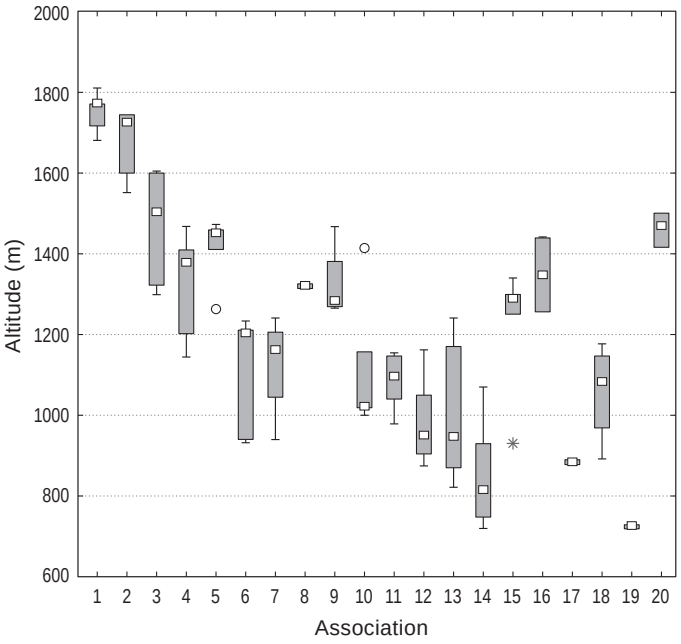


Figure 15. Altitudinal distribution of forests. Legend: Number of association is as in Table 1.

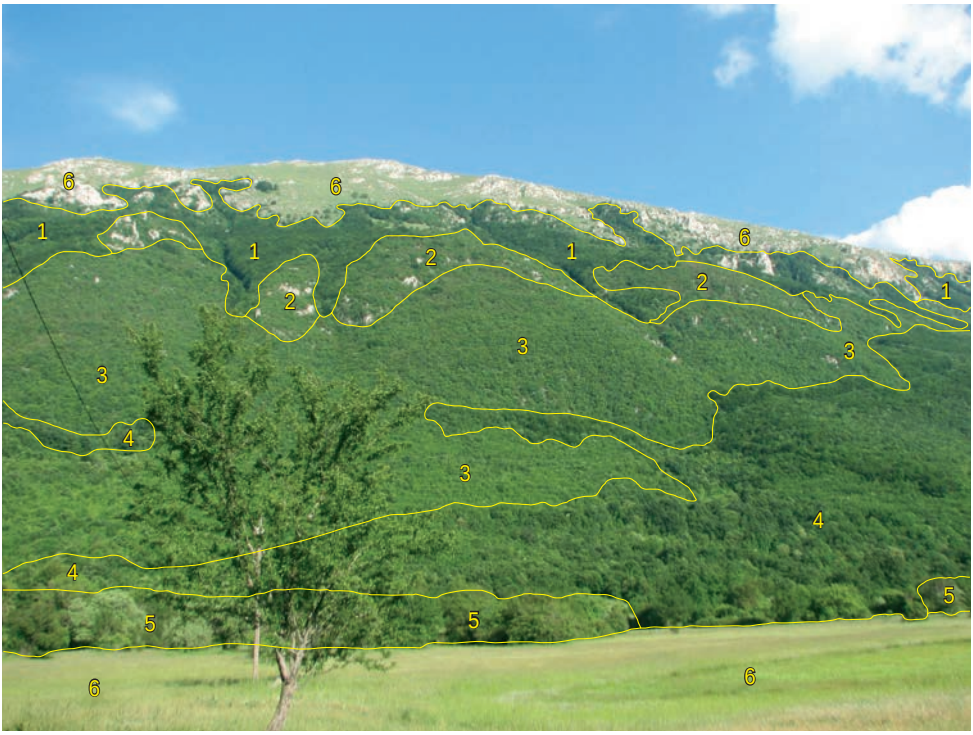


Figure 16. Distribution of associations on Lako Signoj. Legend: 1 – *Aceri obtusati-Fagetum*, 2 – *Seslerio robustae-Ostryetum*, 3 – *Quercetum frainetto-cerris*, 4 – *Quercetum trojanae*, 5 – *Salicetum albae*, 6 – non-forest vegetation.

ravine *Corylo colurnae-Ostryetum*. The other ravine forest *Corylo colurnae-Aceretum obtusati* and *Carpinus betulus* dominated forest (*Corylo colurnae-Carpinetum*) are already situated in the vegetation belt dominated by oak species. The zonal oak forests are distributed in their natural order, *Fraxino-Quercetum petraeae* at the highest, *Fraxino-Quercetum cerris and Ostryo-Quercetum cerris* at medium, and *Quercetum frainetto-cerris* at lower altitude. It can be seen that *Quercetum trojanae* and *Querco trojanae-Juniperetum excelsae* can appear at various altitudes within the zone of oak forests. *Phillyreo-Carpinetum* grows close to the lake where the climate is mitigated. *Ostrya carpinifolia* dominated forests are found at a higher altitude – this could be partly a succession stage of *Aceri obtusati-Fagetum* on the one hand (*Seslerio robustae-Ostryetum*), and partly a potential natural vegetation on steep, southern slopes, often codominated by *Quercus pubescens* (*Querco-Ostryetum*). Riverine forests dominated by *Salix alba* (*Salicetum albae*) are found near to the lake and *Juniperus communis* dominated communities on a karstic plateau between 1400/1500 m.

Aspect

Aspect is important, since it determines the length of insolation as well as other factors, e.g. wind. The southern slopes get more insolation and this accelerates heating of surfaces, as the snow melts faster and the soil is drier. So we can hardly find any mesophilous plants on the southern slopes. In our estimation we calculated the cosine of degrees in order to get a continuous function, as north can be designated by 0° or 360°, thus cos 0° is equal to cos 360° and is 1; whereas cos 180° is -1. The graph is presented in Figure 17.

We can see that all beech forests as well as *Carpinus betulus* dominated and ravine forests can be found on the northern aspects; this is partly the result of the geomorphology of the mountain; the north facing slopes are in Macedonia and south facing slopes are in Albania. In the transitional positions (east and west), we can find the following associations: *Fraxino orni-Quercetum petraeae*, *Phillyreo-Carpinetum orientalis*, *Seslerio robustae-Ostryetum carpinifoliae*, *Fraxino orni-Quercetum cerris*, *Quercetum trojanae*, *Pruno webii-Juniperetum excelsae*, and *Salicetum albae*. Associations *Quercetum frainetto-cerris*, *Querco trojanae-Juniperetum excelsae*, and *Querco pubescentis-Ostryetum carpinifoliae* appear almost only on the southern slopes.

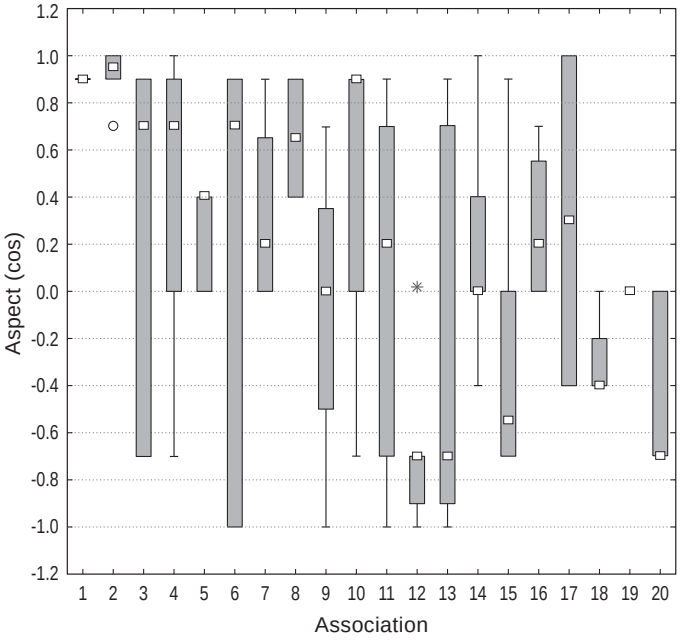


Figure 17. Distribution of aspects in forests. Legend: Number of association is as in Table 1.

Slope

Slope influences also the structure and growth of forest, but above all the depth and character of the soil, and modifies the microclimate. The distribution of slopes is

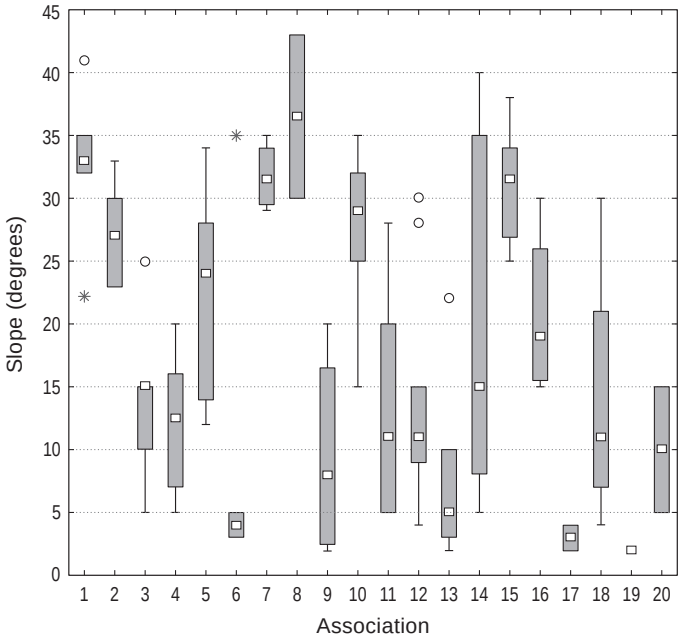


Figure 18. Distribution of slopes in forests. Legend: Number of association is as in Table 1.

presented in Figure 18. On the steepest slopes we can find subalpine and altimontane beach forest (*Asyneumo-Fagetum* and *Abieti-Fagetum*), thermophilous beech forest *Aceri obtusati-Fagetum*, ravine forest *Corylo colurnae-Aceretum obtusati* and *Corylo colurnae-Ostryetum*, thermophilous montane *Ostrya* dominated forests *(Seslerio-Ostryetum)*; on the steep slopes can be found also *Ostryo carpinifoliae-Quercetum cerris*, as well as *Querco-Ostryetum*. On more or less flat surfaces can be found *Calamintho-Fagetum*, *Festuco heterophyllae-Fagetum*, *Corylo colurnae-Carpinetum betuli*, *Fraxino-Quercetum petraeae*, *Quercetum frainetto-cerris*, *Quercetum trojanae*, *Querco trojanae-Juniperetum excelsae*, *Pruno webii-Juniperetum excelsae*, *Phillyreo-Carpinetum orientalis*, *Salicetum albae*, and *Juniperus communis* community. Other forests possess the intermediate positions.

Cover of shrub layer

Shrubs develop in a forest when there is enough light at shrub layer. This depends on the vertical and horizontal stand structure. Figure 19 shows that the most shaded are beech forests *(Asyneumo-Fagetum*, *Abieti-Fagetum*, *Calamintho-Fagetum*, *Aceri obtusati-Fagetum*). In the stands *of Festuco heterophyllae-Fagetum* we can find a relatively large coverage of shrub that could support the idea that these forests are a stage of the reforestation process at the lower belt of beech forests. The shrub layer is well developed also in *Fraxino-Quercetum petraeae* that results on small surfaces. We can find more shrub in *Ostryo-Quercetum cerris* than in *Fraxino-Quercetum cerris*. *Phillyreo-Carpinetum orientalis* is more a shrubby community than a forest. The same is valid also for the *Querco-Juniperetum excelsae* and *Juniperus communis* community.

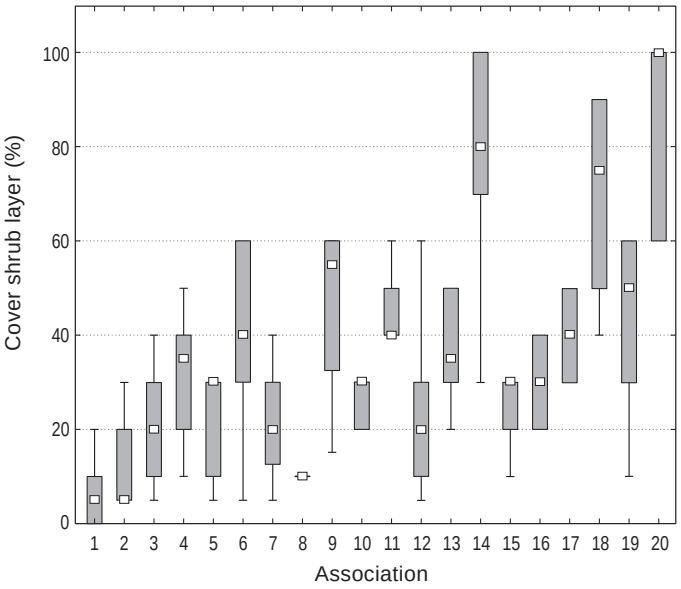


Figure 19. Cover of shrub layer in forests. Legend: Number of association is as in Table 1.

Cover of herb layer

We can find a relatively poor herb layer in all beech forests (Figure 20), the poorest is at high altitude in *Asyneumo-Fagetum* and *Abieti-Fagetum*, but in others – *Calamintho-Fagetum*, *Festuco heterophyllae-Fagetum*, and *Aceri obusati-Fagetum* – the coverage

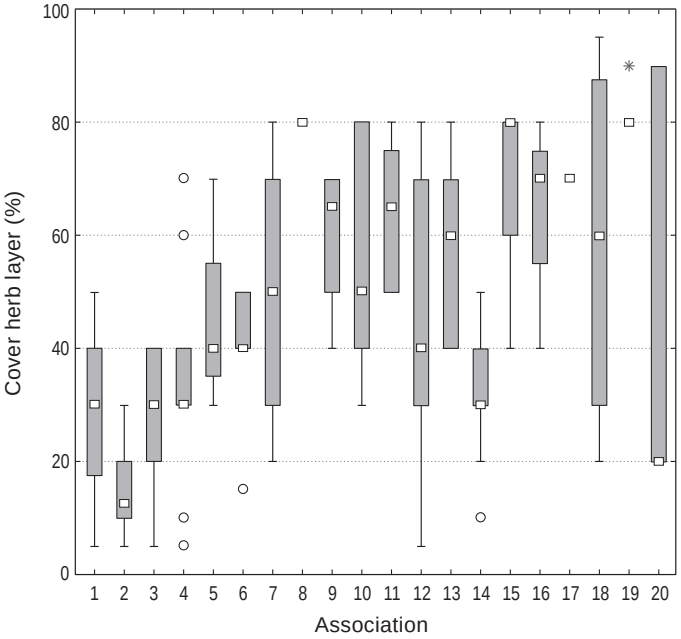


Figure 20. Cover of herb layer in forests. Legend: Number of association is as in Table 1.

is not much higher. The *Carpinus betulus* dominated forests (*Corylo-Carpinetum betuli*), ravine forest (*Corylo colurnae-Aceretum obtusati*), *Quercetum frainetto-cerris*, *Pruno webii-Juniperetum excelsae*, *Ostryo-Quercetum cerris* and *Juniperus communis* community have medium coverage of herb layer. It can be noticed that the *Quercetum frainetto-cerris* has the poorest herb layer among all zonal thermophilous deciduous forests. Among non-zonal thermophilous forests with a low coverage of herb layer we can find *Phillyreo-Carpinetum orientalis*. A well developed herb layer is found within the *Corylo colurnae-Ostryetum*, *Fraxino-Quercetum cerris*, *Fraxino-Quercetum petraeae*, *Quercetum trojanae*, *Querco-Ostryetum*, *Seslerio-Ostryetum*, *Querco-Juniperetum excelsae* and *Salicetum albae*.

Shannon-Wiener index and number of species

The Shannon-Wiener index is used to measure diversity. It is the information about entropy of distribution, treating species as symbols and their relative population sizes as probability. The information is summarized in Figure 21. The highest values are found within the ravine forests *Corylo colurnae-Aceretum obtusati*, *Fraxino orni-Quercetum cerris*, *Ostryo carpinifoliae-Quercetum cerris*, *Quercetum trojanae*, *Querco-Ostryetum*, *Seslerio-Ostryetum*, and *Querco trojanae-Juniperetum excelsae*. The intermediate situation occurs within the *Corylo-Carpinetum betuli*, *Corylo colurnae-Ostryetum carpinifoliae*, *Quercetum frainetto-cerris*, *Phillyreo-Carpinetum orientalis*, *Pruno webii-Juniperetum excelsae*, *Salicetum albae*, and *Juniperus communis* community. Lower biodiversity is found in beech forests of associations *Aceri obtusati-Fagetum* and *Festuco heterophyllae-Fagetum*, and the lowest in the stands of associations *Asyneumo-Fagetum*, *Abieti-Fagetum*, and *Calamintho-Fagetum*.

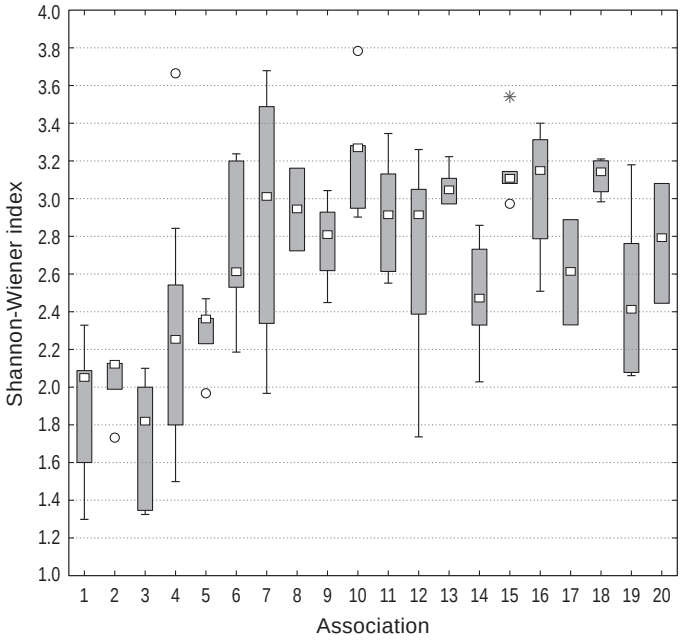


Figure 21. Shannon-Wiener index. Legend: Number of association is as in Table 1.

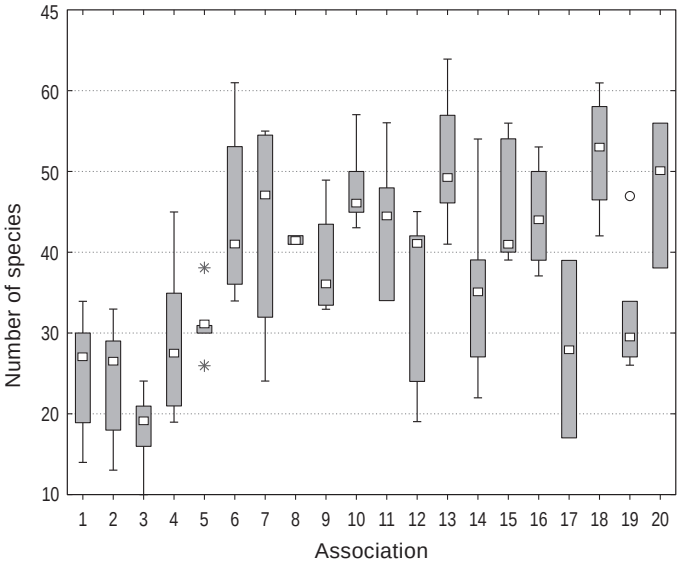


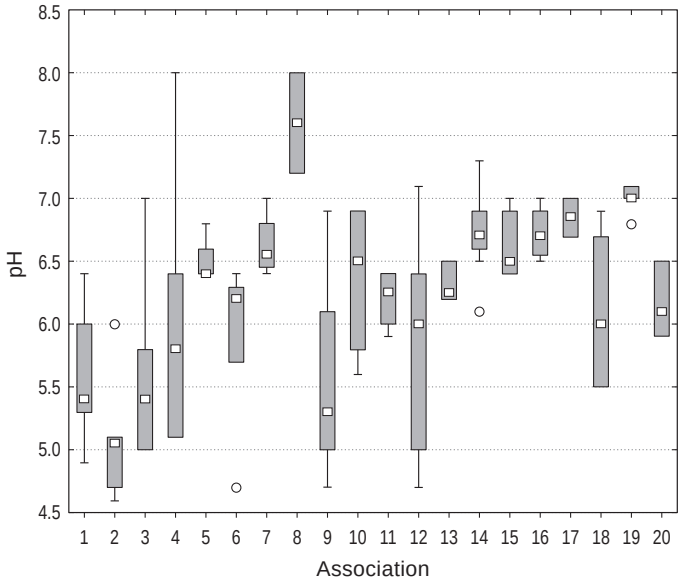
Figure 22. Number of species. Legend: Number of association is as in Table 1.

The number of species in each association is presented in Figure 22. The highest number of species can be found within the associations *Corylo colurnae-Carpinetum betuli*, *Corylo colurnae-Aceretum obtusati*, *Ostryo carpinifoliae-Quercetum cerris*, *Fraxino orni-Quercetum cerris*, *Quercetum trojanae*, *Querco-Ostryetum carpinifoliae*, *Seslerio robustae-Ostryetum*, *Querco trojanae-Juniperetum excelsae*, and *Juniperus communis* community. A lower number of species is found in associations *Corylo colurnae-Ostryetum*, *Fraxino orni-Quercetum petraeae*, *Quercetum frainetto-cerris*, and *Phillyreo-Carpinetum orientalis*, and the lowest in beech forests (*Asyneumo pichleri-Fagetum*, *Abieti borisii-regis-Fagetum*, *Calamintho grandiflorae-Fagetum*, *Festuco heterophyllae-Fagetum*, *Aceri obtusati-Fagetum*), in association *Pruno webii-Juniperetum excelsae* and in association *Salicetum albae*.

Soil reaction

Soil reaction is very important for plant species; it influences their growth in direct and indirect ways, e.g. influences the accessibility of important minerals in soil. pH was measured in soil samples. The extreme basic soils are in the ravine forest *Corylo colurnae-Ostryetum* (Figure 23). The soil shows a neutral reaction in the following forests: *Aceri obtusati-Fagetum*, *Corylo colurnae-Carpinetum betuli*, *Corylo colurnae-Aceretum obtusati*, *Corylo colurnae-Ostryetum carpinifoliae*, *Fraxino orni-Quercetum cerris*, *Ostryo carpinifoliae-Quercetum cerris*, *Quercetum frainetto-cerris*, *Quercetum trojanae*, *Phillyreo-Carpinetum orientalis*, *Querco pubescentis-Ostryetum carpinifoliae*, *Pruno webii-Juniperetum excelsae*, *Querco trojanae-Juniperetum excelsae*, *Salicetum albae*, and *Juniperus communis* community. The acid soil can be found in beech associations *Asyneumo pichleri-Fagetum*, *Abieti borisii-regii-Fagetum*, *Calamintho grandiflorae-Fagetum*, *Festuco heterophyllae-Fagetum*, and *Fraxino orni-Quercetum petraeae*.

Figure 23. Soil reaction in forests. Legend: Number of association is as in Table 1.



Calcium

Calcium is considered as a secondary plant nutrient. Only nitrogen and potassium are required in larger amounts by plants. The content of calcium in the soil is shown in Figure 24. High availability of calcium is found within the soil of *Aceri obtusati-Fagetum*, *Corylo colurnae-Aceretum obtusati*, *Corylo colurnae-Ostryetum*, *Quercetum trojanae*, *Ostryo carpinifoliae-Quercetum cerris*, *Seslerio-Ostryetum*, and *Querco-Ostryetum*. The other communities possess a lower level of calcium availability.

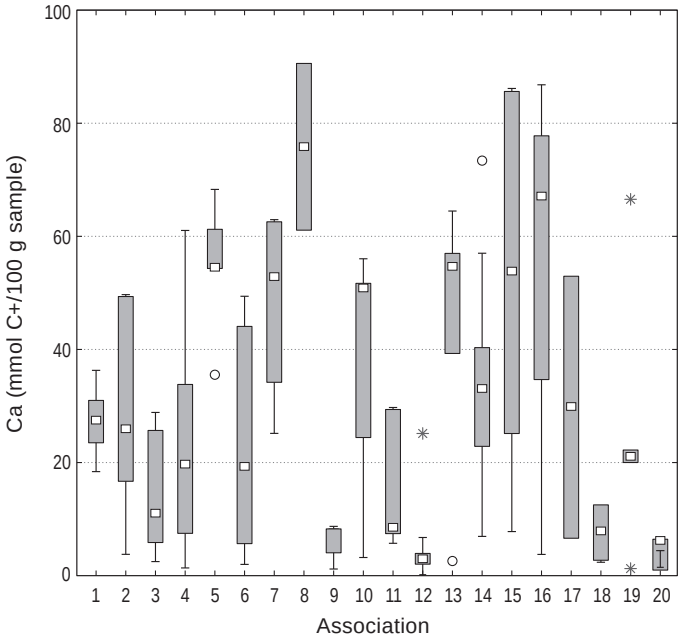


Figure 24. Content of calcium in soil. Legend: Number of association is as in Table 1.

Life forms

The spectrum of life forms is an important indicator of the ecological conditions in the communities. The following diagrams show the proportion of chamaephytes, geophytes, hemicriptophytes, phanerophytes, and therophytes.

Chamaephytes

Chamaephyte or dwarf-shrub is a plant that bears hibernating buds on persistent shoots near the ground – usually woody plants with perennating buds borne close to the ground, no more than 25 centimetres above the soil surface. One significance of the closeness to the ground is that the buds remain within the surface boundary layer and are thus somewhat protected from harsh winter winds. Chamaephytes are especially important in stressful environments, for example in alpine, arctic or dry ecosystems, often grazed by herbivores, and on rock and nutrient-poor soils.

Our analysis shows that most chamaephytes occur in high mountain beech forests *Asyneumo-Fagetum* and *Abieti-Fagetum* and there in dry forests, such as *Aceri obtusati-Fagetum*, *Fraxino orni-Quercetum petraeae*, *Quercetum trojanae*, *Phillyreo-Carpinetum orientalis*, *Seslerio robustae-Ostryetum*, *Querco-Ostryetum*, *Querco trojanae-Juniperetum excelsae*, and *Juniperus communis* community. In the other communities the proportion of chamaephytes is lower (Figure 25).

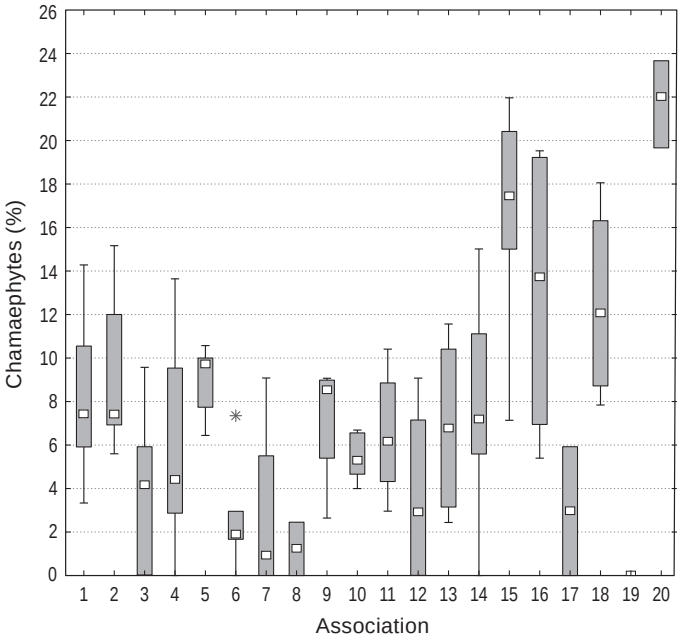


Figure 25. Proportion of chamaephytes. Legend: Number of association is as in Table 1.

Geophytes

The geophytes have hibernating buds below ground – with resting buds lying beneath the surface of the ground, either as a rhizome, bulb, corm, etc. The proportion of geophytes is shown in Figure 26.

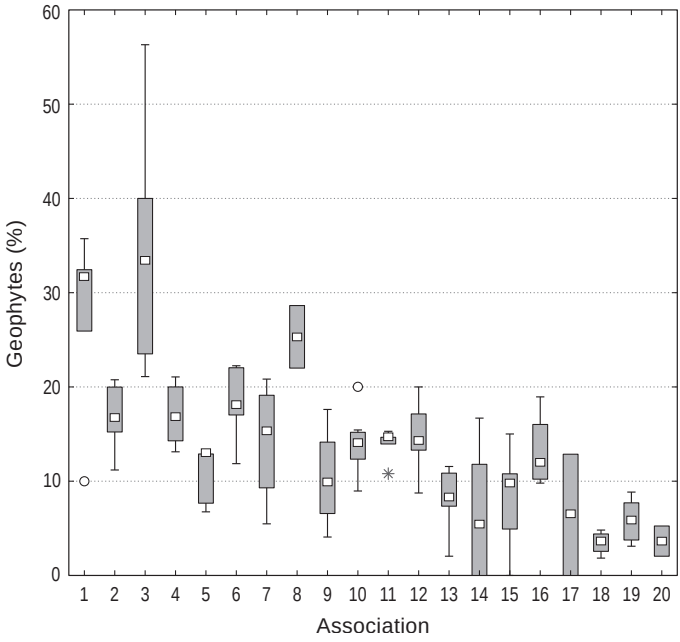


Figure 26. Proportion of geophytes. Legend: Number of association is as in Table 1.

The highest proportion of geophytes is present in montane beech forest (*Calamintho grandiflorae-Fagetum*) and further in subalpine beech forest (*Asyneumo-Fagetum)* and ravine *Corylo colurnae-Ostryetum*. The proportion of geophytes is lower in thermophilous beech forest *Aceri obtusati-Fagetum* and zonal oak forests (*Fraxino-Quercetum petraeae*, *Fraxino orni-Quercetum cerris*, *Ostryo-Quercetum cerris*, and *Quercetum frainetto-cerris*). The lowest proportion is found in non-zonal thermophilous deciduous forests (*Quercetum trojanae*, *Phillyreo-Carpinetum orientalis*, *Querco pubescentis-Ostryetum carpinifoliae*, *Seslerio robustae-Ostryetum carpinifoliae*, *Pruno webii-Juniperetum excelsae*, *Querco trojanae-Junipereteum excelsae*) as well as in riverine forests (*Salicetum albae*) and the shrub *Juniperus communis* community.

Hemicriptophytes

The hemicriptophytes have hibernating buds at or near the soil surface. Their proportion is shown in Figure 27. It can be recognised that hemicriptophytes represent the majority of plant species in the community concerned: the proportion of hemicriptophytes is slightly higher in the thermophilous deciduous forest of *Quercetalia*

than in mesophilous forests that are classified within *Fagetalia sylvaticae*. Extremely low is the proportion of hemicriptophytes in *Pruno webii-Juniperetum excelae* due to stands degraded by human impact and the high population of cormorants on the island Golem Grad.

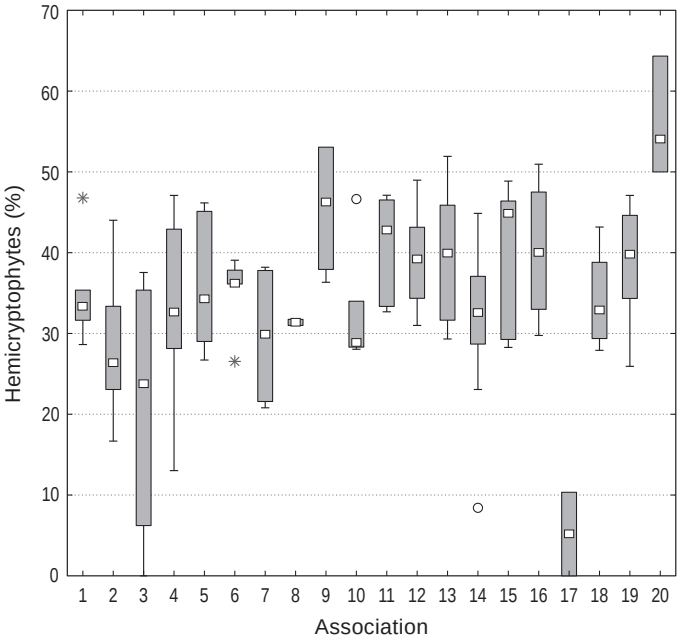


Figure 27. Proportion of hemicryptophytes. Legend: Number of association is as in Table 1.

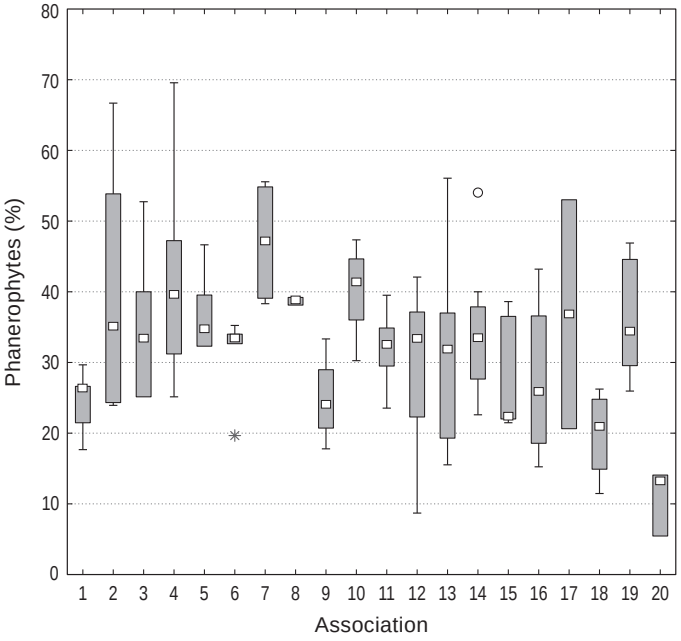


Figure 28. Proportion of phanerophytes. Legend: Number of association is as in Table 1.

Phanerophytes

Phanerophytes project into the air on stems – normally woody perennials – with resting buds more than 25 cm above soil level (trees and shrubs). The proportion is shown in Figure 28. The least diverse woody species can be found in *Asyneumo pichleri-Fagetum*, *Fraxino orni-Quercetum petraeae*, *Querco trojanae-Juniperetum excelsae*, and *Juniperus communis* community. The most diverse woody species are within *Abieti borisii-regis-Fagetum*, *Festuco heterophyllae-Fagetum*, *Corylo colurnae-Aceretum obtusati*, *Ostryo carpinifoliae-Quercetum cerris*, *Pruno webii-Juniperetum excelsae*, and *Salicetum albae*. The other forests have an intermediate position in this respect.

Therophytes

Therophytes are annual plants which survive the unfavourable season in the form of seeds and complete their life-cycle during the favourable season. The proportion of therophytes is shown in Figure 29. The highest proportion of therophytes is in *Pruno webii-Juniperetum excelsae* and *Querco trojanae-Juniperetum excelsae* due to degraded stands and extreme sites conditions. Then there is a group with less therophytes, such as *Corylo colurnae-Carpinetum betuli*, *Corylo colurnae-Aceretum obtusati*, *Fraxino orni-Quercetum petraeae*, *Quercetum frainetto-cerris*, *Quercetum trojanae*, *Phillyreo-Carpinetum orientalis*, *Salicetum albae*, and *Juniperus communis* community. The least therophytes occur within *Asyneumo-Fagetum*, *Abieti-Fagetum*, *Calamintho-Fagetum*, *Festuco heterophyllae-Fagetum*, *Aceri obtusati-Fagetum*, *Corylo colurnae-Ostryetum*, *Ostryo carpinifoliae-Quercetum cerris*, *Fraxino orni-Quercetum cerris*, *Seslerio robustae-Ostryetum*, and *Querco pubescentis-Ostryetum*.

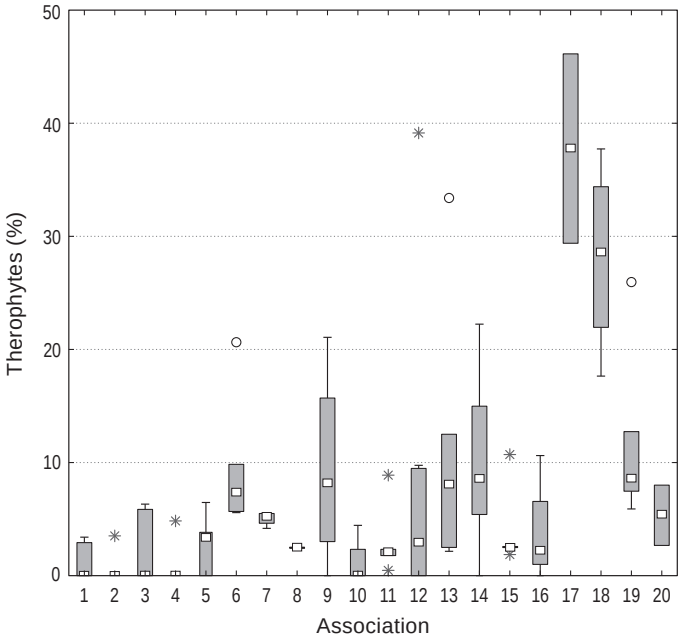


Figure 29. Proportion of therophytes. Legend: Number of association is as in Table 1.

Chorotypes

Chorotypes are defined according to the present distribution of plant species. They show the origin of the forests as well as the ecological conditions.

Endemic species

Endemic species (Figure 30) are species that have a narrow area of distribution, e.g. the south of the Balkan Peninsula. The proportion is shown in Figure 31.

We can see that endemic species are mostly thermophilous, since they appear in more thermophilous forests. The most endemic species can be found in *Seslerio-Ostryetum*, *Querco-Ostryetum*, *Fraxino orni-Quercetum petraeae*, *Querco trojanae-Juniperetum excelsae*, and *Aceri obtusati-Fagetum*. The frigoriphilous endemic species can be found in the *Asyneumo pichleri-Fagetum* and *Juniperus communis* community. We can find some endemic species also in *Fraxino orni-Quercetum cerris*, *Quercetum frainetto-cerris*, *Quercetum trojanae*, and *Corylo colurnae-Ostryetum*. The least endemic species can be found in *Abieti-Fagetum*, *Calamintho-Fagetum*, *Festuco heterophyllae-Fagetum*, *Corylo colurnae-Carpinetum betuli*, *Corylo colurnae-Aceretum obtusati*, *Phillyreo-Carpinetum orientalis* (Figure 32), *Pruno webii-Juniperetum excelsae*, and *Salicetum albae*.

Figure 30. *Nepeta ernesti-mayeri*, an endemic plant with very restricted distribution. In Galičica it is found on the western slopes of the mountain.

Figure 31. Proportion of endemic species. Legend: Number of association is as in Table 1.

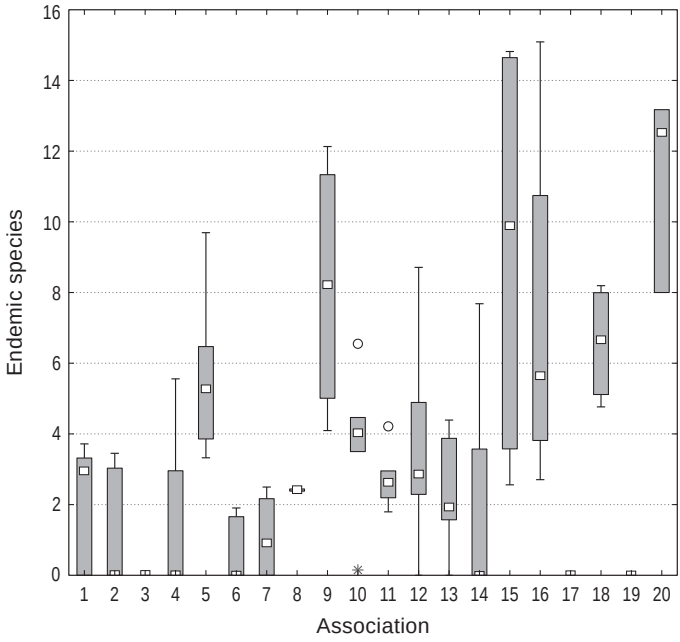


Figure 32. *Centaurea soskae* is an endemic species and can be found in *Phillyreo-Carpinetum orientalis*.

Eurimediterranean species

Eurimediterranean species have their centre of distribution on the Mediterranean coast, but they are distributed also in the submediterranean areas. The proportion of these species is shown in Figure 33. The highest proportion of eurimediterranean species can be found in *Pruno webii-Juniperetum excelsae*, *Phillyreo-Carpinetum orientalis*, *Querco trojanae-Juniperetum excelsae*, *Ostryo carpinifoliae-Quercetum cerris*, *Fraxino orni-Quercetum cerris*, *Quercetum trojanae*, and *Quercetum frainetto-cerris*. The intermediate proportion is found in the following forests: *Festuco heterophyllae-Fagetum*, *Aceri obtusati-Fagetum*, *Corylo colurnae-Carpinetum betuli*, *Corylo colurnae-Aceretum obtusati*, *Fraxino orni-Quercetum petraeae*, *Querco-Ostryetum*, *Seslerio-Ostryetum*, *Salicetum albae*, and *Juniperus communis* community. The least eurimediterranean species can be found at higher altitude, in *Asyneumo-Fagetum*, *Abieti-Fagetum*, *Calamintho-Fagetum*, and *Corylo colurnae-Ostryetum*.

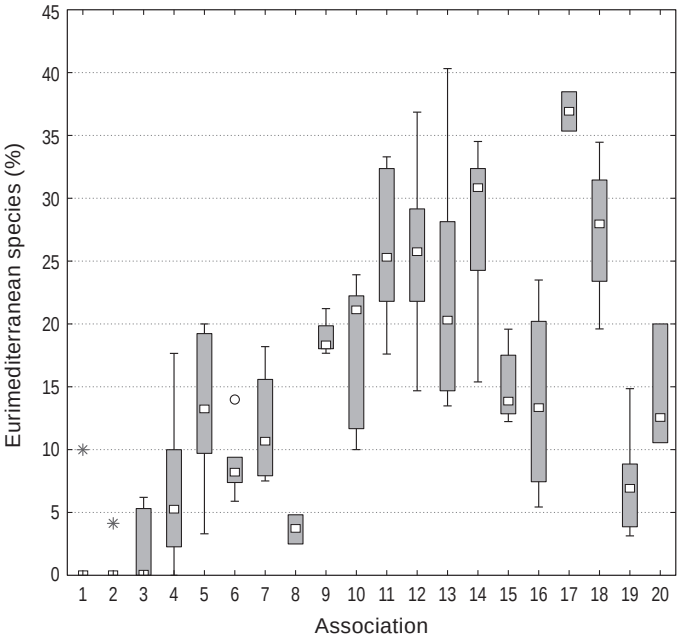


Figure 33. Proportion of eurimediterranean species. Legend: Number of association is as in Table 1.

Pontic (South European-South Siberian) species

These species are distributed in warm parts of Europe and in the southern part of Siberia. They have a centre of distribution near to the Black Sea and have a steppic character. The proportion of these species is shown in Figure 34. The most steppic species to be found are in *Festuco heteropyllae-Fagetum*, *Fraxino orni-Quercetum cerris*, *Ostryo-Quercetum cerris*, *Quercetum trojanae*, *Phillyreo-Carpinetum orientalis*,

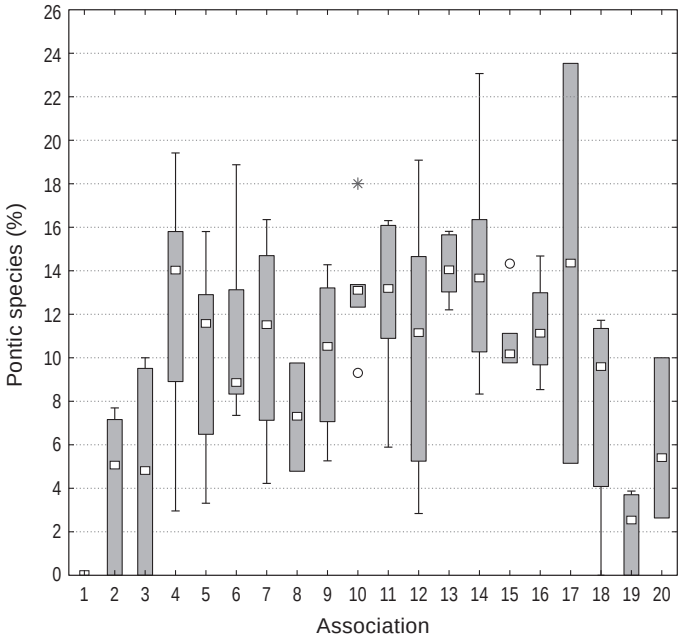


Figure 34. Proportion of pontic species. Legend: Number of association is as in Table 1.

and *Pruno webii-Juniperetum excelsae*. The intermediate proportion is in *Aceri obtusati-Fagetum*, *Corylo colurnae-Carpinetum betuli*, *Corylo colurnae-Aceretum obtusati*, *Corylo colurnae-Ostryetum carpinifoliae*, *Fraxino orni-Quercetum petraeae*, *Quercetum frainetto-cerris*, *Querco pubescentis-Ostryetum carpinifoliae*, *Seslerio robustae-Ostryetum*, and *Querco trojanae-Juniperetum excelsae*. The lower proportion is within *Asyneumo pichleri-Fagetum*, *Abieti borisii-regis-Fagetum*, *Calamintho grandiflorae-Fagetum*, *Salicetum albae*, and the *Juniperus communis* community. The majority of steppic species can be found in the most extreme habitats that are the hottest during summer and have most similar site conditions to the steppe region. The lowest proportion of these species is in cold, high montane beech forests.

South European orophytes

These species appear in the mountains of South Europe. The proportions are illustrated in Figure 35. We find that these species appear above all in subalpine beech forest *Asyneumo-Fagetum* and altimontane beech forest *Abieti-Fagetum*. On the other hand they are characteristic also for ravine forests, *Corylo colurnae-Ostryetum* (higher altitude) and *Corylo colurnae-Aceretum obtusati* (lower altitude). A high proportion of these species is also found in the montane *Juniperus communis* dominated shrub community.

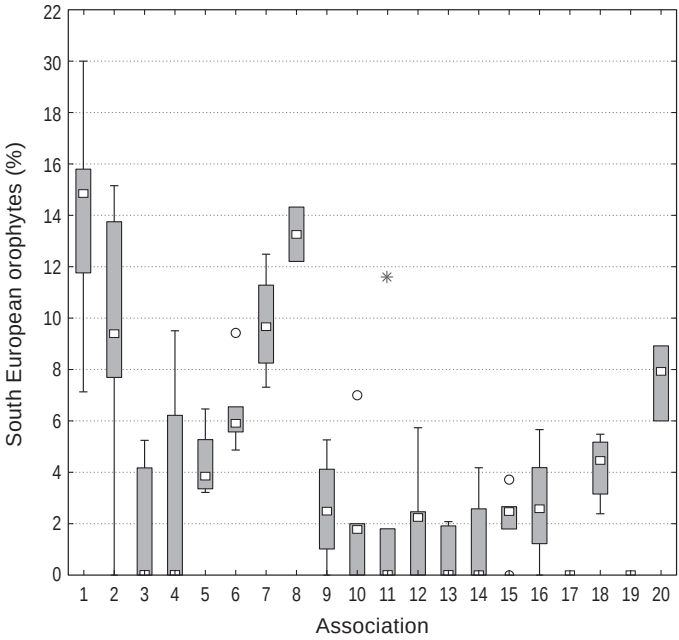


Figure 35. Proportion of South European orophytes. Legend: Number of association is as in Table 1.

Euro-Caucasian species

These species are distributed throughout Europe and on the Causasus mountains. The proportion of species is presented in Figure 36. We can detect two distinct groups. More Euro-Caucasian species can be found in mesophilous forest, classified within *Fagetalia sylvaticae* (*Asyneumo pichleri-Fagetum*, *Abieti borisii-regis-Fagetum*, *Calamintho grandiflorae-Fagetum*, *Festuco heterophyllae-Fagetum*, *Aceri obtusati-Fagetum*, *Corylo colurnae-Carpinetum betuli*, *Corylo colurnae-Aceretum obtusati*, *Corylo colurnae-Ostryetum carpinifoliae)*; whereas in the thermophilous, deciduous forests of *Quercetalia pubescenti-petraeae (Fraxino orni-Quercetum petraeae*, *Fraxino orni-Quercetum cerris*, *Ostryo carpinifoliae-Quercetum cerris*, *Quercetum frainetto cerris*, *Quercetum trojanae*, *Phillyreo-Carpinetum orientalis*, *Seslerio robustae-Ostryetum*, *Querco pubescentis-Ostryetum carpinifoliae*, *Pruno webii-Juniperetum excelsae*, *Querco trojanae-Juniperetum excelsae*), we cannot find many species of this chorotype.

Centroeuropean species

These species have a centre of distribution in central Europe and can be found also on the Galičica mountain. We can find a high proportion of these species only in the beech dominated forests: *Asyneumo pichleri-Fagetum*, *Abieti borisii-regis-Fagetum*, *Calamintho grandiflorae-Fagetum*, *Festuco heterophyllae-Fagetum*, and *Aceri obtusati-Fagetum*. Elsewhere these species are more or less sporadic (Figure 37).

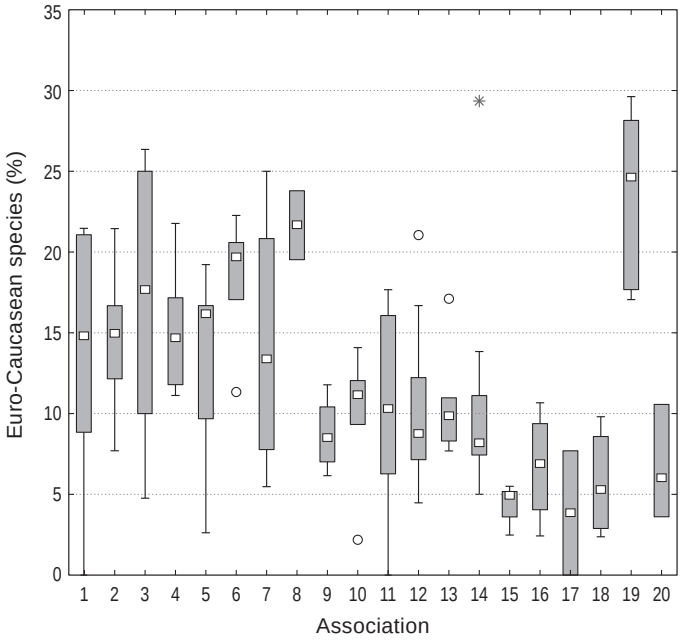


Figure 36. Proportion of Euro-Caucasean species. Legend: Number of association is as in Table 1.

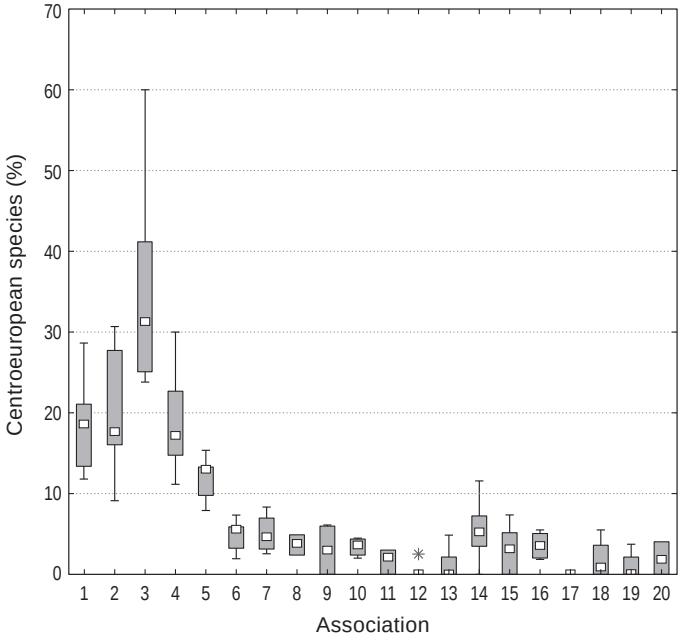


Figure 37. Proportion of Centroeuropean species. Legend: Number of association is as in Table 1.

FOREST VEGETATION OF GALIČICA MONTAIN RANGE

Mesophilous forests

We can divide the forests elaborated into two distinct groups: one with more or less mesophilous character, dominated by *Fagus sylvatica*, *Carpinus betulus*, *Corylus colurna*, and *Acer obtusatum*. The other group is composed of thermophilous deciduous forest, dominated by various oak species (*Quercus cerris*, *Q. frainetto*, *Q. petraea*, *Q. pubescens*, *Q. trojana*) and also forests dominated by *Ostrya carpinifolia*, *Carpinus orientalis*, and *Juniperus excelsa*. Besides, there exist also riverine forests dominated by *Salix alba*, and we deal also with the mountainous *Juniperus communis* dominated shrub community.

Within mesophilous forests we can distinguish several groups, one is the zonal beech forest that ranges from submontane *Festuco heterophyllae-Fagetum*, montane *Calamintho grandiflorae-Fagetum*, altimontane *Abieti-Fagetum* to subalpine *Asyneumo-Fagetum* (Figure 38). There exist also thermophilous azonal *Aceri obtusati-Fagetum* association, ravine forest (*Corylo colurnae-Aceretum obtusati* and *Corylo colurnae-Ostryetum carpinifoliae*) and *Carpinus betulus* dominated forest that can be found in valleys.

Figure 38. Typical view of a subalpine beech forest. Saber trees are the result of sliding snow.

Doronico orientalis-Fagion (Raus ex Bergmeier 1990) Dierschke 1997 (*Doronico columnae-Fagenion* Dzwonko et al. 1999)

The beech forests of the central part of the Balkan Peninsula have been classified within the *Doronico columnae-Fagenion* suballiance. The *Fagus sylvatica* dominated forests that can be found in the southern part of the Balkans, in Greece, are classified within the *Doronico orientalis-Fagenion*. Beech forests can be classified within the frame of beech forest of Moesian province, into the alliance *Doronico orientalis-Fagion*, and it is possible to separate an independant suballiances on the basis of ecologically distinct groups of characteristic and differential species (Dzwonko et al. 1999, Dzwonko & Loster 2000, Bergmeier & Dimopoulos 2001, Tsiripidis et al. 2007, Marinšek et al. in preparation).

In the research area, the site conditions are not favourable for beech. Beech is a subatlantic species and thrives well in the regions with mild winters and humid summers without a pronounced dry season. With its shallow roots it cannot outcompete deeply rooted oak species. Therefore in the research area, beech can find advantageous conditions only in the mountain regions.

The upper altitudinal belt of thermophilous forests is composed of *Quercus petraea* and sporadically also *Quercus cerris* dominated forests, which convert to beech forests rather suddenly. This transition zone is more gradual in the western part of the Balkans, where there exists a rather large transitional zone between *Quercо-Carpinetum* and the submontane beech forests (e.g. *Hacquetio-Fagetum* Košir ex Horvat et al. 1974).

Asyneumo pichleri-Fagetum (Em 1961) Dzwonko et al. 1999 corr. Matevski et al. nom. corr. hoc loco

Subalpine beech forest appears at altitudes from 1600 to 1800 m and represents the timber line in the Galičica mountain range (Figure 40). At that altitude the conditions for beech are harder and trees do not exceed the height of 20 m; there appear more trunks from the same root and trunks become "saber" i.e. trunks are curved at the bottom (Figure 38). The trees become lower and lower, and at the altitude of 1900–2000 m they reach only maximum 10 m. Further up they appear as shrub and these shrub communities form the transition to sub-

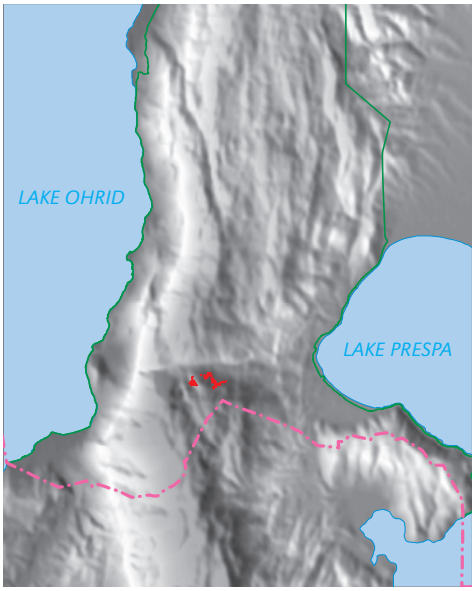


Figure 39. Distribution of the association *Asyneumo pichleri-Fagetum*.

Figure 40. Subalpine beech forest (*Asyneumo pichleri-Fagetum*) forms a timber line on Stara Galičica.

alpine pastures. These hard conditions have also an influence on the floristic composition of forests and we can find many subalpine plant species in these stands (Em 1961, Rizovski & Džekov 1990).

The association had been described as *Fagetum subalpinum scardico-pindicum* (Horvat 1938, Tregubov 1957) Em 1961, then the name was changed according to the International Code of Phytosociological nomenclature by Dzwonko et al. (1999), and now we propose a correction of the name.

Nomenclatural remark

The association was called *Asyneumo trichocalicinae-Fagetum* (Em 1961) Dzwonko et al. 1999. The latest taxonomic research in the region (Lakušić & Conti 2004) found out that *Asyneuma trichocalicina* does not appear in the Balkans. The taxon appearing in the Balkans is *Asyneuma pichleri* (Figure 41). Therefore it is necessary to correct the name of the association to *Asyneumo pichleri-Fagetum* (Em 1961) Dzwonko et al. 1999 corr. Matevski et al. nom. corr. hoc loco (Art. 48).

Diagnostic species: *Lonicera xylosteum*, *Sorbus aucuparia*; ***Asyneuma pichleri***, ***Doronicum austriacum***, *Hieracium murorum*, ***Polystichum aculeatum***, ***Polystichum lonchitis***, *Taraxacum officinale*.
Constant species: *Fagus sylvatica*; *Polystichum lonchitis*, *Sanicula europaea*.
Dominant species: ***Fagus sylvatica***.

Figure 41. *Asyneuma pichleri*, endemic to the Balkan peninsula, is one of the diagnostic species in the association *Asyneumo pichleri-Fagetum*.

On Galičica mountain, subalpine forest can be found only on Stara Galičica, in the area below Propast and above Lipona Livada and Volko Legalo (Figure 39).

Table 2. *Asyneumo pichleri-Fagetum* (Em 1961) Dzwonko et al. 1999 corr. Matevski et al. nom. corr. hoc loco

Relevé number		1	2	3	4	5	
Year		2009	2009	2009	2010	2010	
Date (mmdd)		0617	0618	0617	0616	0616	
Altitude (m)		1680	1717	1770	1770	1810	
Aspect		NNW	NNW	NNE	NNE	NNE	
Slope (°)		33	22	32	35	41	
Cover upper tree layer (%)		90	95	90	80	60	
Cover lower tree layer (%)		10	20	5	20	40	
Cover shrub layer (%)		0	0	5	20	10	
Cover herb layer (%)		30	5	50	30	0	
Cover moss layer (%)		0	0	0	3	1	
Cover bare rock (%)	Layer	2	0	0	5	1	Presence
Diagnostic species of the association							
Polystichum lonchitis	hl	+	+	+	+	+	5
Asyneuma pichleri	hl	+	.	+	+	+	4
Polystichum aculeatum	hl	.	+	+	+	.	3

	Relevé number		1	2	3	4	5	
	Lonicera xylosteum	sl	.	.	+	.	.	1
	Lonicera xylosteum	hl	+	.	1	.	.	2
	Doronicum austriacum	hl	+	.	2	.	.	2
	Sorbus aucuparia	hl	+	.	.	+	.	2
	Taraxacum officinale	hl	.	.	.	+	1	2
	Hieracium murorum	hl	.	.	.	+	+	2
DF	***Doronico orientalis-Fagion***							
	Aremonia agrimonoides	hl	+	+	+	+	+	5
	Calamintha grandiflora	hl	+	.	+	+	+	4
	Lonicera alpigena ssp. *formanekiana*	sl	.	.	.	.	+	1
	Lonicera alpigena ssp. *formanekiana*	hl	.	.	.	+	1	2
	Doronicum columnae	hl	.	.	.	1	1	2
	Abies borisii-regis	hl	.	.	.	+	+	2
	Primula veris ssp. *columnae*	hl	.	.	.	.	+	1
QF	***Fagetalia sylvaticae*, *Querco-Fagetea***							
	Fagus sylvatica	t1	5	5	5	5	5	5
	Fagus sylvatica	t2	1	2	+	1	3	5
	Fagus sylvatica	sl	.	.	+	1	1	3
	Fagus sylvatica	hl	.	.	+	.	+	2
	Sanicula europaea	hl	+	+	+	+	+	5
	Galium odoratum	hl	+	+	1	1	.	4
	Euphorbia amygdaloides	hl	+	+	+	+	.	4
	Cardamine bulbifera	hl	1	+	1	2	.	4
	Prenanthes purpurea	hl	2	1	.	+	.	3
	Actaea spicata	hl	.	+	.	1	+	3
	Saxifraga rotundifolia	hl	.	.	+	+	+	3
	Daphne mezereum	sl	.	.	.	.	+	1
	Daphne mezereum	hl	.	.	.	+	+	2
	Festuca drymeia	hl	+	.	.	1	.	2
	Cystopteris fragilis	hl	+	.	.	+	.	2
	Brachypodium sylvaticum	hl	.	+	+	.	.	2
	Dryopteris filix-mas	hl	+	.	.	.	.	1
	Viola reichenbachiana	hl	.	.	.	+	.	1
	Lilium martagon	hl	.	.	.	+	.	1
QP	***Quercetalia pubescenti-petraeae***							
	Poa nemoralis	hl	.	.	.	+	+	2
	Campanula spatulata ssp. *spruneriana*	hl	.	.	.	+	.	1
	Viola alba ssp. *denhardtii*	hl	.	.	.	.	+	1
	Other species							
	Orthilia secunda	hl	.	.	+	+	+	3
	Hieracium bifidum	hl	+	+	.	.	.	2
	Dactylis glomerata	hl	.	.	2	+	.	2

Other species with low frequency:

Crepis geracioides [hl] 3: 1; *Rhamnus alpinus* ssp. *fallax* [sl] 3: +; *Rubus idaeus* [hl] 3: +; *Sorbus aucuparia* ssp. *aucuparia* [hl] 3: +; *Chaerophyllum aureum* [hl] 3: +; *Cam-*

panula foliosa [hl] 3: +; *Corydalis marchalliana* [hl] 3: +; *Polygonatum verticillatum* [hl] 4: 1; *Chaerophyllum temulum* [hl] 4: +; *Polystichum* x *illyricum* [hl] 4: +; *Valeriana montana* [hl] 5: 1; *Heracleum sphondylium* [hl] 5: +; *Vicia incana* [hl] 5: +; *Juniperus communis* [hl] 5: +; *Festuca galicicae* [hl] 5: +.

Legend to all the tables: upper tree layer – t1, lower tree layer – t2, shrub layer – sl, herb layer – hl, moss layer – ml, seedlings – s.

Localities and other characteristics are given in the Appendix.

Abieti borisii-regis-Fagetum (Em 1985) Matevski et al. ass. nova

The areals of two fir species, *Abies alba* and *Abies cephalonica*, are encountered in the region of northern Greece, southern Bulgaria and southern part of Republic of Macedonia. Here we can find *Abies borisii-regis*, a transitional form between *A. alba* and *A. cephalonica* (Brus 2004). Some treat it as a natural hybrid between those two species. Only a few morphological characteristics are distinctive and sometimes it is also treated as a subspecies of *A. cephalonica*. It thrives at altitudes between 700 and 1500 m and has pretension to different ecological conditions than *Abies alba*.

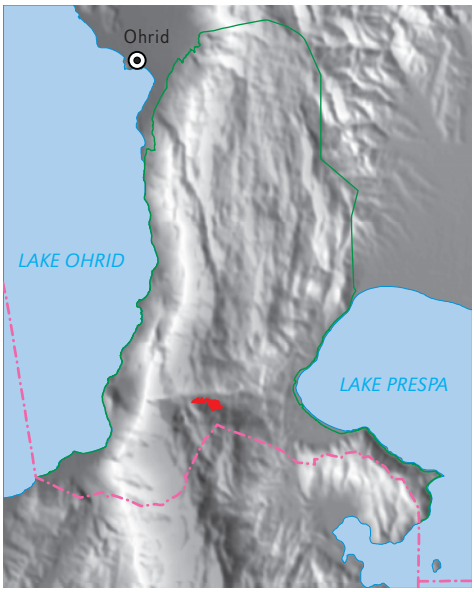


Figure 42. Distribution of the association *Abieti borisii-regis-Fagetum*.

These forests (Figure 43, 44) were first treated as a subassociation of *Calamintho grandiflorae-Fagetum*, but later they were called *Abieti-Fagetum macedonicum* Em 1985 (Jovanović et al. 1986). The name was not in accordance with the International Code of Phytosociological Nomenclature since it has a regional epithet (Art. 34). Later Dzwonko et al. (1999) and Dzwonko & Loster (2000) included relevés from mount Bistra (Rizovski & Džekov 1990), where *Fagus* is codominated by *Abies borisii-regis* into the association *Doronico columnae-Fagetum calaminthetosum grandiflorae*. They did not proceed with the typification of the subassociation.

In Macedonia there exist *Abieti-Fagetum moesicae* Horvat et al. 1974 (Horvat et al. 1974), which do not meet the conditions of the Code, as well as *Fago-Abietetum meridionale* Em 1974 (Em 1974) that is also not in accordance with the Code (Art. 34). Nevertheless in all these communities there appears *Abies alba* and not *Abies borisii-regis* that is characteristic for the western part of Macedonia and Greece, where it appears as a common species in the *Doronico orientalis-Fagion* alliance. So it was decided to follow the suggestion proposed by Em in 1985 (in Jovanović et al. 1986) and to validate Em's name.

Figure 43. Altimontane fir-beech forest (*Abieti borisii-regis-Fagetum*) on Stara Galičica. *Abies borisii-regis* is distinguished in the early spring.

These are very productive forests and form a vegetation belt above the association *Calamintho grandiflorae-Fagetum*. We can foresee that the thriving of *Abies borisii-regis* is due to higher air humidity in the region.

In this elaboration it was decided to follow the nomenclatural approach proposed by Macedonian authors (Em 1961, Rizovski & Džekov 1990), who distinguish several associations within the altitudinal gradient of beech forest – they propose the zonation submontane *Festuco heteropyllae-Fagetum*, montane *Calamintho grandiflorae-Fagetum*, altimontane *Abieti borisii-regis-Fagetum*, and subalpine *Asyneumo-Fagetum*. Dzwonko et al. (1999) and Dzwonko & Loster (2000) distinguished *Festuco heteropyllae-Fagetum* as *Doronico columnae-Fagetum festucetosum heterophyllae*, and joined the *Calamintho grandiflorae-Fagetum* and *Abieti-Fagetum* under the name *Doronico columnae-Fagetum calaminthetosum*; but they distinguished the subalpine beech forests as *Asyneumo-Fagetum*.

Nomenclatural remark

Holotypus: Table 3/2 – *holotypus hoc loco*

Ecological circumstances and distribution: The association forms the altimontane vegetation belt (1500–1700 m) on carbonate bedrock in the western part of the Republic of Macedonia.

Diagnostic species: *Cotoneaster nebrodensis*, *Sorbus aucuparia* ssp. *aucuparia*; *Asplenium trichomanes*, *Sedum magellense*.

Constant species: *Abies borisii-regis*, *Fagus sylvatica*; *Galium odoratum*.

Dominant species: ***Fagus sylvatica***.

Figure 44. View of an altimontane fir-beech forest.

In Galičica these forests can be found only on Stara Galičica, under the subalpine beech forest, in the area of Lipone Livada and Volko Legalo (Figure 42).

Table 3. *Abieti borisii-regis-Fagetum* (Em 1985) Matevski et al. ass. nova hoc loco

Relevé number		1	2	3	4	5	6	
Year		2009	2009	2010	2010	2009	2010	
Date (mmdd)		0617	0617	0616	0616	0617	0616	
Altitude (m)		1600	1550	1720	1750	1730	1750	
Aspect		N	NNW	NNW	N	NE	N	
Slope (°)		23	27	23	33	30	27	
Cover upper tree layer (%)		80	95	90	80	80	80	
Cover lower tree layer (%)		20	10	40	20	40	0	
Cover shrub layer (%)		5	5	5	5	20	30	
Cover herb layer (%)		10	5	20	30	10	15	
Cover of seedlings (%)		1	1	0	0	0	0	
Cover moss layer (%)	Layer	0	0	5	1	0	15	Presence
Cover bare rock (%)		0	0	10	1	5	30	
Diagnostic species of the association								
Cotoneaster nebrodensis	sl	.	.	.	.	+	+	2
Cotoneaster nebrodensis	hl	.	.	.	.	+	+	2
Asplenium trichomanes	hl	+	.	.	.	.	+	2

	Relevé number		1	2	3	4	5	6	
	Sedum magellense	hl	.	.	+	.	.	+	2
	Sorbus aucuparia ssp. *aucuparia*	sl	.	.	.	.	+	.	1
	Sorbus aucuparia ssp. *aucuparia*	hl	+	.	.	.	.	.	1
DF	***Doronico orientalis-Fagion***								
	Abies borisii-regis	t1	1	2	.	.	.	.	2
	Abies borisii-regis	t2	+	.	2	1	.	.	3
	Abies borisii-regis	sl	+	.	+	+	+	+	5
	Abies borisii-regis	hl	.	+	+	+	.	+	4
	Abies borisii-regis	s	.	+	.	.	.	.	1
	Aremonia agrimonoides	hl	+	.	+	+	+	+	5
	Calamintha grandiflora	hl	.	+	1	+	+	+	5
	Festuca drymeia	hl	1	.	1	+	.	.	3
	Asyneuma pichleri	hl	.	+	+	.	.	.	2
	Doronicum columnae	hl	.	.	.	1	.	+	2
	Lonicera alpigena ssp. *formanekiana*	hl	.	.	.	+	.	+	2
	Knautia drymeia	hl	.	.	.	+	.	.	1
QF	***Fagetalia sylvaticae*, *Querco-Fagetea***								
	Fagus sylvatica	t1	3	3	5	5	5	5	6
	Fagus sylvatica	t2	1	+	+	+	2	.	5
	Fagus sylvatica	sl	+	+	.	+	2	1	5
	Fagus sylvatica	hl	+	.	+	+	+	.	4
	Fagus sylvatica	s	+	+	.	.	.	.	2
	Galium odoratum	hl	+	+	2	2	1	1	6
	Euphorbia amygdaloides	hl	.	.	+	1	+	+	4
	Prenanthes purpurea	hl	.	.	+	+	+	1	4
	Sanicula europaea	hl	1	.	+	+	.	.	3
	Cardamine bulbifera	hl	.	.	1	1	1	.	3
	Mycelis muralis	hl	.	.	+	.	+	+	3
	Cystopteris fragilis	hl	.	.	+	.	+	+	3
	Daphne mezereum	sl	.	.	.	.	.	+	1
	Daphne mezereum	hl	.	.	.	+	+	.	2
	Actaea spicata	hl	.	.	+	.	+	.	2
	Saxifraga rotundifolia	hl	.	.	.	.	+	1	2
	Acer pseudoplatanus	hl	+	.	.	.	.	.	1
	Acer pseudoplatanus	s	+	.	.	.	.	.	1
	Lonicera xylosteum	sl	.	.	.	.	+	.	1
	Lonicera xylosteum	hl	.	.	.	.	+	.	1
	Milium effusum	hl	.	+	.	.	.	.	1
	Aruncus dioicus	hl	.	.	+	.	.	.	1
	Lilium martagon	hl	.	.	.	+	.	.	1
	Viola reichenbachiana	hl	.	.	.	+	.	.	1
	Polystichum aculeatum	hl	.	.	.	+	.	.	1
	Stellaria nemorum	hl	.	.	.	+	.	.	1
	Hieracium murorum	hl	.	.	.	.	.	+	1
	Rosa arvensis	hl	.	.	.	.	.	+	1

	Relevé number		1	2	3	4	5	6	
QP	***Quercetalia pubescenti-petraeae***								
	Sorbus aria	hl	+	.	.	.	+	+	3
	Poa nemoralis	hl	.	.	+	.	.	+	2
	Viola alba ssp. *denhardtii*	hl	.	.	+	.	.	.	1
	Campanula spatulata ssp. *spruneriana*	hl	.	.	.	.	.	+	1
	Other species								
	Orthilia secunda	hl	1	+	.	.	+	1	4
	Hieracium bifidum	hl	.	.	+	+	.	+	3
	Rhamnus alpinus ssp. *fallax*	sl	.	.	.	+	+	+	3
	Veronica chamaedrys	hl	.	+	+	.	.	.	2
	Dactylis glomerata	hl	.	.	.	1	1	.	2
	Polystichum lonchitis	hl	.	.	.	.	1	+	2

Other species with low frequency:

Polystichum x *illyricum* [hl] 3: +; *Rhamnus rhodopeus* [hl] 4: 1; *Chaerophyllum temulum* [hl] 4: +; *Sorbus aucuparia* [hl] 4: +; *Doronicum austriacum* [hl] 5: 1; *Rubus idaeus* [hl] 5: +; *Polygonatum verticillatum* [hl] 6: 1; *Solidago virgaurea* [hl] 6: +; *Viburnum lantana* [hl] 6: +; *Arabis alpina* ssp. *caucasica* [hl] 6: +; *Ctenidium molluscum* [ml] 6: +.

Localities and other characteristics are given in the Appendix.

Calamintho grandiflorae-Fagetum (Em 1965) Rizovski & Džekov ex Matevski et al. ass. nova

Calamintho grandiflorae-Fageteum is the most widespread beech forest community (Figure 46). It forms the montane forests in Macedonia in a vegetation belt from 1300 to 1700 m. On northern slopes it can be found even lower, as well as at higher altitudes on southern sites. In the montane vegetation belt, dry periods do not appear during summer, and the winter frost is not so hard, either. Fogs often appear and snow lies till late spring. These are the right site conditions for beech forests. These forests can be found in all aspects and on various bedrocks. The only condition is that the soil layer is deep and fresh and

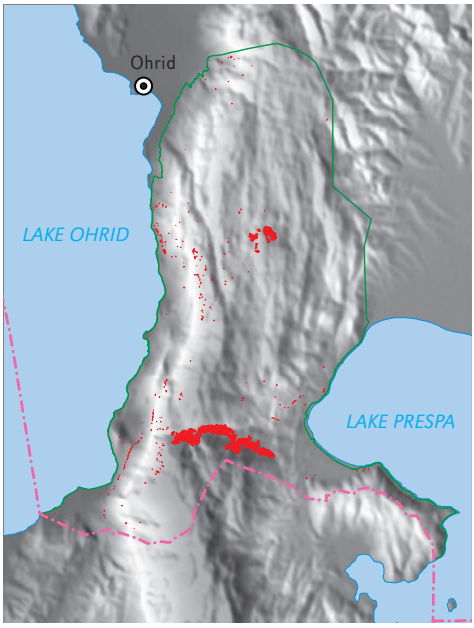


Figure 45. Distribution of the association *Calamintho grandiflorae-Fagetum*.

Figure 46. Montane beech forest (*Calamintho grandiflorae-Fagetum*) in Kazan.

that there are sufficient nutrients. These forests are very productive, fairly well preserved and easy to approach; they rejuvenate successfully and are an important source of wood (Rizovski & Džekov 1990).

As already said, it has been decided to follow the widely accepted syntaxonomical scheme in the region, and therefore we validate the name in current use.

Figure 47. *Epipactis microphylla* appears in montane beech forest.

Nomenclatural remark

Lectotypus: Table 14/7 in Rizovski & Džekov (1990)

Ecological circumstances and distribution: see above

Diagnostic species: *Dryopteris filix-mas*, *Milium effusum*, *Neottia nidus-avis*, *Pulmonaria officinalis*.

Constant species: *Fagus sylvatica*.

Dominant species: ***Fagus sylvatica***.

These forests are found below Deva Livada and Tepeno, on Lipona Livada, Volko Legalo, under the hill Goga, and sporadically all over Galičica, from the oak forest to the altimontane *Abieti-Fagetum* (Figure 45).

Table 4. *Calamintho grandiflorae-Fagetum* (Em 1965) Rizovski & Džekov ex Matevski et al. ass. nova hoc loco

	Relevé number		1	2	3	4	5	6	7	
	Year		2009	2010	2010	2010	2009	2009	2010	
	Date (mmdd)		0617	0616	0622	0620	0618	0618	0615	
	Altitude (m)		1500	1322	1517	1300	1605	1599	1360	
	Aspect		NNW	SE	NW	NNE	NNW	NW	SW	
	Slope (°)		25	10	15	15	5	10	15	
	Cover upper tree layer (%)		90	90	80	90	80	80	90	
	Cover lower tree layer (%)		10	40	20	20	40	60	40	
	Cover shrub layer (%)		5	10	40	20	20	20	30	
	Cover herb layer (%)		40	20	20	5	40	35	30	
	Cover of seedlings (%)		1	0	0	0	0	1	0	
	Cover moss layer (%)		0	0	0	0	0	0	0	
	Cover bare rock (%)	Layer	0	0	0	0	1	0	10	Presence
	Diagnostic species of the association									
	Neottia nidus-avis	hl	.	.	.	.	+	+	+	3
	Dryopteris filix-mas	hl	+	.	.	r	.	.	.	2
	Milium effusum	hl	+	.	.	.	1	.	.	2
	Pulmonaria officinalis	hl	.	.	.	.	+	1	.	2
DF	***Doronico orientalis-Fagion***									
	Aremonia agrimonoides	hl	.	.	.	.	+	+	+	3
	Festuca drymeia	hl	.	.	.	r	+	.	.	2
	Doronicum columnae	hl	.	.	.	.	+	.	.	1
F2	***Fagetalia sylvaticae***									
	Fagus sylvatica	t1	5	5	5	5	5	5	4	7
	Fagus sylvatica	t2	1	2	2	2	3	3	3	7
	Fagus sylvatica	sl	+	1	3	2	2	2	2	7
	Fagus sylvatica	hl	1	+	1	1	.	1	1	6
	Fagus sylvatica	s	+	.	.	.	.	+	.	2
	Galium odoratum	hl	2	1	1	+	1	+	.	6
	Cardamine bulbifera	hl	2	2	1	.	2	2	1	6

	Relevé number		1	2	3	4	5	6	7	
	Viola reichenbachiana	hl	.	+	.	.	+	+	+	4
	Actaea spicata	hl	+	1	.	.	.	+	.	3
	Euphorbia amygdaloides	hl	+	.	.	.	.	+	+	3
	Acer platanoides	sl	.	.	.	.	.	.	+	1
	Acer platanoides	hl	.	.	.	.	+	.	+	2
	Sanicula europaea	hl	+	+	.	.	.	.	.	2
	Epipactis helleborine	hl	.	+	.	+	.	.	.	2
	Cephalanthera damasonium	hl	.	.	.	r	.	.	+	2
	Lamiastrum galeobdolon	hl	.	.	.	.	2	+	.	2
	Brachypodium sylvaticum	hl	.	.	.	.	+	+	.	2
	Acer pseudoplatanus	s	+	.	.	.	.	.	.	1
	Cystopteris fragilis	hl	.	+	.	.	.	.	.	1
	Rosa arvensis	sl	.	.	+	.	.	.	.	1
	Mercurialis perennis	hl	.	.	.	+	.	.	.	1
	Lonicera xylosteum	hl	.	.	.	.	+	.	.	1
	Hieracium murorum	hl	.	.	.	.	+	.	.	1
	Epipactis microphylla	hl	.	.	.	.	.	.	+	1
	Corylus colurna	t2	.	.	.	.	.	.	+	1
QP	***Quercetalia pubescenti-petraeae***									
	Melica uniflora	hl	1	+	.	r	.	.	2	4
	Lathyrus venetus	hl	+	.	+	r	.	.	.	3
	Helleborus odorus	hl	.	+	.	r	+	.	.	3
	Acer obtusatum	t1	.	.	.	.	.	.	2	1
	Acer obtusatum	t2	.	+	.	.	.	.	1	2
	Acer obtusatum	hl	.	+	.	.	.	.	+	2
	Viola alba ssp. *denhardtii*	hl	.	+	.	.	.	.	.	1
	Euonymus verrucosus	hl	.	+	.	.	.	.	.	1
	Lathyrus laxiflorus var. *laxiflorus*	hl	.	+	.	.	.	.	.	1
QF	***Querco-Fagetea***									
	Mycelis muralis	hl	+	.	.	.	+	.	.	2
	Prenanthes purpurea	hl	+	.	.	.	+	.	.	2
	Rubus hirtus	sl	.	.	+	.	.	.	.	1
	Rubus hirtus	hl	.	.	.	+	.	.	.	1
	Other species									
	Dactylis glomerata	hl	.	1	.	.	+	1	.	3
	Polystichum lonchitis	hl	.	.	+	.	+	.	.	2

Other species with low frequency:

Epilobium montanum [hl] 1: +; *Geranium robertianum* [hl] 1: +; *Fragaria moschata* [hl] 1: +; *Polygonatum odoratum* [hl] 2: 2; *Symphytum tuberosum* ssp. *angustifolia* [hl] 2: +; *Galium aparine* [hl] 4: +; *Orthilia secunda* [hl] 5: 1; *Viburnum lantana* [hl] 5: +.

Localities and other characteristics are given in the Appendix.

Festuco heterophyllae-Fagetum (Em 1965) Rizovski & Džekov ex Matevski et al. ass. nova

In Macedonia these forests form a submontane vegetation belt at altitudes from 1000 to 1200 m, but on warmer sites they can reach up to 1500 m and on shaded sites up to 800 m (Figure 49). Forests of association *Festuco heterophyllae-Fagetum* grow on deep, fresh soil with plenty of nutrients over carbonate or silicate bedrocks. Only on sites where bedrock comes to the surface is it replaced by *Aceri obusati-Fagetum*. In *Festuco heterophyllae-Fagetum* the dominant species is beech, but sometimes it is codominated by *Acer obtusatum* (Rizovski & Džekov 1990).

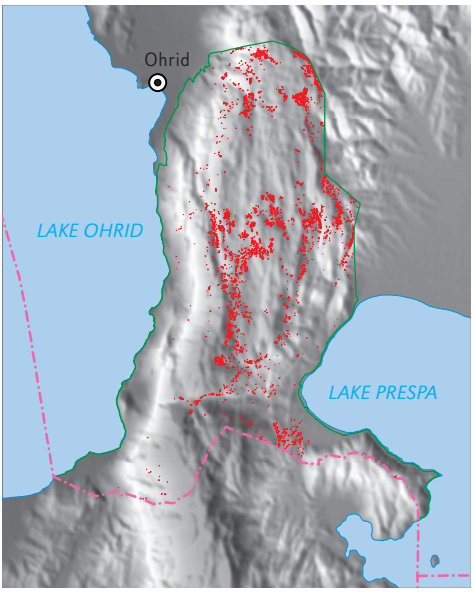


Figure 48. Distribution of the association *Festuco heterophyllae-Fagetum*.

Figure 49. In the submontane beech forest (*Festuco heteropyllae-Fagetum*) the herb layer is formed by thermophilous herbs, such as *Festuca heterophylla*, *Cephalanthera rubra* or *Luzula foersteri*.

Figure 50. *Cephalantera rubra* in submontane beech forest.

Nomenclatural remark
Lectotypus: Table 11/3 in Rizovski & Džekov (1990)
Ecological circumstances: see above
Diagnostic species: *Corylus avellana*; *Anemone nemorosa*.
Constant species: *Fagus sylvatica*.
Dominant species: ***Fagus sylvatica***.

These forests are not well developed in the region and do not build a continuous vegetation belt. They appear sporadically on the lower edge of beech forests belt (Figure 48). Sometimes human impact (cutting) enables the thermophilous species to settle in these communities. This presents a more thermophilous form of these forests.

Table 5. *Festuco heterophyllae-Fagetum* (Em 1965) Rizovski & Džekov ex Matevski et al. ass. nova hoc loco

	Relevé number		1	2	3	4	5	6	7	8	9	10	
	Year		2009	2009	2009	2010	2010	2009	2010	2009	2010	2009	
	Date (mmdd)		0616	0622	0621	0620	0620	0622	0620	0619	0620	0618	
	Altitude (m)		1380	1145	1407	1253	1390	1202	1197	1441	1373	1466	
	Aspect		E	NE	W	N	NNE	W	NNW	NW	SE	NE	
	Slope (°)		14	11	5	15	5	20	10	20	7	16	
	Cover upper tree layer (%)		95	90	40	30	60	80	70	30	80	80	
	Cover lower tree layer (%)		10	30	60	80	50	30	30	80	20	40	
	Cover shrub layer (%)		10	20	40	50	40	40	30	20	40	20	
	Cover herb layer (%)		5	10	40	40	60	30	70	30	30	30	
	Cover of seedlings (%)		0	0	1	0	0	0	0	0	0	0	
	Cover moss layer (%)		0	0	1	5	0	10	0	0	10	20	
	Cover bare rock (%)	Layer	0	0	0	5	0	0	0	60	10	10	Presence
	Diagnostic species of the association												
	Anemone nemorosa	hl	+	.	.	.	+	.	+	.	.	.	3
	Corylus avellana	sl	.	+	.	1	.	.	+	.	.	.	3
DF	***Doronico orientalis-Fagion***												
	Aremonia agrimonoides	hl	+	1	1	+	+	.	+	+	.	+	8
	Calamintha grandiflora	hl	.	.	.	.	.	.	.	+	.	+	2
	Lonicera alpigena ssp. *formanekiana*	sl	.	.	.	.	.	.	.	+	.	.	1
F2	***Fagetalia sylvaticae***												
	Fagus sylvatica	t1	5	5	3	3	3	5	5	2	4	+	10
	Fagus sylvatica	t2	1	+	4	5	2	2	2	5	2	2	10
	Fagus sylvatica	sl	1	1	2	2	2	3	2	1	3	1	10
	Fagus sylvatica	hl	+	+	+	1	.	+	.	+	+	.	7
	Brachypodium sylvaticum	hl	+	+	+	+	.	.	1	.	.	.	5
	Euphorbia amygdaloides	hl	.	+	+	.	+	.	.	.	.	+	4
	Acer pseudoplatanus	t2	.	.	.	.	.	.	+	.	.	.	1
	Acer pseudoplatanus	sl	.	.	.	1	2	.	.	.	.	.	2
	Acer pseudoplatanus	hl	.	.	.	1	+	.	+	.	.	.	3
	Cephalanthera damasonium	hl	+	.	.	.	.	.	.	+	+	.	3
	Cardamine bulbifera	hl	.	.	.	1	+	+	.	.	.	.	3
	Galium pseudaristatum	hl	.	.	.	+	+	.	+	.	.	.	3
	Doronicum columnae	hl	.	.	.	.	+	.	+	.	.	1	3
	Rosa arvensis	sl	.	.	.	.	.	.	1	.	+	.	2
	Rosa arvensis	hl	.	.	.	1	.	.	+	.	.	.	2
	Tilia cordata	t2	.	1	.	.	.	.	.	.	.	.	1
	Tilia cordata	sl	.	.	.	+	.	.	.	.	.	.	1

	Relevé number		1	2	3	4	5	6	7	8	9	10	
	Tilia cordata	hl	.	+	.	+	.	.	.	.	.	.	2
	Acer platanoides	sl	.	.	.	.	1	.	.	.	.	.	1
	Acer platanoides	hl	.	.	+	.	.	.	.	.	.	+	2
	Festuca drymeia	hl	+	.	.	.	.	.	.	.	.	1	2
	Lilium martagon	hl	.	.	.	1	.	.	.	.	.	+	2
	Neottia nidus-avis	hl	.	.	.	+	.	.	.	.	.	+	2
	Primula vulgaris	hl	.	.	.	.	.	+	+	.	.	.	2
	Arum maculatum	hl	.	.	.	.	.	.	.	+	+	.	2
	Cystopteris fragilis	hl	.	.	.	.	.	.	.	.	+	+	2
	Lonicera caprifolium	sl	.	.	.	+	.	.	.	.	.	.	1
	Euonymus latifolius	sl	.	.	.	+	.	.	.	.	.	.	1
	Corylus colurna	sl	.	.	.	.	+	.	.	.	.	.	1
	Viola reichenbachiana	hl	.	.	.	.	.	.	+	.	.	.	1
	Lonicera etrusca	sl	.	.	.	.	.	.	+	.	.	.	1
	Bromus ramosus	hl	.	.	.	.	.	.	+	.	.	.	1
	Sanicula europaea	hl	.	.	.	.	.	.	+	.	.	.	1
	Hordelymus europaeus	hl	.	.	.	.	.	.	.	.	2	.	1
	Lonicera xylosteum	sl	.	.	.	.	.	.	.	.	.	+	1
	Lonicera xylosteum	hl	.	.	.	.	.	.	.	.	.	+	1
	Actaea spicata	hl	.	.	.	.	.	.	.	.	.	+	1
	Pulmonaria officinalis	hl	.	.	.	.	.	.	.	.	.	+	1
	Daphne mezereum	hl	.	.	.	.	.	.	.	.	.	+	1
	Hieracium murorum	hl	.	.	.	.	.	.	.	.	.	+	1
	Saxifraga rotundifolia	hl	.	.	.	.	.	.	.	.	.	+	1
	Galium sylvaticum	hl	.	.	.	.	.	.	.	.	.	+	1
QP	***Quercetalia pubescenti-petraeae***												
	Festuca heterophylla	hl	.	+	+	2	+	1	2	+	.	+	8
	Fraxinus ornus	sl	+	+	1	+	+	.	.	.	.	+	6
	Fraxinus ornus	hl	.	+	+	+	.	.	.	.	.	+	4
	Helleborus odorus	hl	.	+	1	+	.	+	+	.	.	+	6
	Euonymus verrucosus	sl	.	+	.	1	+	1	+	.	.	.	5
	Euonymus verrucosus	hl	.	.	.	+	.	.	.	.	.	.	1
	Poa nemoralis	hl	.	.	.	.	.	1	1	2	+	+	5
	Acer obtusatum	t1	1	.	.	.	1	.	.	.	1	.	3
	Acer obtusatum	t2	.	1	.	.	2	.	.	.	.	+	3
	Acer obtusatum	sl	+	.	.	.	1	.	.	.	2	1	4
	Acer obtusatum	hl	+	+	.	.	.	.	.	.	1	.	3
	Acer obtusatum	s	.	.	+	.	.	.	.	.	.	.	1
	Cornus mas	sl	.	1	.	1	.	.	+	+	.	.	4
	Cornus mas	hl	+	.	.	.	.	.	.	.	.	.	1
	Convallaria majalis	hl	.	.	2	2	2	.	.	.	.	+	4
	Lathyrus venetus	hl	.	.	.	+	+	1	+	.	.	.	4
	Melica uniflora	hl	.	.	.	+	+	+	1	.	.	.	4
	Melittis melissophyllum	hl	.	.	.	1	.	+	+	.	.	.	3
	Lathyrus laxiflorus var. *laxiflorus*	hl	.	.	.	.	.	.	+	.	+	+	3
	Quercus cerris	t1	+	.	.	.	.	.	.	.	.	.	1
	Quercus cerris	hl	.	+	.	.	.	.	.	.	+	.	2

	Relevé number		1	2	3	4	5	6	7	8	9	10	
	Sorbus torminalis	sl	.	.	.	+	.	.	+	.	.	.	2
	Potentilla micrantha	hl	.	.	.	.	.	+	+	.	.	.	2
	Juglans regia	sl	.	+	.	.	.	.	.	.	.	.	1
	Viola alba ssp. *denhardtii*	hl	.	.	.	+	.	.	.	.	.	.	1
	Carex depauperata	hl	.	.	.	+	.	.	.	.	.	.	1
	Sorbus aria	sl	.	.	.	.	+	.	.	.	.	.	1
	Sorbus aria	hl	.	.	.	.	+	.	.	.	.	.	1
	Coronilla emerus ssp. *emeroides*	sl	.	.	.	.	+	.	.	.	.	.	1
	Scutellaria columnae	hl	.	.	.	.	+	.	.	.	.	.	1
	Campanula persicifolia	hl	.	.	.	.	+	.	.	.	.	.	1
	Luzula forsteri	hl	.	.	.	.	.	+	.	.	.	.	1
	Lathyrus niger	hl	.	.	.	.	.	+	.	.	.	.	1
	Carpinus orientalis	sl	.	.	.	.	.	.	.	+	.	.	1
	Ostrya carpinifolia	t2	.	.	.	.	.	.	.	.	.	+	1
QF	***Querco-Fagetea***												
	Cephalanthera rubra	hl	.	1	+	.	.	.	.	.	.	.	2
	Hedera helix	hl	.	1	.	.	.	.	.	.	.	.	1
	Cephalanthera longifolia	hl	.	.	.	.	+	.	.	.	.	.	1
	Mycelis muralis	hl	.	.	.	.	.	.	.	+	.	.	1
	Other species												
	Symphytum tuberosum ssp. *angustifolia*	hl	+	+	.	+	.	.	+	1	2	+	7
	Veronica chamaedrys	hl	+	.	+	.	+	+	+	.	.	+	6
	Dactylis glomerata	hl	.	.	+	.	.	+	.	+	1	.	4
	Fragaria vesca	hl	.	.	.	.	+	.	+	.	+	.	3
	Peucedanum austriacum	hl	.	.	+	.	+	.	.	.	.	.	2
	Fragaria moschata	hl	.	.	+	.	.	.	.	+	.	.	2
	Sorbus aucuparia	sl	.	.	+	.	.	.	.	.	.	+	2
	Polypodium vulgare	hl	.	.	.	+	.	.	.	.	.	+	2
	Juniperus communis	sl	.	.	.	.	.	.	+	+	.	.	2
	Clinopodium vulgare	hl	.	.	.	.	.	.	+	.	+	.	2
	Digitalis grandiflora	hl	.	.	.	.	.	.	.	.	+	+	2
	Vicia incana	hl	.	.	.	.	.	.	.	.	+	+	2

Other species with low frequency:

Geum urbanum [hl] 1: +; *Poa angustifolia* [hl] 3: +; *Taraxacum officinale* [hl] 4: +; *Eryngium palmatum* [hl] 4: +; *Dicranum scoparium* [ml] 6: 2; *Arabis alpina* [hl] 8: +; *Geranium robertianum* [hl] 8: +; *Iberis sempervirens* [hl] 8: +; *Sambucus ebulus* [hl] 9: +; *Asplenium ceterach* [hl] 9: +; *Alliaria petiolata* [hl] 9: +; *Chaerophyllum hirsutum* [hl] 9: +; *Silene vulgaris* [hl] 9: +; *Lamium maculatum* [hl] 9: +; *Prunus spinosa* [sl] 9: +, [hl] 9: +; *Brachypodium pinnatum* [hl] 9: +; *Asphodelus albus* [hl] 9: +; *Abies borisii-regis* [hl] 10: 1; *Dactylorhiza maculata* [hl] 10: +; *Cotoneaster marianae* [sl] 10: +; *Luzula sylvatica* [hl] 10: +; *Asplenium trichomanes* [hl] 10: +; *Rhamnus alpinus* ssp. *fallax* [sl] 10: +; *Thalictrum minus* [hl] 10: +; *Orthilia secunda*[hl] 10: +.

Localities and other characteristics are given in the Appendix.

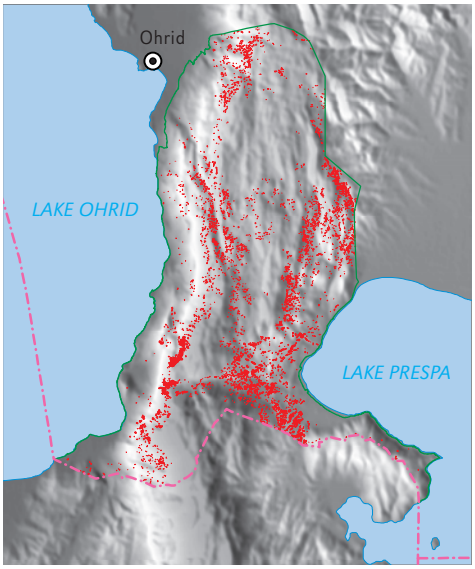


Figure 51. Distribution of the association *Aceri obtusati-Fagetum*.

Aceri obtusati-Fagetum Fabijanić, Fukarek et Sefanović ex Fukarek, Stefanović et Fabijanić 1967

This forest forms azonal vegetation that appears on steep southern slopes (Figure 52). It was described in Bosnia and was treated as a geovicariant association (southern, more continental) of *Seslerio autumnalis-Fagetum* M. Wraber ex Borhidi 1963 found in the submediterranean part of the western part of the Balkans. In the western Balkans, on sunny, steep slopes in the continental parts, we can find *Ostryo-Fagetum* M. Wraber ex Trinajstić 1972. The community under consideration is therefore a geovicariant to both communities (Rizovski & Džekov 1990). The community is found on steep slopes at altitudes between 1200 and 1500 m. The soil profile over the carbonate bedrock is shallow. In the stands we can find many thermophilous species that show the relation of these stands to the thermophilous deciduous forests of *Quercetalia pubescenti-petraeae*.

The communities under consideration resemble floristically, to a large extent, the communities described in Bosnia (Fabijanić et al. 1963, Fukarek et. al 1967); particularly those described on the Bistra mountain in Macedonia (Rizovski & Džekov 1990). The only important difference is that in the communities under consideration, unlike all other communities, there abundantly appears *Sesleria robusta* instead of *Sesleria autumnalis*. This ecological similarity with a different taxon as a dominant species in the layer is rather difficult to explain and needs special consideration in the future.

The syntaxonomical position of the association is not clear. Dzwonko et al. (1999) and Dzwonko & Loster (2000) propose the classification within the *Ostryo-Fagenion*, a thermophilous suballiance of *Aremonio-Fagion* thriving in the southern part of the Balkans. But if we accept the *Doronico-Fagion* as an alliance of beech forest of the central part of the southern Balkans, based on phytogeographically defined diagnostic species, such a classification remains rather uncertain. This question needs further consideration, but for the present, it was decided to classify it within the *Doronico columnae-Fagenion*.

Diagnostic species: *Arabis muralis*, *Campanula trachelium*, *Vicia incana*.
Constant species: *Fagus sylvatica*; *Sesleria robusta*.
Dominant species: ***Fagus sylvatica***; *Sesleria robusta*.

These forests can be found on steep slopes all over the Galičica (Figure 51).

Figure 52. The name-giving taxon of *Aceri obtusati-Fagetum Acer obtusatum* grows on carbonate bedrock in the submediterranean region in the Balkans.

Figure 53. *Daphne oleoides* is a species of limestone crevices. Within the forest of Galičica it can be found also in the association *Aceri obtusati-Fagetum*.

Table 6. *Aceri obtusati-Fagetum* Fabijanić et al. ex Fukarek et al. 1967

	Relevé number		1	2	3	4	5	
	Year		2009	2009	2010	2010	2010	
	Date (mmdd)		0621	0622	0616	0616	0616	
	Altitude (m)		1263	1471	1460	1410	1450	
	Aspect		NWW	NWW	W	W	NWW	
	Slope (°)		12	14	34	24	28	
	Cover upper tree layer (%)		80	80	80	70	70	
	Cover lower tree layer (%)		20	5	20	20	20	
	Cover shrub layer (%)		10	5	30	30	30	
	Cover herb layer (%)		70	0	40	40	30	
	Cover moss layer (%)	Layer	0	5	5	30	0	Presence
	Cover bare rock (%)		0	10	40	40	1	
	Diagnostic species of the association							
	Vicia incana	hl	.	+	+	.	+	3
	Arabis muralis	hl	+	+	.	.	.	2
	Campanula trachelium	hl	+	+	.	.	.	2
DF	***Doronico orientalis-Fagion***							
	Aremonia agrimonoides	hl	.	.	+	+	+	3
	Lonicera alpigena ssp. *formanekiana*	sl	.	.	1	.	.	1
	Lonicera alpigena ssp. *formanekiana*	hl	.	.	.	+	+	2
	Doronicum columnae	hl	1	.	+	.	.	2
	Knautia drymeia	hl	.	.	+	.	.	1
	Primula veris ssp. *columnae*	hl	.	.	.	.	+	1
F2	***Fagetalia sylvaticae***							
	Fagus sylvatica	t1	4	5	5	4	4	5
	Fagus sylvatica	t2	.	1	1	1	1	4
	Fagus sylvatica	sl	.	1	1	1	+	4
	Fagus sylvatica	hl	+	+	.	1	+	4
	Acer platanoides	t2	.	+	+	.	.	2
	Acer platanoides	sl	.	+	.	.	.	1
	Acer platanoides	hl	.	.	1	+	+	3
	Euphorbia amygdaloides	hl	.	+	+	.	+	3
	Rosa arvensis	sl	.	.	.	+	+	2
	Rosa arvensis	hl	.	.	+	.	+	2
	Mercurialis perennis	hl	+	+	.	.	.	2
	Lilium martagon	hl	+	.	+	.	.	2
	Cephalanthera damasonium	hl	.	.	.	+	+	2
	Euonymus latifolius	sl	.	.	.	.	+	1
	Euonymus latifolius	hl	.	.	+	.	.	1
	Lonicera xylosteum	hl	.	+	.	.	.	1
	Galium pseudaristatum	hl	.	.	1	.	.	1
	Neottia nidus-avis	hl	.	.	.	+	.	1

	Relevé number		1	2	3	4	5	
	Platanthera chlorantha	hl	.	.	.	+	.	1
	Acer pseudoplatanus	sl	.	.	.	.	+	1
	Hieracium murorum	hl	.	.	.	.	+	1
	Epipactis microphylla	hl	.	.	.	.	+	1
	Daphne laureola	hl	.	.	.	.	+	1
QP	***Quercetalia pubescenti-petraeae***							
	Sesleria robusta	hl	4	2	2	3	2	5
	Juniperus oxycedrus	sl	2	+	.	2	1	4
	Juniperus oxycedrus	hl	.	1	.	.	+	2
	Carex hallerana	hl	+	+	.	.	+	3
	Acer obtusatum	t1	.	.	+	.	+	2
	Acer obtusatum	t2	1	.	.	.	.	1
	Acer obtusatum	sl	1	.	.	.	1	2
	Acer obtusatum	hl	+	.	.	.	1	2
	Euonymus verrucosus	hl	+	+	.	.	.	2
	Poa nemoralis	hl	.	1	+	.	.	2
	Festuca heterophylla	hl	.	+	+	.	.	2
	Helleborus odorus	hl	.	.	+	+	.	2
	Quercus pubescens	t1	1	.	.	.	.	1
	Quercus pubescens	t2	+	.	.	.	.	1
	Fraxinus ornus	t1	+	.	.	.	.	1
	Fraxinus ornus	sl	+	.	.	.	.	1
	Sorbus aria	sl	.	.	+	.	.	1
	Sorbus aria	hl	+	.	.	.	.	1
	Coronilla emerus ssp. *emeroides*	sl	1	.	.	.	.	1
	Physospermum cornubiense	hl	1	.	.	.	.	1
	Convallaria majalis	hl	+	.	.	.	.	1
	Cornus mas	sl	+	.	.	.	.	1
	Asyneuma limonifolium	hl	+	.	.	.	.	1
	Sorbus torminalis	sl	+	.	.	.	.	1
	Lathyrus laxiflorus var. *laxiflorus*	hl	.	+	.	.	.	1
	Potentilla micrantha	hl	.	+	.	.	.	1
	Ostrya carpinifolia	t2	.	.	1	.	.	1
	Mercurialis ovata	hl	.	.	1	.	.	1
	Lathyrus laxiflorus var. *glabratus*	hl	.	.	.	.	1	1
QF	***Querco-Fagetea***							
	Cephalanthera rubra	hl	+	+	.	.	.	2
	Trifolium patulum	hl	.	.	+	.	.	1
	Mycelis muralis	hl	.	.	+	.	.	1
FB	***Festuco-Brometea***							
	Thymus longicaulis var. *longicaulis*	hl	+	.	.	+	.	2
	Arabis sagittata	hl	.	.	+	.	.	1
	Trifolium campestre	hl	.	.	.	+	.	1

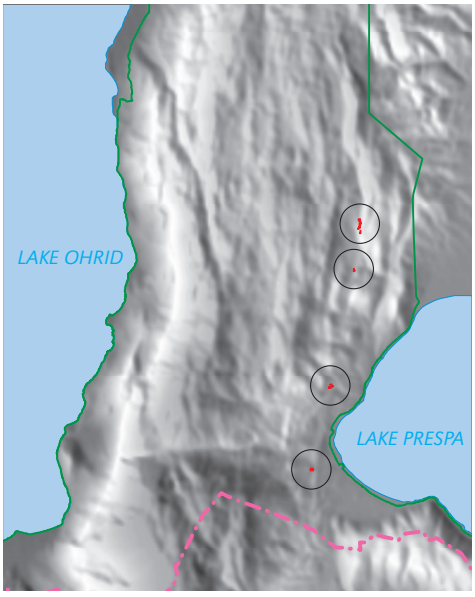
Relevé number		1	2	3	4	5	
Festuca galicicae	hl	.	.	.	+	.	1
Medicago lupulina	hl	.	.	.	+	.	1
Hieracium bauhinii	hl	.	.	.	+	.	1
Dorycnium herbaceum var. *macedonicum*	hl	.	.	.	+	.	1
Other species							
Galium rigidifolium	hl	+	+	.	+	.	3
Veronica chamaedrys	hl	.	+	+	+	.	3
Peucedanum austriacum	hl	.	+	1	.	.	2
Pimpinella tragium ssp. *lithophila*	hl	.	+	.	+	.	2
Daphne oleoides	hl	.	.	.	+	+	2

Other species with low frequency:

Achillea grandifolia [hl] 1: 1; *Hieracium bifidum* [hl] 1: 1; *Scorzonera hispanica* [hl] 1: +; *Carlina corymbosa* [hl] 1: +; *Arrhenatherum elatius* [hl] 1: +; *Rhamnus alpinus* ssp. *fallax* [hl] 1: +; *Leontodon crispus* ssp. *crispus* [hl] 1: +; *Clinopodium vulgare* [hl] 1: +; *Teucrium chamaedrys* [hl] 1: +; *Aethionema saxatile* [hl] 1: +; *Sedum cepaea* [hl] 2: +; *Silene vulgaris* [hl] 3: +; *Ctenidium molluscum* [ml] 3: +; *Thalictrum minus* [hl] 3: +; *Taraxacum officinale* [hl] 4: +; *Cotoneaster nebrodensis* [hl] 4: +; *Prunus spinosa* [hl] 4: +; *Crataegus heldreichii* [hl] 4: +; *Trifolium physodes* [hl] 4: +; *Juniperus communis* [hl] 4: +; *Orthilia secunda* [hl] 5: 1; *Nigella damascena* [hl] 5: +; *Geranium sanguineum* [hl] 4: +.

Localities and other characteristics are given in the Appendix.

Erythronio-Carpinion betuli Marinček in Wallnöfer et al. 1993



Corylo colurnae-Carpinetum betuli Matevski et al. ass. nova

Carpinus betulus dominated forests (Figure 55) can be found throughout the Republic of Macedonia, from the lowland (200 m) till higher altitudes (1500 m). *Carpinus betulus* can be found in the mesophilous subassociation of *Fraxino orni-Quercetum petraeae*, in the zone of beech forests, in ravine forests, in *Castanea sativa* forests in successional stages etc., but rarely builds *Carpinus betulus* monodominated forests (Em 1968).

Figure 54. Distribution of the association *Corylo colurnae-Carpinetum betuli.*

Figure 55. View of hornbeam forests (*Corylo colurnae-Carpinetum betuli*) that appear on small surfaces mostly in valleys.

The association under consideration is classified within the alliance *Erythronio-Carpinion* that forms the climazonal vegetation belt in the western part of the Balkans. In the eastern part of the Balkans, the global climate is too continental (dry and hot) for this type of vegetation; so we can find some communities dominated by *Carpinus betulus* only in valleys where the global climate is mitigated (Tomašević 1959). Due to the position of plant communities at the bottom of valleys, the soil horizon is deep and the site is fresh. This vegetation can be treated as extrazonal and appears in special ecological conditions in the zone of oak forests (*Quercus cerris* and *Quercus petraea*).

Nomenclatural remark

Holotypus: Table 7/5 – *holotypus hoc loco*

Ecological circumstances: Deep soil and humid site in valleys at the altitude of 900/1200 m in the southern part of the Republic of Macedonia.

Diagnostic species: *Tilia cordata*; *Carex depauperata*, ***Geranium reflexum***, *Lathyrus venetus*, ***Moehringia trinervia***, *Sedum cepaea*, *Stellaria media*, *Viola reichenbachiana*.

Constant species: *Carpinus betulus*, *Rosa arvensis*; *Aremonia agrimonoides*, *Cardamine bulbifera*, *Poa nemoralis*, *Symphytum tuberosum* ssp. *angustifolia*.

Dominant species: ***Carpinus betulus***, *Cornus mas*, *Corylus colurna*, *Hedera helix*.

Figure 56. Species *Epipactis helleborine* can be found in *Corylo colurnae-Carpinetum betuli.*

These forests are only fragmentarily developed in Galičica. They appear below Prečno brdo and Vison above the village of Leskoec as well under the hills Smolojca and Ceremušana (Figure 54).

Table 7. *Corylo colurnae-Carpinetum betuli* Matevski et al. ass. nova hoc loco

	Relevé number		1	2	3	4	5	
	Year		2009	2009	2010	2010	2010	
	Date (mmdd)		0616	0621	0615	0616	0616	
	Altitude (m)		1210	932	940	1233	1200	
	Aspect		NNE	NW	NNW	S	S	
	Slope (°)		5	4	35	3	3	
	Cover upper tree layer (%)		30	90	90	80	80	
	Cover lower tree layer (%)		85	0	20	70	60	
	Cover shrub layer (%)		30	30	5	60	40	
	Cover herb layer (%)		40	50	15	40	50	
	Cover moss layer (%)	Layer	0	0	0	0	0	Presence
	Cover bare rock (%)		0	0	0	0	0	
	Diagnostic species of the association							
	Lathyrus venetus	hl	+	+	.	1	+	4
	Geranium reflexum	hl	+	.	.	2	1	3
	Moehringia trinervia	hl	.	+	.	+	+	3
	Viola reichenbachiana	hl	.	+	.	+	+	3
	Tilia cordata	t1	.	.	.	+	.	1
	Tilia cordata	sl	.	.	.	+	1	2
	Tilia cordata	hl	.	.	.	.	+	1
	Sedum cepaea	hl	.	.	+	+	.	2
	Stellaria media	hl	.	.	1	.	+	2
	Carex depauperata	hl	.	.	.	+	+	2
EC	***Erythronio-Carpinion***							
	Carpinus betulus	t1	.	5	5	3	4	4
	Carpinus betulus	t2	4	.	1	3	3	4
	Carpinus betulus	sl	1	2	+	2	+	5
	Carpinus betulus	hl	.	+	+	.	.	2
	Fallopia convolvulus	hl	.	.	1	.	+	2
F2	***Fagetalia sylvaticae***							
	Cardamine bulbifera	hl	1	1	+	1	1	5
	Aremonia agrimonoides	hl	+	+	+	+	+	5
	Rosa arvensis	sl	.	1	.	+	+	3
	Rosa arvensis	hl	+	+	+	+	.	4
	Primula vulgaris	hl	.	1	+	2	1	4
	Corylus colurna	t1	.	.	.	3	2	2
	Corylus colurna	t2	1	.	.	2	2	3
	Corylus colurna	sl	.	+	.	.	.	1
	Corylus colurna	hl	.	+	.	.	.	1

	Relevé number		1	2	3	4	5	
	Cephalanthera damasonium	hl	+	.	.	+	+	3
	Euphorbia amygdaloides	hl	.	+	+	.	+	3
	Doronicum columnae	hl	+	.	1	.	.	2
	Brachypodium sylvaticum	hl	.	.	+	+	.	2
	Asperula taurina	hl	.	.	.	2	1	2
	Cystopteris fragilis	hl	.	.	.	1	+	2
	Saxifraga rotundifolia	hl	.	.	.	1	+	2
	Galium pseudaristatum	hl	.	.	.	+	+	2
	Acer pseudoplatanus	t2	+	.	.	.	.	1
	Acer pseudoplatanus	sl	+	.	.	.	.	1
	Acer pseudoplatanus	hl	+	.	.	.	.	1
	Polygonatum multiflorum	hl	1	.	.	.	.	1
	Primula veris ssp. *columnae*	hl	+	.	.	.	.	1
	Fagus sylvatica	sl	.	+	.	.	.	1
	Milium effusum	hl	.	+	.	.	.	1
	Arum maculatum	hl	.	.	+	.	.	1
	Neottia nidus-avis	hl	.	.	.	+	.	1
	Thalictrum aquilegiifolium	hl	.	.	.	+	.	1
	Lilium martagon	hl	.	.	.	.	1	1
	Epipactis helleborine	hl	.	.	.	.	+	1
	Prunus avium	sl	.	.	.	.	+	1
	Adoxa moschatellina	hl	.	.	.	.	+	1
	Ulmus glabra	sl	.	.	.	.	+	1
QP	***Quercetalia pubescenti-petraeae***							
	Poa nemoralis	hl	+	1	+	2	2	5
	Helleborus odorus	hl	+	+	.	+	+	4
	Melica uniflora	hl	1	+	.	.	+	3
	Cornus mas	sl	1	.	.	3	2	3
	Viola alba ssp. *denhardtii*	hl	.	.	+	+	+	3
	Fraxinus ornus	t1	.	.	+	+	.	2
	Fraxinus ornus	t2	.	.	.	+	+	2
	Fraxinus ornus	sl	.	.	+	+	+	3
	Fraxinus ornus	hl	.	.	.	+	+	2
	Acer obtusatum	t1	.	.	+	.	.	1
	Acer obtusatum	t2	.	.	.	1	.	1
	Acer obtusatum	sl	.	.	.	+	1	2
	Acer obtusatum	hl	.	.	+	.	+	2
	Euonymus verrucosus	sl	.	.	.	1	1	2
	Euonymus verrucosus	hl	.	.	.	+	.	1
	Lathyrus laxiflorus var. *laxiflorus*	hl	1	+	.	.	.	2
	Viola alba ssp. *thessala*	hl	+	+	.	.	.	2
	Physospermum cornubiense	hl	.	1	.	.	+	2
	Scutellaria columnae	hl	.	.	.	+	+	2
	Quercus cerris	t1	1	.	.	.	.	1
	Quercus cerris	sl	.	1	.	.	.	1
	Quercus cerris	hl	.	.	.	.	+	1

	Relevé number		1	2	3	4	5	
	Quercus frainetto	t1	.	.	+	.	.	1
	Quercus frainetto	sl	.	.	+	.	.	1
	Quercus frainetto	hl	.	.	+	.	.	1
	Convallaria majalis	hl	1	.	.	.	.	1
	Sorbus torminalis	sl	+	.	.	.	.	1
	Potentilla micrantha	hl	+	.	.	.	.	1
	Melittis melissophyllum	hl	+	.	.	.	.	1
	Luzula forsteri	hl	.	+	.	.	.	1
	Juglans regia	t1	.	.	+	.	.	1
	Lathyrus laxiflorus var. *glabratus*	hl	.	.	.	+	.	1
	Festuca heterophylla	hl	.	.	.	.	+	1
QF	***Querco-Fagetea***							
	Mycelis muralis	hl	.	+	+	.	1	3
	Acer campestre	hl	+	+	.	.	.	2
	Hedera helix	t2	.	.	.	+	+	2
	Hedera helix	hl	.	.	.	1	3	2
	Cephalanthera longifolia	hl	.	+	.	.	.	1
	Lapsana communis	hl	.	.	.	.	+	1
	Anemone nemorosa	hl	.	.	.	.	+	1
GU	***Galio-Urticetea***							
	Chaerophyllum temulum	hl	+	+	+	1	.	4
	Geum urbanum	hl	+	+	.	.	+	3
	Galium aparine	hl	.	+	+	.	+	3
	Geranium purpureum	hl	.	.	+	.	.	1
	Chelidonium majus	hl	.	.	+	.	.	1
	Chaerophyllum hirsutum	hl	.	.	.	.	1	1
	Other species							
	Symphytum tuberosum ssp. *angustifolia*	hl	1	+	+	1	1	5
	Veronica chamaedrys	hl	.	+	+	+	+	4
	Dactylis glomerata	hl	+	+	.	.	.	2
	Prunella vulgaris	hl	.	.	.	+	+	2
	Lamium maculatum	hl	.	.	.	+	+	2

Other species with low frequency:

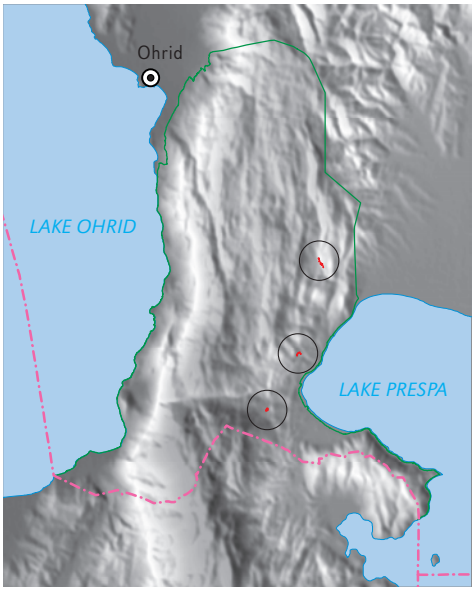
Rumex obtusifolius [hl] 1: +; *Euonymus europaeus* [sl] 1: +; *Lamium garganicum* [hl] 1: +; *Galium tricornutum* [hl] 1: +; *Fragaria moschata* [hl] 2: 1; *Arum italicum* [hl] 2: +; *Pteridium aquilinum* [hl] 2: +; *Dactylorhiza fuchsii* [hl] 2: +; *Poa trivialis* ssp. *sylvicola* [hl] 2: +; *Galium rigidifolium* [hl] 2: +; *Clinopodium vulgare* [hl] 2: +; *Lamium garganicum* ssp. *laevigatum* [hl] 3: 1; *Vicia barbazitae* [hl] 3: +; *Fragaria vesca* [hl] 4: 1; *Ficaria verna* [hl] 4: +; *Asplenium ceterach* [hl] 4: +; *Origanum vulgare* [hl] 4: +; *Trifolium medium* ssp. *balcanicum* [hl] 4: +; *Silene italica* [hl] 4: +; *Sonchus oleraceus* [hl] 5: +; *Rumex alpestris* [hl] 5: +; *Sedum maximum* [hl] 5: +; *Geranium bulbosum* [hl] 5: +; *Prunus cerasifera* [sl] 5: +.

Localities and other characteristics are given in the Appendix.

Tilio-Acerion Klika 1955 (*Ostryo-Tilienion* P. Košir et al. 2008)

Ravine forests grow on spatially restricted sites with specific soil conditions. They occur on slopes, at the foot of slopes, in sinkholes, gorges and hollows with colluvial, skeletal, and primarily unstable soil, which allow the broad-leaved trees *Acer platanoides*, *A. pseudoplatanus*, *Fraxinus excelsior*, *Tilia cordata*, *T. platyphyllos*, and *Ulmus glabra* to replace otherwise competitively stronger tree species. The suballiance *Ostryo-Tilienion* P. Košir et al. 2008 includes xerothermophilous forests from a great part of the Apennine-Balkan province, especially from the regions with a sub-mediterranean climate. They are defined by a diagnostic species combination which is partly shared with the alliance *Carpinion orientalis*. In south Europe the communities are classified within the suballiance *Ostryo-Tilienion*.

Corylo colurnae-Aceretum obtusati Matevski et al. ass. nova



This is typical ravine forest that appears on steep slopes (Figure 58). Here the bedrock is not stable and favorises species, such as *Acer obtusatum* (Figure 52) and *Corylus colurna* (Figure 59), that can thrive in such conditions. On these sites the zonal vegetation, in our case *Quercus cerris* and *Quercus petraea* dominated forests, cannot thrive. The soil in the ravines is more humid and there exist more nutrients, so we can find also some species that are more or less nitrophilous, such as *Alliaria petiolata*, *Lamium maculatum*, and some others. On these sites we can find a combination of thermophilous and nitrophilous plants characteristic for the suballiance *Ostryo-Tilienion*.

Figure 57. Distribution of the association *Corylo colurnae-Aceretum obtusati*.

Nomenclatural remark

Holotypus: Table 8/4 – *holotypus hoc loco*

Ecological circumstances: Ravine forests on carbonate bedrock in the zone of *Quercus cerris* and *Quercus petraea* dominated forests in the southern part of the Republic of Macedonia.

Diagnostic species: ***Acer campestre***; ***Arum maculatum***, *Asperula taurina*, ***Lamium maculatum***, *Scutellaria columnae*.

Constant species: *Acer obtusatum*, *Corylus colurna*.

Dominant species: *Acer obtusatum*, *Corylus colurna*, *Hedera helix*; *Convallaria majalis*.

Figure 58. Ravine forest *Corylo colurnae-Aceretum obtusati* develops on unstable soils.

This forest can be found on steep slopes below the hills Osoj, Vison, and Ceremušana in the eastern part of Galičica (Figure 57).

Figure 59. Frut of *Corylus colurna*. This species is native to southeast Europe and northeast Asia; on the Galičica Mountain range it is a codominant species of *Corylo colurnae-Aceretum obtusati*.

Table 8. *Corylo colurnae-Aceretum obtusati* Matevski et al. ass. nova hoc loco

Relevé number		1	2	3	4	
Year		2010	2010	2010	2010	
Date (mmdd)		0615	0617	0620	0620	
Altitude (m)		940	1240	1150	1170	
Aspect		NNW	W	E	NEE	
Slope (°)		33	35	30	29	
Cover upper tree layer (%)		90	80	70	90	
Cover lower tree layer (%)		30	40	30	30	
Cover shrub layer (%)		20	5	20	40	
Cover herb layer (%)		20	80	40	60	
Cover moss layer (%)	Layer	0	0	20	0	Presence
Cover bare rock (%)		0	5	30	0	
Diagnostic species of the association						
Acer campestre	t2	.	.	+	.	1
Acer campestre	sl	+	.	+	+	3
Acer campestre	hl	.	.	.	+	1
Arum maculatum	hl	+	.	+	+	3
Lamium maculatum	hl	+	.	1	1	3

	Relevé number		1	2	3	4	
	Scutellaria columnae	hl	.	2	1	+	3
	Asperula taurina	hl	.	+	.	+	2
TA	***Tilio-Acerion***						
	Corylus colurna	t1	.	3	2	3	3
	Corylus colurna	t2	+	2	+	1	4
	Corylus colurna	sl	2	+	+	1	4
	Corylus colurna	hl	.	.	.	+	1
	Euonymus latifolius	t2	.	+	.	.	1
	Euonymus latifolius	sl	.	+	.	.	1
	Euonymus latifolius	hl	.	.	.	+	1
	Lunaria rediviva	hl	.	r	.	.	1
F2	***Fagetalia sylvaticae***						
	Cardamine bulbifera	hl	2	+	.	+	3
	Aremonia agrimonoides	hl	.	+	+	+	3
	Carpinus betulus	t1	+	.	.	.	1
	Carpinus betulus	t2	1	.	.	+	2
	Carpinus betulus	sl	+	.	.	1	2
	Carpinus betulus	hl	+	.	.	+	2
	Rosa arvensis	sl	.	.	+	.	1
	Rosa arvensis	hl	.	.	+	+	2
	Acer pseudoplatanus	t1	.	.	.	+	1
	Acer pseudoplatanus	t2	.	.	.	r	1
	Doronicum columnae	hl	+	.	.	.	1
	Mercurialis perennis	hl	.	1	.	.	1
	Campanula trachelium	hl	.	+	.	.	1
	Epipactis helleborine	hl	.	+	.	.	1
	Lilium martagon	hl	.	+	.	.	1
	Lonicera etrusca	hl	.	+	.	.	1
	Thalictrum aquilegiifolium	hl	.	+	.	.	1
	Clematis vitalba	sl	.	+	.	.	1
	Brachypodium sylvaticum	hl	.	.	1	.	1
	Cephalanthera damasonium	hl	.	.	+	.	1
	Elymus caninus	hl	.	.	+	.	1
	Cystopteris fragilis	hl	.	.	+	.	1
	Primula vulgaris	hl	.	.	.	1	1
	Acer platanoides	sl	.	.	.	+	1
QP	***Quercetalia pubescenti-petraeae***						
	Acer obtusatum	t1	5	2	+	2	4
	Acer obtusatum	t2	1	+	.	+	3
	Acer obtusatum	sl	.	+	+	1	3
	Acer obtusatum	hl	1	.	.	+	2
	Quercus cerris	t1	.	.	2	+	2
	Quercus cerris	t2	.	.	+	.	1
	Quercus cerris	sl	.	.	+	+	2
	Quercus cerris	hl	+	.	+	+	3

	Relevé number		1	2	3	4	
	Poa nemoralis	hl	.	1	2	+	3
	Melica uniflora	hl	.	+	2	+	3
	Viola alba ssp. *denhardtii*	hl	.	+	+	+	3
	Fraxinus ornus	t1	.	+	+	.	2
	Fraxinus ornus	t2	.	+	1	.	2
	Fraxinus ornus	sl	.	+	.	+	2
	Fraxinus ornus	hl	.	+	+	+	3
	Lathyrus laxiflorus var. *laxiflorus*	hl	+	.	+	.	2
	Helleborus odorus	hl	+	.	.	+	2
	Ostrya carpinifolia	t1	.	.	2	.	1
	Ostrya carpinifolia	t2	.	+	1	.	2
	Ostrya carpinifolia	sl	.	.	.	+	1
	Ostrya carpinifolia	hl	.	.	+	.	1
	Convallaria majalis	hl	.	4	.	+	2
	Cornus mas	sl	.	.	1	+	2
	Euonymus verrucosus	sl	.	.	+	1	2
	Euonymus verrucosus	hl	.	.	+	.	1
	Melittis melissophyllum	hl	.	.	+	+	2
	Juglans regia	t1	+	.	.	.	1
	Juglans regia	sl	+	.	.	.	1
	Buglossoides purpurocaerulea	hl	.	+	.	.	1
	Juniperus oxycedrus	hl	.	.	+	.	1
	Arabis turrita	hl	.	.	+	.	1
	Carex depauperata	hl	.	.	+	.	1
	Sorbus torminalis	sl	.	.	.	+	1
	Sorbus torminalis	hl	.	.	.	+	1
	Lathyrus venetus	hl	.	.	.	+	1
QF	***Querco-Fagetea***						
	Mycelis muralis	hl	+	+	.	.	2
	Hedera helix	t2	.	.	.	1	1
	Hedera helix	sl	.	.	.	+	1
	Hedera helix	hl	.	+	.	3	2
	Lapsana communis	hl	.	.	.	+	1
GU	***Galio-Urticetea***						
	Alliaria petiolata	hl	1	+	.	.	2
	Galium aparine	hl	+	.	.	+	2
	Chaerophyllum temulum	hl	.	+	.	+	2
	Geranium robertianum	hl	.	r	.	.	1
	Cruciata laevipes	hl	.	.	+	.	1
	Geum urbanum	hl	.	.	.	+	1
TG	***Trifolio-Geranietea sanguinei***						
	Clinopodium vulgare	hl	.	.	1	1	2
	Polygonatum odoratum	hl	.	2	.	.	1
	Silene italica	hl	.	.	+	.	1
	Teucrium chamaedrys	hl	.	.	+	.	1

Relevé number		1	2	3	4	
Other species						
Symphytum tuberosum ssp. *angustifolia*	hl	+	.	1	+	3
Arabis sagittata	hl	.	+	+	.	2
Fragaria vesca	hl	.	.	1	+	2
Veronica chamaedrys	hl	.	.	+	+	2

Other species with low frequency:

Vicia incana [hl] 1: +; *Achillea grandifolia* [hl] 2: +; *Silene dioica* [hl] 2: +; *Dactylis glomerata* [hl] 2: +; *Fallopia dumetorum* [hl] 3: +; *Alyssum saxatile* ssp. *orientale* [hl] 3: +; *Vicia barbazitae* [hl] 3: +; *Asplenium ceterach* [hl] 3: +; *Thymus longicaulis* var. *longicaulis* [hl] 3: +; *Eryngium palmatum* [hl] 3: +; *Sedum cepaea* [hl] 3: +; *Hypnum cupressiforme* [ml] 3: +; *Geranium sanguineum* [hl] 3: +; *Geranium asphodeloides* ssp. *nemorosus* [hl] 4: +.

Localities and other characteristics are given in the Appendix.

Corylo colurnae-Ostryetum **Blečić 1958**

These ravine forests (Figure 61) can be found in the transitional zone between oak and beech. They grow on shady sites and stony soils at the base of rock blocks. Here the conditions are humid and the soil is stony but rich in humus that gives the adequate site condition for prosperity of *Corylus colurna*. The dominant tree species is *Ostrya carpinifolia*, accompanied by *Corylus colurna*. These forests are found at altitudes from 1000 to 1500 m (Rizovski & Džekov 1990).

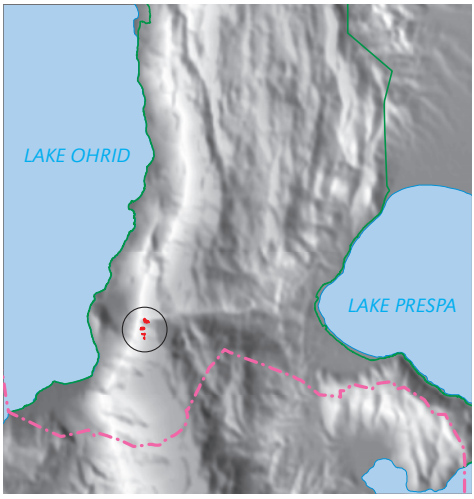


Figure 60. Distribution of the association *Corylo colurnae-Ostryetum*.

Diagnostic species: *Cephalanthera damasonium*, ***Convallaria majalis*** (Figure 62), ***Cystopteris fragilis***, ***Festuca drymeia***, ***Galium pseudaristatum***, ***Lunaria rediviva***, ***Mercurialis ovata***, ***Mycelis muralis***.

Constant species: *Abies borisii-regis*, *Acer obtusatum*, *Acer platanoides*, *Corylus colurna*, *Fraxinus ornus*, *Ostrya carpinifolia*; *Calamintha grandiflora*, *Cardamine bulbifera*, *Cephalanthera damasonium*, *Clematis vitalba*, *Convallaria majalis*, *Cystopteris fragilis*, *Doronicum columnae*, *Festuca drymeia*, *Galium pseudaristatum*, *Helleborus odorus*, *Lunaria rediviva*, *Melica uniflora*, *Mercurialis ovata*, *Mycelis muralis*, *Poa nemoralis*, *Polygonatum multiflorum*, *Primula vulgaris*, *Saxifraga rotundifolia*.

Dominant species: *Acer pseudoplatanus*; *Convallaria majalis*.

Figure 61. Ravine forest *Corylo colurnae-Ostryetum*. Special ecological conditions enable many endemic species to survive in these habitats.

Figure 62. *Convallaria majalis* is a diagnostic species of *Corylo colurnae-Ostryetum*.

In the area these forests are rare. They appear on Krvov kamen below Dava Livada and above the village of Trpejca in the western part of Galičica (Figure 60).

Table 9. *Corylo colurnae-Ostryetum* Blečić 1958

	Relevé number		1	2	
	Year		2010	2010	
	Date (mmdd)		0617	0617	
	Altitude (m)		1315	1325	
	Aspect		WWN	NNW	
	Slope (°)		43	30	
	Cover upper tree layer (%)		95	95	
	Cover lower tree layer (%)		10	20	
	Cover shrub layer (%)		10	10	
	Cover herb layer (%)		75	80	
	Cover moss layer (%)	Layer	0	5	Presence
	Cover bare rock (%)		0	20	
	Diagnostic species of the association				
	Convallaria majalis	hl	3	2	2
	Festuca drymeia	hl	2	2	2
	Cystopteris fragilis	hl	1	+	2
	Galium pseudaristatum	hl	+	+	2
	Lunaria rediviva	hl	+	+	2
	Mercurialis ovata	hl	+	+	2
	Mycelis muralis	hl	+	+	2
	Cephalanthera damasonium	hl	+	+	2
F2	***Tilio-Acerion*, *Fagetalia sylvaticae*, *Querco-Fagetea***				
	Acer platanoides	t1	2	+	2
	Acer platanoides	t2	+	.	1
	Acer platanoides	sl	+	.	1
	Acer platanoides	hl	1	+	2
	Corylus colurna	t1	1	.	1
	Corylus colurna	t2	.	1	1
	Corylus colurna	hl	+	+	2
	Polygonatum multiflorum	hl	2	2	2
	Primula vulgaris	hl	2	+	2
	Saxifraga rotundifolia	hl	1	+	2
	Doronicum columnae	hl	+	1	2
	Clematis vitalba	hl	+	+	2
	Cardamine bulbifera	hl	+	+	2
	Acer pseudoplatanus	t1	.	5	1
	Acer pseudoplatanus	t2	.	+	1
	Ostrya carpinifolia	t1	2	+	2
	Ostrya carpinifolia	t2	+	.	1
	Fraxinus ornus	t2	+	.	1
	Fraxinus ornus	sl	+	+	2
	Helleborus odorus	hl	+	+	2
	Poa nemoralis	hl	+	+	2
	Melica uniflora	hl	+	+	2
	Acer obtusatum	t1	+	.	1
	Acer obtusatum	sl	.	+	1
	Arabis turrita	hl	1	.	1
	Melittis melissophyllum	hl	+	.	1
	Scutellaria columnae	hl	.	1	1
	Viola alba ssp. *denhardtii*	hl	.	+	1
	Dryopteris pallida	hl	.	+	1
DF	***Doronico orientalis-Fagion***				
	Abies borisii-regis	t2	+	.	1
	Abies borisii-regis	sl	+	+	2
	Abies borisii-regis	hl	.	+	1
	Calamintha grandiflora	hl	2	2	2
	Other species				
	Peucedanum austriacum	hl	+	.	1
	Melampyrum heracleoticum	hl	+	.	1
	Chaerophyllum temulum	hl	.	1	1
	Rhamnus alpinus ssp. *fallax*	sl	.	1	1
	Arabis sagittata	hl	.	+	1
	Polypodium vulgare	hl	.	+	1
	Cyclamen hederifolium	hl	.	+	1

Localities and other characteristics are given in the Appendix.

Thermophilous deciduous forests

Among forests in the submontane and even montane vegetation belt in the southern part of the Balkan Peninsula, the dominant role is played by thermophilous deciduous forests of *Quercetalia pubescenti-petraeae*. These forests used to cover large surfaces in the past, but for a long time there has been a heavy human impact; so these forests have been largely cut out and the remaining stands have been severely changed by cutting, litter collection, forest pasture, and similar. Today we can find well preserved forest in non accessible sites that are far from transportation routes.

Various oak species are dominant in the forests of the Galičica mountain range: *Quercus cerris*, *Q. frainetto*, *Q. petraea*, *Q. pubescens*, *Q. trojana*. Within the frame of this group of forests (order *Quercetalia pubescenti-petraeae*) we can include also *Ostrya carpinifolia*, *Carpinus orientalis* dominated forests, as well as *Juniperus excelsae* dominated forests that grow on extreme habitats over shallow soil horizons in the extreme southern aspect, or in our case, on the island of Golem Grad where the local climate is mitigated by Lake Prespa. *Juniperus excelsa* is a tertiary endemic species that has remained here in the most thermic forest stands (Em et al. 1985). It shows a certain affiliation to the mediterranean class of oromediterranean and supramediterranean juniper-pine wood and scrubs of *Pino-Juniperetea* Rivas-Martínez 1964, but the species composition of these stands strongly supports the classification within *Quercetalia pubescenti-petraeae*.

We have to take into consideration that southern Europe is a cradle of thermophilous forests that here form the zonal vegetation; the alliances *Quercion frainetto*, *Quercion petraeae-cerris*, and *Carpinion orientalis* contain some zonal associations. In these (zonal) forests we can find widely spread species with more or less thermophilous character that can be found in the central and northern parts of Europe only as extrazonal vegetation thriving mainly on a southern aspect and carbonated bedrock. The southern aspect and carbonate bedrock offer the ecological circumstances similar to those in the area of origin where this vegetation is zonal i.e., drought and warmth.

We have to mention here the opinion of Oberdorfer (1948), who linked *Quercetalia pubescenti-petraeae* to the Mediterreanean region and gave the argumentation that *Quercetalia pubescenti-petraeae* should be treated as an independent class. The reason for joining the two orders *Fagetalia* and *Quercetalia pubescenti-petraeae* into one class of *Querco-Fagetea* was that the thermophilous deciduous vegetation was first elaborated on its islands in central Europe, where a certain similarity of both orders can be seen. But if we compare the thermophilous deciduous forests from the southern border of its distribution (e.g. *Phillyreo-Carpinetum orientalis*) we can hardly find any similarity. The opinion of Oberdorfer (1948) has been becoming widely accepted in recent years (Rodwell et al. 2002).

In the area of distribution of thermophilous deciduous forests, there appear also certain degradation stages; among them we should mention šibljak vegetation that

is closely attached to the *Quercetalia pubescenti-petraeae*. The šibljak vegetation is according to Adamović (1901, 1909) a vegetation that was partly primary vegetation of a canyon vegetation, but spread abundantly as a succession stage of *Quercetalia pubescenti-petraeae* forests. This kind of vegetation is classified within the alliances of *Pruno tenellae-Syringion* (B. Jovanović 1979) Čarni et al. 2009, and *Eryngio campestris-Paliurion* (Jovanović 1985) Matevski et al. 2008. Within the framework of a new conception of the class *Quercetalia pubescenti-petraeae*, this shrub vegetation is attached to the *Fraxino orni-Cotinetalia* Jakucs 1961 within the class *Quercetea pubescentis* (Matevski et al. 2008). A similar situation occurs within beech forests; we can find the order *Prunetalia spinosae*, a shrubby degradation of beech forests that could be floristically integrated within *Fagetalia sylvaticae*.

We can divide the thermophilous deciduous forest into two groups. The first group comprises forests dominated by oak species, such as *Quercus frainetto*, *Quercus cerris*, and *Quercus petraea*. These forests build the zonal communities, such as *Quercetum frainetto-cerris*, *Fraxino orni-Quercetum cerris*, *Ostryo carpinifoliae-Quercetum cerris*, and *Fraxino orni-Quercetum petraeae*. We can recognize two sub-units, i. e. alliances: one is alliance *Quercion frainetto* that appears at lower altitudes and comprises only *Quercetum frainetto-cerris*. The other alliance *Quercion petraeae-cerris* can be found at higher altitudes and comprises *Fraxino orni-Quercetum cerris*, *Ostryo-Quercetum cerris* and *Fraxino orni-Quercetum petraeae*.

The other groups consist of forests with non-zonal character, and this vegetation is composed of three major subgroups: there exists a group dominated by *Juniperus excelsa*, a relict terciar endemic species that can be found on extreme sites (belonging to *Juniperion excelsae-foetidissimae*), there is group of submediterranean vegetation, dominated by *Carpinus orientalis* and *Quercus trojana* (alliance *Carpinion orientalis*), and the last is the group dominated by *Ostrya carpinifolia* and *Quercus pubescens* that can be found on steep thermophilic sites, mediating between *Carpinion orientalis* and *Fraxino orni-Ostryion*.

Quercion petraeae-cerris (Jovanović et Lakušić 1980) Čarni et al. 2009

This alliance can be found at altitudes above the *Quercion frainetto* alliance. If we compare the floristic composition of both alliances, we can recognize that *Quercion frainetto* is much poorer in species and is characterised only by a few species that indicate deep and acidic soils, such as *Veronica officinalis*, *Prunella vulgaris*, and *Sorbus domestica*, whereas in the *Quercion petraeae-cerris* communities there are many diagnostic species that indicate deep soils (e.g. *Veronica chamaedrys*), thermophilous character (e.g. *Luzula foersteri*), regional character of flora (e.g. *Lychnis coronaria*) (Figure 63), and the submediterranen character of the site (e.g. *Scutellaria columnae*) (Čarni et al. 2009).

Figure 63. *Lychnis coronaria* can be found on dry grasslands and in scarce oak forests. It thrives in Southeastern Europe, Asia minor over the Caucasus till the Himalaya.

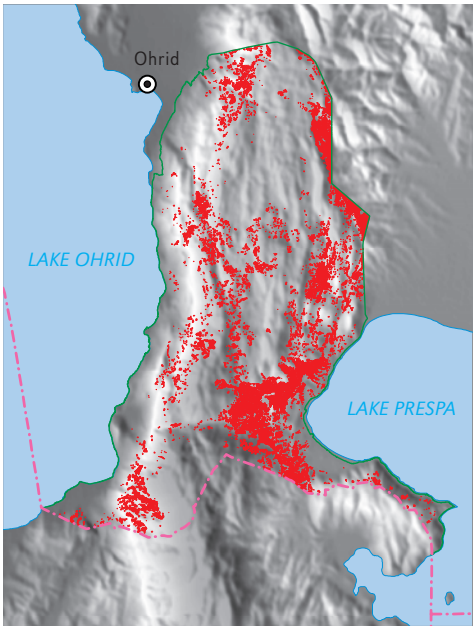


Figure 64. Distribution of the association *Fraxino orni-Quercetum petraeae.*

***Fraxino orni-Quercetum petraeae* Em 1968**

In the mountain zone of the Republic of Macedonia *Quercus petraea* dominated forests appear as a vegetation belt on the upper limit of the thermophilous deciduous forest of *Quercetalia pubescenti-petraeae*. It builds the vegetation belt at altitudes between 700 and 1500 m (Figure 65). These forests can be found all over the Republic of Macedonia and are rather well preserved, in comparison with *Quercus frainetto* and *Quercus cerris* dominated forests in the lowlands, or in comparison with *Quercus petraea* and *Carpinus betulus* forests in the western Balkans. The reason is that these forests do not appear in the lowlands, where the main human activities take place (Em 1968, Rizovski & Džekov 1990).

Figure 65. A view towards Lake Ohrid. On the slope we can see the sessile oak forest, on the Karstic plateau we can recognize beech forest.

Diagnostic species: ***Quercus petraea***; ***Chamaecytisus tommasinii***, *Festuca heterophylla*, *Orlaya daucoides*, *Trifolium patulum*.
Constant species: *Quercus petraea*; *Festuca heterophylla*, *Poa angustifolia*.
Dominant species: ***Quercus petraea***; *Festuca heterophylla*.

These forests appear sporadically at altitudes between 1200 and 1500 m on the eastern and western slopes all over Galičica (Figure 64).

Figure 66. *Helleborus odorus* is a species of thermophilous forests; in Galičica it can be found in *Fraxino orni-Quercetum petraeae*.

Table 10. *Fraxino orni-Quercetum petraeae* Em 1968

	Relevé number		1	2	3	4	
	Year		2009	2010	2010	2009	
	Date (mmdd)		0617	0620	0622	0621	
	Altitude (m)		1296	1270	1265	1467	
	Aspect		S	E	W	NW	
	Slope (°)		3	13	2	20	
	Cover upper tree layer (%)		90	50	30	80	
	Cover lower tree layer (%)		0	40	70	0	
	Cover shrub layer (%)		60	15	50	60	
	Cover herb layer (%)		70	60	40	70	
	Cover moss layer (%)	Layer	0	1	0	0	Presence
	Cover bare rock (%)		0	0	0	10	
	Diagnostic species of the association						
	Quercus petraea	t1	5	3	2	4	4
	Quercus petraea	t2	.	3	3	.	2
	Quercus petraea	sl	3	1	3	.	3
	Quercus petraea	hl	2	2	1	+	4
	Festuca heterophylla	hl	2	2	3	+	4
	Chamaecytisus tommasinii	hl	2	1	+	.	3
	Trifolium patulum	hl	.	2	1	.	2
	Orlaya daucoides	hl	.	.	+	+	2
QF	***Quercion petraeae-cerris*, *Quercetalia pubescentis*, *Querco-Fagetea***						
	Quercus cerris	t1	.	+	2	1	3
	Quercus cerris	t2	.	.	1	.	1
	Quercus cerris	sl	.	+	+	.	2
	Quercus cerris	hl	.	+	.	+	2
	Campanula spatulata ssp. *spruneriana*	hl	+	+	+	.	3
	Poa nemoralis	hl	1	.	+	+	3
	Acer monspessulanum	sl	.	.	.	1	1
	Acer monspessulanum	hl	.	.	+	+	2
	Lathyrus venetus	hl	2	+	.	.	2
	Luzula forsteri	hl	+	1	.	.	2
	Juniperus oxycedrus	sl	+	+	.	.	2
	Lathyrus laxiflorus var. *laxiflorus*	hl	1	.	.	.	1
	Potentilla micrantha	hl	+	.	.	.	1
	Melittis melissophyllum	hl	+	.	.	.	1
	Melica uniflora	hl	+	.	.	.	1
	Lathyrus niger	hl	+	.	.	.	1
	Lathyrus laxiflorus var. *glabratus*	hl	.	1	.	.	1
	Trifolium pignantii	hl	.	.	1	.	1
	Vicia grandiflora	hl	.	.	+	.	1
	Acer obtusatum	sl	.	.	.	2	1

	Relevé number		1	2	3	4	
	Helleborus odorus	hl	.	.	.	1	1
	Carex hallerana	hl	.	.	.	+	1
	Sesleria robusta	hl	.	.	.	+	1
	Fraxinus ornus	hl	.	.	.	+	1
F2	***Fagetalia sylvaticae***						
	Fagus sylvatica	sl	+	+	.	.	2
	Fagus sylvatica	hl	.	+	.	.	1
	Doronicum columnae	hl	+	.	+	.	2
	Carpinus betulus	sl	+	.	.	.	1
	Prunus avium	hl	.	+	.	.	1
	Galium pseudaristatum	hl	.	+	.	.	1
	Viola reichenbachiana	hl	.	.	.	+	1
FB	***Festuco-Brometea***						
	Thymus longicaulis var. *longicaulis*	hl	+	.	.	+	2
	Poa bulbosa	hl	.	+	.	+	2
	Koeleria splendens	hl	.	+	.	.	1
	Phleum phleoides	hl	.	+	.	.	1
	Hieracium bauhinii	hl	.	.	+	.	1
	Trifolium campestre	hl	.	.	+	.	1
	Valerianella turgida	hl	.	.	+	.	1
	Cerastium brachypetalum	hl	.	.	+	.	1
	Brachypodium pinnatum	hl	.	.	.	2	1
	Helianthemum nummularium	hl	.	.	.	+	1
	Medicago lupulina	hl	.	.	.	+	1
	Festuca valesiaca	hl	.	.	.	+	1
	Festuca galicicae	hl	.	.	.	+	1
	Dorycnium herbaceum var. *macedonicum*	hl	.	.	.	+	1
	Arabis sagittata	hl	.	.	.	+	1
TG	***Trifolio-Geranietea sanguinei***						
	Poa angustifolia	hl	+	+	1	1	4
	Silene italica	hl	+	.	+	+	3
	Trifolium alpestre	hl	1	.	.	1	2
	Trifolium medium ssp. *balcanicum*	hl	.	2	+	.	2
	Astragalus glycyphyllos	hl	.	+	.	.	1
	Hypericum perforatum	hl	.	.	+	.	1
	Coronilla varia	hl	.	.	.	+	1
	Other species						
	Dactylis glomerata	hl	+	+	.	1	3
	Veronica chamaedrys	hl	+	+	.	+	3
	Galium rigidifolium	hl	1	.	1	+	3
	Juniperus communis	sl	.	.	+	2	2

Other species with low frequency:

Fragaria vesca [hl] 1: 1; *Helichrysum plicatum* [hl] 1: +; *Carduus tmoleus* [hl] 1: +; *Linum austriacum* [hl] 1: +; *Viola hirta* [hl] 1: +; *Elymus repens* [hl] 1: +; *Cruciata laevipes* [hl] 1: +; *Vicia incana* [hl] 1: +; *Symphytum tuberosum* ssp. *angustifolia* [hl] 1: +; *Hieracium piloselloides* [hl] 2: 1; *Vicia lathyroides* [hl] 2: +; *Vicia tetrasperma* [hl] 2: +; *Veronica officinalis* [hl] 2: +; *Chamaecytisus heuffellii* [hl] 2: +; *Thymus longicaulis* var. *intermedia* [hl] 2: +; *Galium aparine* [hl] 3: 1; *Cardamine hirsuta* [hl] 3: +; *Trifolium physodes* [hl] 3: +; *Scabiosa fumarioides* [hl] 3: +; *Ranunculus psilostachys* [hl] 3: +; *Cynosurus echinatus* [hl] 3: +; *Rumex acetosella* [hl] 3: +; *Hieracium pilosella* [hl] 3: +; *Myosotis ramosissima* [hl] 3: +; *Leontodon cichoraceus* [hl] 3: +; *Dianthus viscidus* ssp. *viscidus* [hl] 3: +; *Erysimum cuspidatum* [hl] 4: +; *Arenaria leptoclados* [hl] 4: +; *Ajuga genevensis* [hl] 4: +; *Verbascum chrysanthum* [hl] 4: +; *Acinos alpinus* ssp. *meridionalis* [hl] 4: +; *Alliaria petiolata* [hl] 4: +; *Arrhenatherum elatius* [hl] 4: +; *Trisetum flavescens* [hl] 4: +; *Silene vulgaris* [hl] 4: +; *Prunus cerasifera* [sl] 4: +; *Lathyrus digitatus* [hl] 4: +; *Dianthus cruentus* [hl] 4: +; *Galium tricornutum* [hl] 4: +; *Aethionema saxatile* [hl] 4: +.

Localities and other characteristics are given in the Appendix.

Ostryo carpinifoliae-Quercetum cerris **Redžepi et Ružić ex Matevski et al. ass. nova**

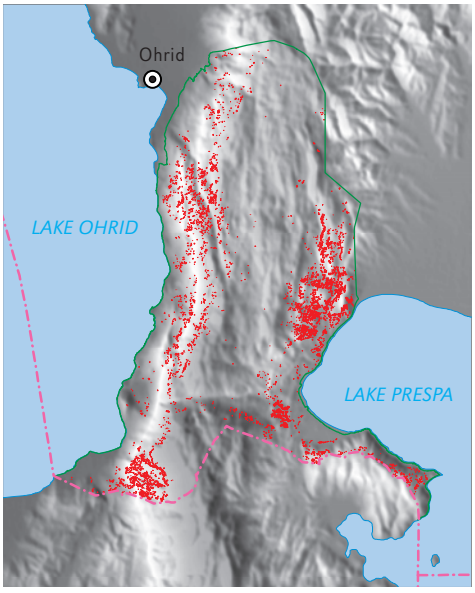


Figure 67. Distribution of the association *Ostryo carpinifoliae-Quercetum cerris*.

The syntaxonomic position of forest communities dominated by *Quercus cerris* has not been clear. In fact, *Quercus cerris* is the most common tree species in the region and therefor it thrives in most of the other thermophilous forests. Prodromus phytoceonosum Jugoslaviae (Jovanović et al. 1986) recognised the individuality of two *Quercus cerris* dominated communities as *Orno-Quercetum cerris* and *Ostryo-Quercetum cerris* (Figure 68).

The first information about the *Quercus cerris-Ostrya carpinifolia* dominated forest that appears over the carbonate bedrock was provided by Em (1964), who proposed the name *Querco pubescentis-Ostryeteum carpinifoliae cerretosum*. Later on Redžepi & Ružić (1985) described the association *Ostryo carpinifoliae-Quercetum cerris*, but the description was not valid according to the International Code of Phytosociological Nomenclature (Weber et al. 2000). Therefore it is necessary to validate the name.

Figure 68. *Ostryo-Quercetum cerris* can be found on steep slopes where carbonate bedrocks come to the surface.

Figure 69. *Acer obtusatum* is distributed in southern Europe and northern Africa. It is a constant species in *Ostryo-Quercetum cerris*.

Nomenclature remark

Lectotypus: Table 1/2 in Redžepi & Ružić (1985)

Ecological circumstances: *Quercus cerris* dominated forest over carbonate bedrock.

Diagnostic species: *Cornus mas*, *Prunus avium*; *Geranium sanguineum*, *Knautia drymeia*, *Ptilostemon strictus*, ***Trifolium pignantii***, *Viola alba* ssp. *denhardtii*.

Constant species: *Acer obtusatum* (Figure 69), *Cornus mas*, *Ostrya carpinifolia*, *Quercus cerris*, *Rosa arvensis*; *Aremonia agrimonoides*, *Dactylis glomerata*, *Veronica chamaedrys*.

Dominant species: *Fraxinus ornus*, *Quercus cerris*.

These forests are found all over the Galičica on carbonate bedrocks (Figure 67).

Table 11. *Ostryo-Quercetum cerris* Redžepi et Ružić ex Matevski et al. ass. nova hoc loco

	Relevé number		1	2	3	4	5	
	Year		2010	2010	2010	2010	2009	
	Date (mmdd)		0615	0616	0618	0618	0615	
	Altitude (m)		1000	1412	1020	1020	1158	
	Aspect		NNE	SE	NNE	NNE	E	
	Slope (°)		25	15	32	29	35	
	Cover upper tree layer (%)		60	95	70	60	70	
	Cover lower tree layer (%)		30	40	30	30	30	
	Cover shrub layer (%)		30	20	20	30	30	
	Cover herb layer (%)		80	80	30	40	50	
	Cover moss layer (%)	Layer	0	0	10	5	0	Presence
	Cover bare rock (%)		5	30	10	10	0	
	Diagnostic species of the association							
	Cornus mas	sl	+	+	+	+	+	5
	Cornus mas	hl	.	.	.	+	.	1
	Viola alba ssp. *denhardtii*	hl	+	1	+	1	.	4
	Trifolium pignantii	hl	1		+	+	+	4
	Knautia drymeia	hl	+	+	.	+	.	3
	Ptilostemon strictus	hl	1	.	1	.	.	2
	Prunus avium	hl	+	.	.	+	.	2
	Geranium sanguineum	hl	.	.	+	+	.	2
QP	***Quercion petraeae-cerris*, *Quercetalia pubescenti-petraeae***							
	Quercus cerris	t1	1	4	3	3	4	5
	Quercus cerris	t2	+	.	1	1	+	4
	Quercus cerris	sl	+	.	+	1	.	3
	Quercus cerris	hl	+	+	+	+	+	5
	Ostrya carpinifolia	t1	1	1	2	+	.	4
	Ostrya carpinifolia	t2	2	2	+	.	+	4
	Ostrya carpinifolia	sl	1	.	.	.	+	2
	Ostrya carpinifolia	hl	+	.	.	.	.	1

	Relevé number		1	2	3	4	5	
	Acer obtusatum	t1	.	+	.	.	.	1
	Acer obtusatum	t2	.	1	+	.	+	3
	Acer obtusatum	sl	+	2	+	.	1	4
	Acer obtusatum	hl	+	1	+	+	.	4
	Coronilla emerus ssp. *emeroides*	sl	1	.	1	1	.	3
	Coronilla emerus ssp. *emeroides*	hl	1	.	2	1	.	3
	Quercus pubescens	t1	2	.	+	+	.	3
	Quercus pubescens	t2	.	.	.	+	.	1
	Quercus pubescens	sl	.	.	.	+	.	1
	Juniperus oxycedrus	sl	+	.	+	+	.	3
	Juniperus oxycedrus	hl	.	.	+	.	.	1
	Lathyrus venetus	hl	+	+	.	.	+	3
	Helleborus odorus	hl	2	.	.	+	+	3
	Festuca heterophylla	hl	+	.	.	+	1	3
	Campanula spatulata ssp. *spruneriana*	hl	+	.	+	+	.	3
	Melica uniflora	hl	.	2	.	2	2	3
	Fraxinus ornus	t1	.	.	.	.	1	1
	Fraxinus ornus	t2	.	.	+	.	2	2
	Fraxinus ornus	sl	.	.	1	.	3	2
	Fraxinus ornus	hl	.	.	+	+	.	2
	Lathyrus laxiflorus var. *glabratus*	hl	1	1	.	.	.	2
	Lathyrus laxiflorus var. *laxiflorus*	hl	.	.	.	+	+	2
	Quercus trojana	hl	+	.	+	.	.	2
	Juglans regia	t2	+	.	.	1	.	2
	Euonymus verrucosus	hl	+	.	.	+	.	2
	Arabis turrita	hl	+	.	.	.	+	2
	Poa nemoralis	hl	.	1	.	.	+	2
	Juniperus oxycedrus ssp. *macrocarpa*	t2	.	.	+	+	.	2
	Sorbus torminalis	sl	.	.	.	.	+	1
	Sorbus torminalis	hl	.	.	.	.	+	1
	Luzula forsteri	hl	+	.	.	.	.	1
	Cyclamen hederifolium	hl	+	.	.	.	.	1
	Physospermum cornubiense	hl	.	+	.	.	.	1
	Scutellaria columnae	hl	.	+	.	.	.	1
	Carex hallerana	hl	.	.	+	.	.	1
	Potentilla micrantha	hl	.	.	.	.	+	1
	Carex depauperata	hl	.	.	.	.	+	1
	Melittis melissophyllum	hl	.	.	.	.	+	1
	Buglossoides purpurocaerulea	hl	.	.	.	.	+	1
QF	***Querco-Fagetea***							
	Hedera helix	sl	+	.	.	.	.	1
	Hedera helix	hl	+	.	+	+	.	3
	Acer campestre	sl	+	.	.	.	.	1
	Acer campestre	hl	+	.	.	.	.	1
	Quercus petraea	t2	1	.	.	.	.	1
	Anemone nemorosa	hl	.	+	.	.	.	1

	Relevé number		1	2	3	4	5	
	Cephalanthera longifolia	hl	.	.	+	.	.	1
	Corylus avellana	sl	.	.	.	.	+	1
	Cephalanthera rubra	hl	.	.	.	.	+	1
F2	***Fagetalia sylvaticae***							
	Rosa arvensis	sl	+	+	+	+	+	5
	Rosa arvensis	hl	1	.	.	.	.	1
	Aremonia agrimonoides	hl	+	1	+	+	+	5
	Euphorbia amygdaloides	hl	+	+	.	+	1	4
	Brachypodium sylvaticum	hl	.	+	.	1	+	3
	Epipactis helleborine	hl	+	.	+	.	.	2
	Doronicum columnae	hl	.	2	.	.	+	2
	Corylus colurna	t2	.	+	.	.	.	1
	Corylus colurna	sl	.	+	.	.	.	1
	Corylus colurna	hl	+	.	.	.	.	1
	Clematis vitalba	sl	+	.	.	.	.	1
	Clematis vitalba	hl	+	.	.	.	.	1
	Cephalanthera damasonium	hl	.	+	.	.	.	1
	Fagus sylvatica	sl	.	+	.	.	.	1
	Primula vulgaris	hl	.	.	.	.	1	1
	Tilia cordata	sl	.	.	.	.	+	1
	Lilium martagon	hl	.	.	.	.	+	1
	Platanthera chlorantha	hl	.	.	.	.	+	1
	Primula veris ssp. *columnae*	hl	.	.	.	.	+	1
	Viola reichenbachiana	hl	.	.	.	.	+	1
FB	***Festuco-Brometea***							
	Brachypodium pinnatum	hl	2	1	+	.	.	3
	Asphodelus albus	hl	.	1	.	.	.	1
	Festuca valesiaca	hl	.	.	+	.	.	1
TG	***Trifolio-Geranietea sanguinei***							
	Clinopodium vulgare	hl	+	.	+	+	.	3
	Trifolium alpestre	hl	+	.	.	+	.	2
	Trifolium medium ssp. *balcanicum*	hl	.	.	+	.	+	2
	Silene italica	hl	+	.	.	.	.	1
	Astragalus glycyphyllos	hl	+	.	.	.	.	1
	Poa angustifolia	hl	.	+	.	.	.	1
	Teucrium chamaedrys	hl	.	.	.	+	.	1
	Other species							
	Veronica chamaedrys	hl	+	+	+	+	+	5
	Dactylis glomerata	hl	+	+	+	+	+	5
	Fragaria vesca	hl	+	1	+	+	.	4
	Galium rigidifolium	hl	.	+	+	.	1	3
	Prunus cerasifera	sl	+	.	.	+	.	2
	Prunus cerasifera	hl	+	.	.	.	.	1
	Geum urbanum	hl	+	+	.	.	.	2

Relevé number		1	2	3	4	5	
Cruciata laevipes	hl	.	1	+	.	.	2
Symphytum tuberosum ssp. *angustifolia*	hl	.	1	.	.	+	2
Asphodeline lutea	hl	.	.	+	+	.	2
Euonymus europaeus var. *europaeus*	sl	.	.	.	+	+	2

Other species with low frequency:

Muscari neglectum [hl] 1: +; *Vicia incana* [hl] 1: +; *Peucedanum austriacum* [hl] 2: +; *Prunus spinosa* [sl] 2: +; *Galium aparine* [hl] 2: +; *Chaerophyllum hirsutum* [hl] 2: +; *Hypnum cupressiforme* [ml] 3: +; *Asphodeline taurica* [hl] 3: +; *Asplenium trichomanes* [hl] 3: +; *Rhamnus rhodopeus* [sl] 3: +; *Ctenidium molluscum* [ml] 3: +; *Echinops bannaticus* var. *acutilobus* [hl] 4: 1; *Draba muralis* [hl] 4: +; *Cardamine hirsuta* [hl] 4: +; *Sorbus aucuparia* var. *lanuginosa* [hl] 5: +; *Cotoneaster nebrodensis* [sl] 5: +; *Rubus canescens* [hl] 5: +.

Localities and other characteristics are given in the Appendix.

Fraxino orni-Quercetum cerris **Stefanović 1968**

The first information about the individuality of the *Quercus cerris* dominated forests was recognized by Em (1964), who described a community *Quercetum petraeae cerretosum* over silicate bedrock that builds a special vegetation belt and could have the same position as *Querco-Ostryetum cerretosum* on carbonate bedrocks. In our elaboration we accepted the opinion of Stefanović (1968), who described the association dominated by *Quercus cerris* over silicate bedrock as an independent association (Figure 71). Stefanović (1968) distinguished also the subassociation *ostryetosum carpinifoliae* that could be a synonym for *Ostryo carpinifoliae-Quercetum cerris*.

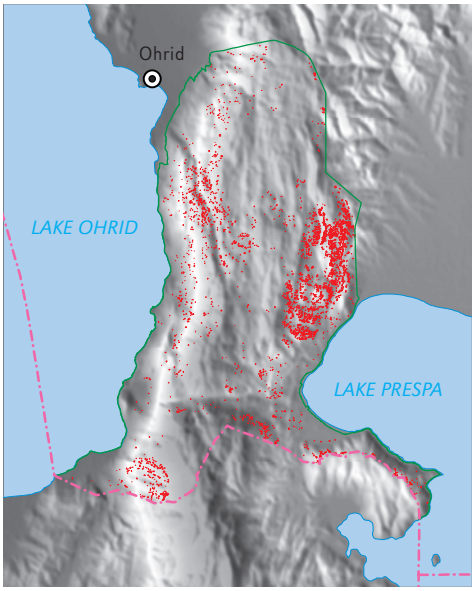


Figure 70. Distribution of the association *Fraxino orni-Quercetum cerris*.

Diagnostic species: *Buglossoides purpurocaerulea*, *Fragaria vesca*, *Luzula forsteri*.
Constant species: *Quercus cerris*; *Veronica chamaedrys*.
Dominant species: ***Quercus cerris***; *Arrhenatherum elatius*, *Brachypodium pinnatum*.

These forests appear all over Galičica and build a vegetation zone at altitudes of 800–1400 m (Figure 70).

Figure 71. *Fraxino orni-Quercetum cerris* appears on deep soil over silicate bedrock.

Figure 72. The fruits (sloes) of *Prunus spinosa*. The blackthorn is one of the species of *Fraxino orni-Quercetum cerris*.

Table 12. *Fraxino orni-Quercetum cerris* Stefanović 1968

	Relevé number		1	2	3	4	5	6	
	Year		2010	2009	2009	2009	2010	2009	
	Date (mmdd)		0615	0616	0622	0616	0616	0619	
	Altitude (m)		1040	1062	978	1128	1147	1155	
	Aspect		W	WWN	SW	NW	S	NNW	
	Slope (°)		28	17	11	5	5	20	
	Cover upper tree layer (%)		60	80	60	60	60	30	
	Cover lower tree layer (%)		40	20	30	50	30	80	
	Cover shrub layer (%)		40	40	40	60	50	40	
	Cover herb layer (%)		60	50	80	75	70	50	Presence
	Cover moss layer (%)	Layer	5	0	0	0	0	0	
	Cover bare rock (%)		5	0	0	0	0	0	
	Diagnostic species of the association								
	Fragaria vesca	hl	1	+	+	+	1	.	5
	Luzula forsteri	hl	+	+	+	.	.	1	4
	Buglossoides purpurocaerulea	hl	.	+	+	.	1	.	3
QP	***Quercion petraeae-cerris*, *Quercetalia pubescenti-petraeae***								
	Quercus cerris	t1	3	4	4	4	4	2	6
	Quercus cerris	t2	2	1	1	2	2	4	6
	Quercus cerris	sl	1	2	2	2	1	1	6
	Quercus cerris	hl	+	.	1	+	+	1	5
	Cornus mas	sl	+	.	1	2	1	+	5
	Cornus mas	hl	+	.	+	.	.	.	2
	Festuca heterophylla	hl	1	2	1	.	+	1	5
	Lathyrus venetus	hl	.	2	+	+	+	.	4
	Fraxinus ornus	t2	+	.	1	1	.	.	3
	Fraxinus ornus	sl	.	.	2	+	+	.	3
	Fraxinus ornus	hl	.	.	.	+	.	.	1
	Helleborus odorus	hl	.	1	.	+	1	.	3
	Scutellaria columnae	hl	.	.	+	+	1	.	3
	Acer obtusatum	t1	.	1	.	.	.	.	1
	Acer obtusatum	t2	1	.	.	+	.	.	2
	Acer obtusatum	sl	1	1	.	.	.	.	2
	Acer obtusatum	hl	+	+	.	.	.	.	2
	Acer monspessulanum	t2	.	.	.	1	+	.	2
	Acer monspessulanum	sl	.	.	+	.	1	.	2
	Acer monspessulanum	hl	.	.	.	.	+	.	1
	Campanula spatulata ssp. *spruneriana*	hl	+	.	.	.	.	+	2
	Lathyrus laxiflorus var. *glabratus*	hl	+	.	.	.	2	.	2
	Viola alba ssp. *denhardtii*	hl	+	.	.	.	+	.	2
	Juniperus oxycedrus	sl	+	.	.	.	.	+	2
	Lathyrus laxiflorus var. *laxiflorus*	hl	.	+	1	.	.	.	2
	Melica uniflora	hl	.	.	+	1	.	.	2
	Melittis melissophyllum	hl	.	.	+	+	.	.	2
	Poa nemoralis	hl	.	.	+	.	.	1	2

	Relevé number		1	2	3	4	5	6	
	Carex hallerana	hl	.	.	+	.	.	+	2
	Potentilla micrantha	hl	.	.	+	.	.	+	2
	Lathyrus niger	hl	.	.	.	.	+	+	2
	Quercus frainetto	t1	1	.	.	.	.	.	1
	Quercus frainetto	sl	.	+	.	.	.	.	1
	Juniperus oxycedrus ssp. *macrocarpa*	t2	+	.	.	.	.	.	1
	Juniperus oxycedrus ssp. *macrocarpa*	sl	.	.	.	+	.	.	1
	Quercus trojana	t2	.	.	+	.	.	.	1
	Quercus trojana	sl	.	.	+	.	.	.	1
	Sorbus torminalis	sl	.	.	+	.	.	.	1
	Sorbus torminalis	hl	.	.	.	1	.	.	1
	Orchis purpurea	hl	+	.	.	.	.	.	1
	Quercus pubescens	t2	+	.	.	.	.	.	1
	Physospermum cornubiense	hl	.	+	.	.	.	.	1
	Ornithogalum pyrenaicum	hl	.	.	1	.	.	.	1
	Trifolium pignantii	hl	.	.	+	.	.	.	1
	Convallaria majalis	hl	.	.	.	1	.	.	1
	Euonymus verrucosus	hl	.	.	.	+	.	.	1
QF	***Querco-Fagetea***								
	Cephalanthera rubra	hl	.	+	+	.	.	.	2
	Trifolium patulum	hl	2	.	.	.	.	.	1
	Acer campestre	hl	.	+	.	.	.	.	1
	Hedera helix	hl	.	.	+	.	.	.	1
	Mycelis muralis	hl	.	.	+	.	.	.	1
	Quercus petraea	t2	.	.	.	.	+	.	1
F2	***Fagetalia sylvaticae***								
	Aremonia agrimonoides	hl	1	+	+	1	+	.	5
	Rosa arvensis	sl	1	.	.	.	1	2	3
	Rosa arvensis	hl	1	.	+	+	.	.	3
	Euphorbia amygdaloides	hl	+	1	.	.	.	.	2
	Viola reichenbachiana	hl	+	.	.	+	.	.	2
	Epipactis helleborine	hl	+	.	.	.	.	+	2
	Primula vulgaris	hl	.	+	1	.	.	.	2
	Asperula taurina	hl	.	.	+	+	.	.	2
	Knautia drymeia	hl	.	+	.	+	.	.	2
	Acer pseudoplatanus	t2	.	.	+	.	.	.	1
	Acer pseudoplatanus	sl	.	.	+	.	.	.	1
	Acer pseudoplatanus	hl	.	.	+	.	.	.	1
	Corylus colurna	t2	.	.	.	1	.	.	1
	Corylus colurna	sl	.	.	.	+	.	.	1
	Corylus colurna	hl	.	.	.	+	.	.	1
	Cephalanthera damasonium	hl	1	.	.	.	.	.	1
	Fagus sylvatica	sl	.	+	.	.	.	.	1
	Bromus ramosus	hl	.	.	+	.	.	.	1
	Clematis vitalba	hl	.	.	+	.	.	.	1
	Brachypodium sylvaticum	hl	.	.	+	.	.	.	1

	Relevé number		1	2	3	4	5	6	
	Doronicum columnae	hl	.	.	.	1	.	.	1
	Galium pseudaristatum	hl	.	.	.	.	+	.	1
	Campanula trachelium	hl	.	.	.	.	.	+	1
	Cystopteris fragilis	hl	.	.	.	.	.	+	1
	Arum maculatum	hl	.	.	.	.	.	+	1
FB	***Festuco-Brometea***								
	Brachypodium pinnatum	hl	2	1	3	.	.	.	3
	Thymus longicaulis var. *longicaulis*	hl	+	.	.	1	.	+	3
	Dorycnium herbaceum var. *macedonicum*	hl	1	.	+	.	.	.	2
	Poa bulbosa	hl	.	.	.	.	.	1	1
TG	***Trifolio-Geranietea sanguinei***								
	Teucrium chamaedrys	hl	+	.	+	+	+	.	4
	Silene italica	hl	+	.	+	.	+	+	4
	Clinopodium vulgare	hl	.	.	.	+	+	+	3
	Trifolium medium ssp. *balcanicum*	hl	+	.	.	.	+	.	2
	Poa angustifolia	hl	+	.	.	.	+	.	2
	Geranium sanguineum	hl	+	.	.	.	.	.	1
	Origanum vulgare	hl	.	.	+	.	.	.	1
	Astragalus glycyphyllos	hl	.	.	+	.	.	.	1
	Ptilostemon strictus	hl	.	.	+	.	.	.	1
	Tanacetum corymbosum	hl	.	.	.	+	.	.	1
	Trifolium alpestre	hl	.	.	.	.	+	.	1
	Agrimonia eupatoria	hl	.	.	.	.	+	.	1
	Other species								
	Veronica chamaedrys	hl	+	+	+	+	+	+	6
	Dactylis glomerata	hl	1	+	1	.	+	+	5
	Symphytum tuberosum ssp. *angustifolia*	hl	.	+	+	+	+	+	5
	Galium rigidifolium	hl	.	+	.	1	+	+	4
	Geum urbanum	hl	.	+	.	.	+	+	3
	Prunus spinosa	sl	.	+	.	.	.	+	2
	Prunus spinosa	hl	.	.	+	.	.	+	2
	Juniperus communis	sl	.	.	+	.	+	.	2
	Juniperus communis	hl	.	.	.	.	+	.	1
	Asphodeline lutea	hl	+	+	.	.	.	.	2
	Iris sintenisii	hl	+	.	.	.	+	.	2
	Peucedanum austriacum	hl	.	+	.	+	.	.	2
	Cruciata laevipes	hl	.	.	+	.	1	.	2
	Poa trivialis ssp. *sylvicola*	hl	.	.	+	.	.	1	2
	Arrhenatherum elatius	hl	.	.	.	+	3	.	2
	Galium tricornutum	hl	.	.	.	+	.	+	2

Other species with low frequency:

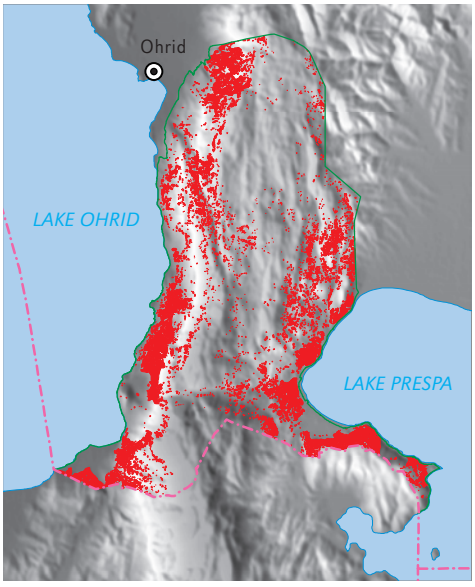
Euonymus europaeus [sl] 4: +, [hl] 5: +; *Chamaecytisus tommasinii* [hl] 1: 2; *Hypnum cupressiforme* [ml] 1: +; *Lathyrus sphaericus* [hl] 1: +; *Rhamnus catharticus* [sl] 1: +; *Silene vulgaris* [hl] 1: +; *Rubus canescens* [hl] 1: +; *Galium oreophilum* [hl] 1: +; *Ruscus aculeatus*

[sl] 2: +; *Crataegus heldreichii* [sl] 2: +; *Geranium asphodeloides* [hl] 2: +; *Echinops banaticus* [hl] 3: +; *Viola odorata* [hl] 3: +; *Lathyrus aphaca* [hl] 3: +; *Eryngium palmatum* [hl] 4: 1; *Inula spiraeifolia* [hl] 4: +; *Rosa canina* [sl] 4: +; *Prunus cerasifera* [sl] 5: 2; *Pyrus pyraster* [sl] 5: +; *Vicia dalmatica* [hl] 5: +; *Euonymus europaeus* var. *europaeus* [sl] 5: +; *Galium aparine* [hl] 5: +; *Cyclamen hederifolium* [hl] 5: +; *Cardamine hirsuta* [hl] 6: 1; *Torilis arvensis* [hl] 6: +; *Ranunculus psilostachys* [hl] 6: +.

Localities and other characteristics are given in the Appendix.

Quercion frainetto Horvat 1954

The alliance is found in the eastern part of the Balkan Peninsula and extends to the south towards Greece and Turkey (Bergmeier et al. 2004, Kavgaci et al. 2010). The communities of this alliance are found on deep soils, where we can find a certain degree of acidity. These forests thrive in the central part of the Balkan Peninsula, where the majority of precipitation is at the beginning of the year, after that there is a long dry and hot period. But during winter the conditions are hard and the temperature is low. The combination of dry and hot summers and cold winters is very unfavourable for plants – hot summers for mesophilous and cold winters for thermophilous; so these forests are rather poor in (endemic) species. Within the vertical distribution we can recognize that the first tree species that disappears at higher altitudes is *Quercus frainetto*, but *Quercus cerris* and *Quercus petraea* appear also at higher altitude and build contact with *Fagus sylvatica* forests. This is the main factor that enables the distinction of two alliances of oak forests in the region (Horvat 1959).



Quercetum frainetto-cerris Horvat 1954

These forests are found in the lowlands and do not reach higher than 1200 m of altitude. The relief is mainly flat or moderately steep, and the soil horizon is deep mainly over silicate bedrock (Figure 74).

Figure 73. Distribution of the association *Quercetum frainetto-cerris*.

Figure 74. *Quercetum frainetto-cerris* with dense canopy.

Diagnostic species: ***Quercus frainetto*** (Figure 75); *Crataegus heldreichii*; *Agrimonia eupatoria*, *Asphodeline lutea*, *Campanula sparsa*, *Lathyrus laxiflorus* var. *laxiflorus*, *Lathyrus niger*, *Origanum vulgare*, *Vicia grandiflora*, *Viola alba* ssp. *thessala*.
Constant species: *Quercus frainetto*.
Dominant species: *Quercus cerris*, *Quercus frainetto*; *Brachypodium sylvaticum*, *Dactylis glomerata*.

These forests appear in the lowlands in the eastern and western part of Galičica (Figure 73).

Figure 75. *Quercus frainetto* is a diagnostic species of *Quercetum frainetto-cerris*. The leaves are large, variable in shape and divided into very deep parallel lobes, with usually short leaf stalks.

Table 13. *Quercetum frainetto-cerris* Horvat 1954

Relevé number		1	2	3	4	5	6	7	8	9	
Year		2009	2009	2009	2009	2009	2009	2009	2009	2009	
Date (mmdd)		0616	0616	0622	0616	0617	0619	0615	0615	0616	
Altitude (m)		1050	1120	993	938	875	1163	904	904	950	
Aspect		SE	SE	SSE	SSE	S	W	S	SE	SE	
Slope (°)		6	14	9	28	30	15	9	11	4	
Cover upper tree layer (%)		50	70	80	70	10	30	85	90	50	
Cover lower tree layer (%)		30	0	20	50	70	80	0	0	0	
Cover shrub layer (%)		20	10	40	5	30	30	20	10	60	
Cover herb layer (%)		70	80	40	10	40	40	70	5	30	
Cover moss layer (%)	Layer	0	0	1	0	0	1	0	0	0	Presence
Cover bare rock (%)		1	5	0	0	0	0	0	0	0	
Diagnostic species of the association											
Quercus frainetto	t1	1	1	2	3	.	2	5	4	3	8
Quercus frainetto	t2	.	.	+	.	3	3	.	.	.	3
Quercus frainetto	sl	.	.	.	.	+	1	+	+	4	5

Relevé number		1	2	3	4	5	6	7	8	9	
Quercus frainetto	hl	.	+	.	.	1	+	+	.	.	4
Lathyrus laxiflorus var. *laxiflorus*	hl	+	1	+	+	.	.	1	+	+	7
Asphodeline lutea	hl	+	+	+	1	.	.	.	.	.	4
Origanum vulgare	hl	+	+	.	+	+	.	.	.	.	4
Crataegus heldreichii	sl	+	1	.	+	.	.	+	.	.	4
Viola alba ssp. *thessala*	hl	.	+	+	+	.	.	+	.	.	4
Lathyrus niger	hl	.	.	.	.	2	1	.	1	+	4
Agrimonia eupatoria	hl	+	+	+	.	.	.	.	.	.	3
Campanula sparsa	hl	+	.	.	.	.	.	+	.	.	2
Vicia grandiflora	hl	.	1	.	.	.	.	+	.	.	2
QP ***Quercion frainetto***, ***Quercetalia pubescenti-petraeae***											
Quercus cerris	t1	3	2	3	.	2	1	+	1	.	7
Quercus cerris	t2	+	.	1	.	+	+	.	.	.	4
Quercus cerris	sl	+	+	1	.	1	+	.	.	.	5
Quercus cerris	hl	+	.	+	1	2	+	.	+	.	6
Festuca heterophylla	hl	1	+	+	.	.	+	+	1	1	7
Juniperus oxycedrus	t1	.	.	1	.	.	.	.	.	.	1
Juniperus oxycedrus	t2	.	.	+	.	.	.	.	.	.	1
Juniperus oxycedrus	sl	.	.	2	+	.	+	+	+	.	5
Fraxinus ornus	t1	.	.	+	2	.	.	.	.	.	2
Fraxinus ornus	t2	.	.	.	1	.	.	.	.	.	1
Fraxinus ornus	sl	+	+	+	+	.	.	.	.	.	4
Fraxinus ornus	hl	.	.	.	+	.	.	.	.	.	1
Cornus mas	sl	2	.	+	+	.	.	+	.	.	4
Luzula forsteri	hl	1	.	.	.	.	+	.	+	+	4
Quercus trojana	t1	.	2	.	1	.	.	.	.	.	2
Quercus trojana	t2	.	.	.	+	.	.	.	.	.	1
Quercus trojana	sl	+	+	.	+	.	.	.	.	.	3
Quercus trojana	hl	+	.	.	.	.	.	.	+	.	2
Quercus pubescens	t1	+	+	.	.	.	.	+	.	.	3
Quercus pubescens	sl	.	.	+	.	.	.	.	.	.	1
Scutellaria columnae	hl	.	+	.	+	.	.	.	+	.	3
Helleborus odorus	hl	.	.	+	+	.	.	2	.	.	3
Poa nemoralis	hl	.	.	+	.	1	1	.	.	.	3
Ornithogalum pyrenaicum	hl	+	.	.	.	.	.	1	.	.	2
Lychnis coronaria	hl	.	+	.	.	.	.	.	.	+	2
Acer monspessulanum	t2	+	.	.	.	.	.	.	.	.	1
Acer monspessulanum	sl	.	+	.	.	.	.	.	.	.	1
Physospermum cornubiense	hl	.	+	.	.	.	.	.	.	.	1
Acer obtusatum	sl	.	.	+	.	.	.	.	.	.	1
Sorbus torminalis	sl	.	.	+	.	.	.	.	.	.	1
Coronilla emerus ssp. *emeroides*	sl	.	.	.	+	.	.	.	.	.	1
Carex hallerana	hl	.	.	.	+	.	.	.	.	.	1
Tamus communis	hl	.	.	.	.	1	.	.	.	.	1
Prunus domestica	sl	.	.	.	.	+	.	.	.	.	1

	Relevé number		1	2	3	4	5	6	7	8	9	
	Orchis purpurea	hl	.	.	.	.	.	+	.	.	.	1
	Trifolium pignantii	hl	.	.	.	.	.	+	.	.	.	1
	Melica uniflora	hl	.	.	.	.	.	+	.	.	.	1
	Potentilla micrantha	hl	.	.	.	.	.	+	.	.	.	1
QF	***Querco-Fagetea***											
	Cephalanthera rubra	hl	.	+	+	1	.	.	.	.	.	3
	Lapsana communis	hl	.	+	.	+	.	.	.	.	+	3
	Quercus petraea	t1	+	+	.	.	.	.	.	.	.	2
	Quercus petraea	t2	.	.	.	.	.	2	.	.	.	1
	Quercus petraea	sl	.	.	.	.	.	1	.	.	.	1
	Quercus petraea	hl	.	.	.	.	.	1	.	.	.	1
	Acer campestre	sl	.	.	.	.	.	+	+	.	.	2
	Hedera helix	hl	.	.	.	+	.	.	.	.	.	1
	Knautia drymeia	hl	.	.	.	+	.	.	.	.	.	1
F2	***Fagetalia sylvaticae***											
	Euphorbia amygdaloides	hl	+	1	1	1	.	.	.	.	.	4
	Asperula taurina	hl	+	+	.	.	.	.	+	.	.	3
	Brachypodium sylvaticum	hl	.	.	3	.	+	+	.	.	.	3
	Doronicum columnae	hl	.	.	.	.	.	2	.	.	1	2
	Clematis vitalba	sl	.	.	.	+	.	.	.	.	.	1
	Clematis vitalba	hl	.	.	.	+	.	.	.	.	.	1
	Aremonia agrimonoides	hl	.	.	+	.	.	.	.	.	.	1
	Hieracium murorum	hl	.	.	.	+	.	.	.	.	.	1
	Rosa arvensis	sl	.	.	.	.	1	.	.	.	.	1
	Cephalanthera damasonium	hl	.	.	.	.	.	+	.	.	.	1
	Viola reichenbachiana	hl	.	.	.	.	.	+	.	.	.	1
	Platanthera chlorantha	hl	.	.	.	.	.	+	.	.	.	1
FB	***Festuco-Brometea***											
	Brachypodium pinnatum	hl	.	1	.	2	.	.	+	1	.	4
	Poa bulbosa	hl	+	+	.	+	.	.	.	.	.	3
	Phleum phleoides	hl	+	+	.	.	.	.	.	.	.	2
	Festuca valesiaca	hl	1	.	+	.	.	.	.	.	.	2
	Thymus longicaulis var. *longicaulis*	hl	.	.	1	.	.	.	.	.	.	1
	Dorycnium herbaceum var. *macedonicum*	hl	.	.	+	.	.	.	.	.	.	1
	Cerastium brachypetalum	hl	.	.	.	+	.	.	.	.	.	1
	Trifolium campestre	hl	.	.	.	.	.	.	.	.	+	1
GU	***Galio-Urticetea***											
	Cruciata laevipes	hl	+	+	.	.	.	.	+	.	.	3
	Galium aparine	hl	.	+	.	.	.	.	+	.	+	3
	Cardamine hirsuta	hl	.	.	.	+	.	.	.	.	+	2
	Geum urbanum	hl	.	+	.	.	.	.	.	.	.	1
	Geranium robertianum	hl	.	.	.	+	.	.	.	.	.	1
	Alliaria petiolata	hl	.	.	.	.	.	.	+	.	.	1

Relevé number		1	2	3	4	5	6	7	8	9	
TG ***Trifolio-Geranietea sanguinei***											
Silene italica	hl	1	+	1	.	+	+	+	+	.	7
Teucrium chamaedrys	hl	1	+	+	+	.	.	.	.	.	4
Trifolium alpestre	hl	+	.	+	.	.	+	+	.	.	4
Clinopodium vulgare	hl	1	.	+	.	+	.	.	.	.	3
Poa angustifolia	hl	+	+	.	.	.	.	.	.	.	2
Ptilostemon strictus	hl	.	.	1	.	2	.	.	.	.	2
Trifolium medium ssp. *balcanicum*	hl	.	.	+	.	+	.	.	.	.	2
Astragalus glycyphyllos	hl	.	.	.	+	.	.	.	.	.	1
Coronilla varia	hl	.	.	.	.	.	.	+	.	.	1
Other species											
Dactylis glomerata	hl	3	3	2	+	1	+	+	.	+	8
Veronica chamaedrys	hl	+	+	+	+	1	1	.	.	1	7
Galium rigidifolium	hl	+	+	+	.	.	+	+	+	.	6
Symphytum tuberosum ssp. *angustifolia*	hl	+	+	+	.	.	+	+	+	.	6
Fragaria vesca	hl	1	+	+	.	.	+	+	.	.	5
Iris sintenisii	hl	+	.	+	.	.	.	+	.	.	3
Prunus spinosa	sl	.	.	.	.	.	.	2	1	.	2
Prunus spinosa	hl	.	.	.	.	+	.	.	+	.	2
Lathyrus digitatus	hl	+	+	.	.	.	.	.	.	.	2
Vicia incana	hl	+	.	+	.	.	.	.	.	.	2
Echinops banaticus	hl	.	+	+	.	.	.	.	.	.	2
Silene vulgaris	hl	.	+	.	+	.	.	.	.	.	2
Acanthus balcanicus	hl	.	1	.	.	.	.	1	.	.	2
Lathyrus aphaca	hl	.	+	.	.	.	.	.	.	+	2
Limodorum abortivum	hl	.	.	.	+	.	.	.	+	.	2
Poa trivialis ssp. *sylvicola*	hl	.	.	.	.	.	.	1	.	+	2

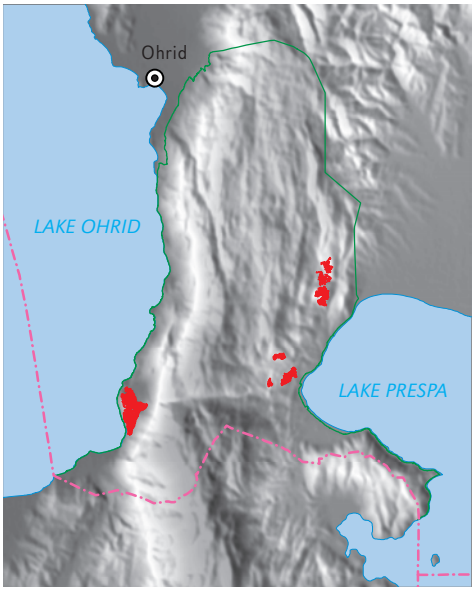
Other species with low frequency:

Elymus repens [hl] 2: +; *Centaurea grisebachii* [hl] 3: +; *Arabis muralis* [hl] 4: +; *Rubus sanguineus* var. *sanguineus* [sl] 5: +; *Sedum cepaea* [hl] 6: +; *Galium verum* [hl] 7: +; *Arrhenatherum elatius* [hl] 7: +; *Geranium asphodeloides* [hl] 7: +; *Cynosurus echinatus* [hl] 7: +; *Rubus canescens* [hl] 8: +; *Chamaecytisus heuffellii* [hl] 9: 1; *Vicia loiseleurii* [hl] 9: 1; *Lathyrus sphaericus* [hl] 9: 1; *Lathyrus cicera* [hl] 9: +.

Localities and other characteristics are given in the Appendix.

Carpinion orientalis Horvat 1954

The forests classified into this alliance form a vegetation belt in coastal regions above the evergreen vegetation of *Quercetea ilicis*. The dominant species are *Quercus pubescens*, *Ostrya carpinifolia* and *Carpinus orientalis*. In comparison with oak-dominated forests, these forests thrive in the areas with a mild climate during winter (Horvat 1954, Čarni et al. 2009).



Quercetum trojanae Horvat 1959

This community is the most characteristic for the area of all southern Balkans forest communities (Figure 77). It was first recognized by Em on Jakupica mountain, but the results have not been published. Horvat (1959) published the synthetic table prepared from Em's material and made the name of the association valid. It appears on the driest sites with a rather deep soil layer. The canopy of these forests is rather low, the diameters are small, and so they do not yield good timber (Horvat 1950).

Figure 76. Distribution of the association *Quercetum trojanae*.

Figure 77. *Quercetum trojanae* can be found on dry and warm sites over carbonate bedrock.

Figure 78. *Quercus trojana* (syn. *Quercus macedonica*) is an oak species from section *cerris* growing in southeastern Europe and Northwest Asia; from Italy to Turkey.

Diagnostic species: *Acanthus balcanicus*, *Anthoxanthum odoratum*, *Bellis perennis*, ***Crepis vesicaria***, ***Medicago lupulina***, ***Ononis pusilla***.
Constant species: *Fraxinus ornus*, *Quercus trojana*; *Galium rigidifolium*.
Dominant species: *Carpinus orientalis*, *Fraxinus ornus*, ***Quercus trojana*** (Figure 78); *Helleborus odorus*, *Melica uniflora*.

These forests can be found on Golemi Osoj above St. Zaum and the village of Trpejca, on Dolovi, Čavkalica, and the hill Strnana above the village of Leskoec, as well on the area of Smolojca hill (Figure 76).

Table 14. *Quercetum trojanae* Horvat 1959

Relevé number		1	2	3	4	5	6	
Year		2009	2010	2010	2009	2010	2009	
Date (mmdd)		0621	0622	0623	0616	0615	0616	
Altitude (m)		869	903	821	1240	1170	991	
Aspect		–	SSW	NW	S	SW	NNE	
Slope (°)		–	3	2	22	5	10	
Cover upper tree layer (%)		90	30	80	60	30	50	
Cover lower tree layer (%)		10	80	30	0	80	80	
Cover shrub layer (%)		30	50	30	20	40	50	
Cover herb layer (%)		50	40	70	80	70	40	
Cover moss layer (%)	Layer	30	30	20	0	0	0	Presence
Cover bare rock (%)		30	30	20	80	0	0	
Diagnostic species of the association								
Medicago lupulina	hl	+	+	+	+	.	.	4
Crepis vesicaria	hl	.	+	+	.	+	.	3
Acanthus balcanicus	hl	+	+	.	.	.	.	2
Bellis perennis	hl	+	.	+	.	.	.	2
Ononis pusilla	hl	.	+	.	+	.	.	2
Anthoxanthum odoratum	hl	.	1	.	.	2	.	2

	Relevé number		1	2	3	4	5	6	
QP	***Carpinion orientalis*, *Quercetalia pubescenti-petraeae***								
	Quercus trojana	t1	3	2	4	4	2	3	6
	Quercus trojana	t2	.	4	.	.	4	1	3
	Quercus trojana	sl	.	+	.	+	1	.	3
	Quercus trojana	hl	+	+	+	+	+	+	6
	Fraxinus ornus	t1	.	+	.	1	.	.	2
	Fraxinus ornus	t2	.	1	+	.	.	2	3
	Fraxinus ornus	sl	1	1	+	1	+	2	6
	Fraxinus ornus	hl	+	+	+	.	.	+	4
	Juniperus oxycedrus	t2	1	.	.	.	.	.	1
	Juniperus oxycedrus	sl	2	1	2	+	2	.	5
	Juniperus oxycedrus	hl	.	.	+	.	.	.	1
	Helleborus odorus	hl	1	+	3	.	.	+	4
	Carex hallerana	hl	.	+	+	+	+	.	4
	Cornus mas	sl	.	+	2	.	+	2	4
	Carpinus orientalis	t1	4	.	1	.	.	.	2
	Carpinus orientalis	t2	1	2	2	.	.	.	3
	Carpinus orientalis	sl	2	2	2	.	.	.	3
	Carpinus orientalis	hl	+	.	+	.	.	.	2
	Acer monspessulanum	t1	.	.	1	.	.	.	1
	Acer monspessulanum	t2	.	.	+	.	.	.	1
	Acer monspessulanum	hl	+	+	+	.	.	.	3
	Melica uniflora	hl	.	1	1	.	.	3	3
	Poa nemoralis	hl	.	+	+	.	.	+	3
	Scutellaria columnae	hl	.	.	+	+	.	+	3
	Quercus pubescens	t1	.	.	.	+	+	.	2
	Quercus pubescens	sl	.	.	.	.	+	.	1
	Quercus pubescens	hl	.	+	+	.	.	.	2
	Quercus frainetto	t1	.	.	.	.	.	+	1
	Quercus frainetto	sl	.	.	.	.	+	+	2
	Asyneuma limonifolium	hl	+	+	.	.	.	.	2
	Viola alba ssp. *thessala*	hl	+	.	.	.	.	+	2
	Viola alba ssp. *denhardtii*	hl	.	+	2	.	.	.	2
	Festuca heterophylla	hl	.	+	.	.	1	.	2
	Campanula spatulata ssp. *spruneriana*	hl	.	.	+	.	+	.	2
	Ostrya carpinifolia	t1	.	.	.	+	.	.	1
	Ostrya carpinifolia	sl	.	.	.	.	.	+	1
	Coronilla emerus ssp. *emeroides*	hl	.	+	.	.	.	.	1
	Euonymus verrucosus	sl	.	.	+	.	.	.	1
	Luzula forsteri	hl	.	.	+	.	.	.	1
	Lathyrus laxiflorus var. *glabratus*	hl	.	.	+	.	.	.	1
	Sorbus torminalis	t2	.	.	.	.	+	.	1
	Juniperus oxycedrus ssp. *macrocarpa*	t2	.	.	.	.	+	.	1
	Quercus cerris	t1	.	.	.	.	+	.	1
	Buglossoides purpurocaerulea	hl	.	.	.	.	.	1	1

	Relevé number		1	2	3	4	5	6	
	Acer obtusatum	sl	.	.	.	.	.	+	1
	Potentilla micrantha	hl	.	.	.	.	.	+	1
QF	***Querco-Fagetea***								
	Hedera helix	t2	.	.	.	.	.	1	1
	Hedera helix	sl	.	.	.	.	.	+	1
	Hedera helix	hl	.	.	+	.	.	1	2
	Cephalanthera rubra	hl	.	.	.	+	+	.	2
	Acer campestre	sl	.	.	.	.	.	+	1
	Acer campestre	hl	.	.	.	.	.	+	1
F2	***Fagetalia sylvaticae***								
	Aremonia agrimonoides	hl	+	.	+	.	+	+	4
	Rosa arvensis	sl	.	.	+	.	+	+	3
	Rosa arvensis	hl	.	+	.	.	.	.	1
	Cephalanthera damasonium	hl	+	.	+	.	.	.	2
	Brachypodium sylvaticum	hl	.	.	+	.	.	+	2
	Euphorbia amygdaloides	hl	.	.	.	+	+	.	2
	Acer pseudoplatanus	t2	.	.	.	.	.	+	1
	Acer pseudoplatanus	hl	.	.	.	.	.	+	1
	Epipactis microphylla	hl	.	.	+	.	.	.	1
	Viola reichenbachiana	hl	.	.	+	.	.	.	1
	Campanula trachelium	hl	.	.	.	+	.	.	1
	Clematis vitalba	hl	.	.	.	.	.	+	1
FB	***Festuco-Brometea***								
	Poa bulbosa	hl	+	+	+	+	.	.	4
	Helianthemum nummularium	hl	.	+	.	+	+	.	3
	Polygala comosa	hl	+	.	.	+	.	.	2
	Hieracium bauhinii	hl	+	.	.	.	+	.	2
	Arabis sagittata	hl	.	+	.	+	.	.	2
	Dorycnium herbaceum var. *macedonicum*	hl	.	.	.	1	2	.	2
	Anthyllis vulneraria ssp. *polyphylla*	hl	.	.	.	+	+	.	2
	Festuca valesiaca	hl	1	.	.	.	.	.	1
	Thymus longicaulis var. *longicaulis*	hl	1	.	.	.	.	.	1
	Euphorbia myrsinites	hl	+	.	.	.	.	.	1
	Minuartia verna	hl	+	.	.	.	.	.	1
	Trifolium campestre	hl	+	.	.	.	.	.	1
	Medicago minima	hl	+	.	.	.	.	.	1
	Trifolium scabrum	hl	+	.	.	.	.	.	1
	Minuartia verna ssp. *collina*	hl	.	+	.	.	.	.	1
	Brachypodium pinnatum	hl	.	.	.	1	.	.	1
	Helictotrichon convolutum	hl	.	.	.	1	.	.	1
	Asphodelus albus	hl	.	.	.	+	.	.	1
	Koeleria splendens	hl	.	.	.	+	.	.	1
	Trinia glauca	hl	.	.	.	+	.	.	1

	Relevé number		1	2	3	4	5	6	
	Sanguisorba minor ssp. *muricata*	hl	.	.	.	+	.	.	1
TG	***Trifolio-Geranietea sanguinei***								
	Poa angustifolia	hl	+	+	1	.	.	+	4
	Teucrium chamaedrys	hl	+	1	.	+	+	.	4
	Silene italica	hl	2	2	+	.	+	.	4
	Coronilla varia	hl	+	.	.	1	.	.	2
	Trifolium alpestre	hl	.	.	.	+	1	.	2
	Origanum vulgare	hl	.	.	.	+	1	.	2
	Anthericum liliago	hl	.	.	.	+	+	.	2
	Hypericum perforatum	hl	.	+	.	.	.	.	1
	Astragalus glycyphyllos	hl	.	.	+	.	.	.	1
	Melampyrum heracleoticum	hl	.	.	.	1	.	.	1
	Asperula purpurea	hl	.	.	.	+	.	.	1
	Clinopodium vulgare	hl	.	.	.	+	.	.	1
	Ptilostemon strictus	hl	.	.	.	.	+	.	1
GU	***Galio-Urticetea***								
	Geranium lucidum	hl	+	.	+	.	.	.	2
	Geranium purpureum	hl	.	+	+	.	.	.	2
	Cruciata laevipes	hl	.	+	+	.	.	.	2
	Geum urbanum	hl	.	.	+	.	.	+	2
	Geranium robertianum	hl	+	.	.	.	.	.	1
	Chaerophyllum hirsutum	hl	.	.	1	.	.	.	1
	Alliaria petiolata	hl	.	.	+	.	.	.	1
	Galium aparine	hl	.	.	+	.	.	.	1
	Cardamine hirsuta	hl	.	.	.	+	.	.	1
	Other species								
	Galium rigidifolium	hl	+	1	1	+	1	+	6
	Dactylis glomerata	hl	.	1	1	+	1	+	5
	Veronica chamaedrys	hl	1	1	+	+	1	.	5
	Trifolium physodes	hl	1	+	+	.	.	.	3
	Silene vulgaris	hl	.	1	+	1	.	.	3
	Leontodon crispus ssp. *crispus*	hl	.	+	.	+	+	.	3
	Lathyrus aphaca	hl	1	.	+	.	.	.	2
	Galium tricornutum	hl	+	.	.	.	.	+	2
	Asphodeline lutea	hl	.	.	.	+	1	.	2
	Geranium sanguineum	hl	.	.	.	+	+	.	2

Other species with low frequency:

Cerastium glomeratum [hl] 1: 1; *Arenaria leptoclados* [hl] 1: +; *Lathyrus digitatus* [hl] 1: +; *Medicago orbicularis* [hl] 1: +; *Ophrys sphegodes* [hl] 1: +; *Valerianella pumila* [hl] 1: +; *Carex lepidocarpa* [hl] 1: +; *Muscari racemosum* [hl] 1: +; *Micropyrum tenellum* [hl] 1: +; *Petrorhagia saxifraga* [hl] 1: +; *Geranium dissectum* [hl] 1: +; *Campanula patula* [hl] 1: +; *Crucianella angustifolia* [hl] 1: +; *Vicia loiseleurii* [hl] 1: +; *Bromus sterilis* [hl] 1: +;

Acinos alpinus ssp. *meridionalis* [hl] 2: +; *Clematis flammula* [sl] 3: +, [hl] 3: +; *Torilis leptophylla* [hl] 3: +; *Silene viridiflora* [hl] 3: +; *Fragaria vesca* [hl] 3: +; *Ranunculus psilostachys* [hl] 3: +; *Peucedanum austriacum* [hl] 4: 1; *Aethionema saxatile* [hl] 4: +; *Valerianella dentata* [hl] 4: +; *Chamaecytisus elongatus* [hl] 4: +; *Alyssum saxatile* [hl] 4: +; *Elymus repens* [hl] 4: +; *Allium guttatum* [hl] 4: +; *Linaria peloponnesiaca* [hl] 4: +; *Hypericum rumeliacum* [hl] 4: +; *Chamaecytisus heuffellii* [hl] 5: 2; *Crataegus monogyna* [sl] 5: +, [hl] 5: +; *Arrhenatherum elatius* [hl] 5: +; *Centaurea rupestris* [hl] 5: +; *Ophrys apifera* [hl] 5: +; *Prunus cerasifera* [sl] 5: +; *Cephalorrhynchus tuberosus* [hl] 6: +; *Malus sylvestris* [sl] 6: +; *Prunus spinosa* [sl] 6: +; *Euonymus europaeus* [sl] 6: +; *Symphytum tuberosum* ssp. *angustifolia* [hl] 6: +; *Fragaria moschata* [hl] 6: +.

Localities and other characteristics are given in the Appendix.

Phillyreo latifoliae-Carpinetum orientalis **Bergmeier & Dimopoulos 2008**

The association *Phillyreo latifoliae-Carpinetum orientalis* (syn. *Pistacio terebinthi-Carpinetum*, *Carpinetum orientalis macedonicum*) has attracted the interest of researchers in the region already from the mid-20th century. Rudski, and at the same time also Oberdorfer, detected that *Carpinus orientalis* dominated communities appear as two subtypes; one where we can find in the species composition a mixture of deciduous and evergreen species (so called pseudomacchia) and the other that is composed only of deciduous species (so called šibljak) (Oberdorfer 1948, Rudski 1949, Horvat 1954).

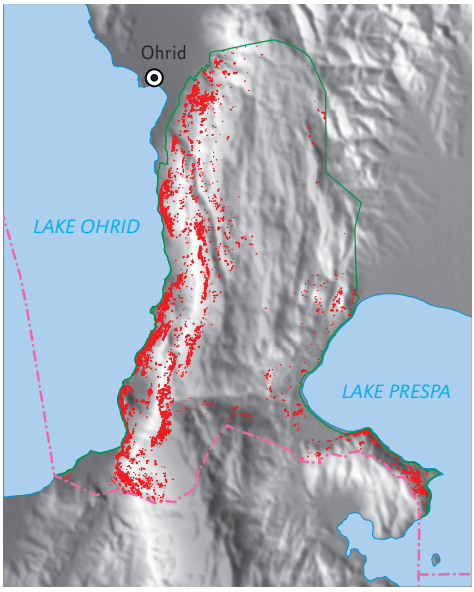


Figure 79. Distribution of the association *Phillyreo latifoliae-Carpinetum orientalis.*

The communities are typical extrazonal vegetation that originates from warmer parts of the Balkans. This is typical vegetation of coastal parts and warm, lowland parts that are under the influence of a submediterranean climate. Here, we can find them near to the lakes where the local climate is mitigated by the water body (Figure 80).

We can distinguish two subassociations, one *typicum* (Table 15, relevés 1–6) and the other *buxetosum* (Table 15, relevés 7–14). Subassociation *buxetosum* is spread probably due to the subatlantic influence of Lake Ohrid. Similar communities, where *Buxus sempervirens* enters into *Carpinus orientalis* communities, were found by Oberdorfer (1948) in northern Greece (Vermion and Athos).

Figure 80. *Phillyreo-Carpinetum* can be found on steep slopes above Lake Ohrid, where the climate is mitigated by the water body.

Nomenclatural remark

Phillyreo-Carpinetum orientalis Bergmeier et al. 2008 *buxetosum sempervirentis* subass. nova hoc loco

Holotypus: Table 15/12 – *holotypus hoc loco*

Ecological circumstances: *Buxus sempervirens* is a subatlantic species that can thrive on these sites because of the influence of Lake Ohrid.

Diagnostic species of the subassociation: *Buxus sempervirens*.

Diagnostic species of the association: ***Buxus sempervirens***, ***Carpinus orientalis***, *Clematis flammula*, *Coronilla emerus* ssp. *emeroides*, ***Phillyrea latifolia***, *Pistacia terebinthus*, *Ruscus aculeatus*; *Colutea arborescens*; *Geranium purpureum*, *Polypodium vulgare*, *Vicia loiseleurii*.

Constant species: *Carpinus orientalis*, *Fraxinus ornus*.

Dominant species: *Buxus sempervirens*, *Carpinus orientalis*, *Coronilla emerus* ssp. *emeroides*, *Phillyrea latifolia*, *Quercus cerris*.

These communities appear in the coastal zone of both lakes and on warm lowland parts of Galičica (Figure 79).

Table 15. *Phillyreo latifoliae-Carpinetum orientalis* Bergmeier & Dimopoulos 2008

Relevé number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Year		2009	2009	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2009	2009	
Date (mmdd)		0619	0621	0617	0617	0617	0623	0623	0621	0621	0618	0618	0618	0618	0622	0622	
Altitude (m)		785	719	930	1050	815	747	750	752	738	1069	990	908	864	723	814	
Aspect		NWW	W	NNW	W	N	W	W	W	W	W	W	W	W	NE	SWW	
Slope (°)		35	15	30	7	5	30	40	40	40	15	10	8	10	11	7	
Cover upper tree layer (%)		30	0	90	80	15	20	20	0	20	10	20	30	40	60	10	
Cover lower tree layer (%)		95	0	0	0	0	0	0	0	0	0	0	0	0	0	60	
Cover shrub layer (%)		30	95	60	60	100	100	100	70	80	100	100	90	80	70	80	
Cover herb layer (%)		40	10	30	40	50	30	30	30	–	20	30	30	30	30	40	
Cover moss layer (%)	Layer	20	0	10	20	40	30	10	40	0	40	10	20	10	0	0	Presence
Cover bare rock (%)		35	40	10	30	40	30	10	40	0	40	0	20	10	0	1	
Diagnostic species of the association																	
Carpinus orientalis	t1	2	.	+	4	1	2	+	.	.	+	+	1	+	2	.	11
Carpinus orientalis	t2	5	.	.	.	.	.	.	.	.	.	.	.	.	.	+	2
Carpinus orientalis	sl	2	2	3	3	5	4	5	4	2	4	2	4	4	.	2	14
Carpinus orientalis	hl	.	.	+	.	.	+	.	+	.	.	.	.	.	.	1	4
Coronilla emerus ssp. *emeroides*	sl	2	1	3	+	+	1	1	2	1	.	1	2	2	.	+	13
Coronilla emerus ssp. *emeroides*	hl	2	.	+	+	1	1	.	1	1	.	.	+	1	.	.	9
Geranium purpureum	hl	.	.	1	.	+	+	+	.	.	+	+	1	.	.	.	7
Polypodium vulgare	hl	.	.	+	.	+	.	+	+	.	.	+	.	+	.	.	6
Phillyrea latifolia	t1	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	1
Phillyrea latifolia	sl	.	1	.	.	.	1	1	2	3	.	.	.	.	.	.	5
Ruscus aculeatus	sl	.	.	.	.	.	.	.	+	+	.	.	.	.	+	+	4
Ruscus aculeatus	hl	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	2
Clematis flammula	hl	.	.	.	+	+	+	.	+	.	.	.	.	.	.	.	4
Vicia loiseleurii	hl	.	.	.	+	+	.	.	.	.	+	.	+	.	.	.	4
Pistacia terebinthus	sl	.	2	.	.	.	.	.	+	+	.	.	.	.	.	.	3
Pistacia terebinthus	hl	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	1
Colutea arborescens	sl	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	3
Differential species of the subassociation																	
Buxus sempervirens	sl	.	.	.	.	.	.	+	2	2	3	4	2	2	4	4	9
Buxus sempervirens	hl	.	.	.	.	.	.	+	.	+	1	1	+	+	+	.	7
QP ***Quercetalia pubescenti-petraeae***																	
Fraxinus ornus	t1	+	.	.	+	+	+	1	.	1	.	+	1	.	1	.	9
Fraxinus ornus	sl	+	.	1	1	1	+	2	1	1	+	.	+	1	+	+	13
Fraxinus ornus	hl	+	+	.	+	1	+	+	+	.	+	+	+	+	.	.	11
Juniperus oxycedrus	sl	+	.	.	+	2	1	+	+	.	1	1	1	+	.	1	11
Juniperus oxycedrus	hl	.	.	+	+	.	+	.	.	+	+	+	.	.	.	.	6

	Relevé number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	Quercus pubescens	t1	.	.	+	1	+	.	.	.	.	1	1	1	2	.	.	7
	Quercus pubescens	t2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1
	Quercus pubescens	sl	.	.	.	+	+	.	.	+	.	.	.	.	+	.	1	5
	Quercus pubescens	hl	+	.	+	+	.	+	+	.	.	+	.	.	.	.	.	6
	Asparagus acutifolius	sl	.	+	.	.	+	.	.	.	+	.	.	.	.	.	.	3
	Asparagus acutifolius	hl	.	.	.	.	+	1	+	1	+	.	.	+	.	.	+	7
	Melica uniflora	hl	1	.	.	2	.	1	1	.	.	.	1	2	1	.	.	7
	Viola alba ssp. *denhardtii*	hl	.	.	+	+	1	+	+	.	.	+	.	.	.	.	.	6
	Helleborus odorus	hl	.	.	+	+	.	1	1	.	.	+	.	.	.	.	+	6
	Arabis turrita	hl	.	.	.	.	.	+	+	2	1	1	+	.	.	.	.	6
	Quercus trojana	t1	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	2
	Quercus trojana	t2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
	Quercus trojana	sl	.	+	.	.	.	+	+	.	.	+	.	.	.	.	1	5
	Quercus trojana	hl	.	.	.	.	.	+	+	.	.	+	.	.	.	.	.	3
	Poa nemoralis	hl	.	.	.	.	.	+	.	1	1	.	.	1	.	+	.	5
	Acer monspessulanum	t1	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	2
	Acer monspessulanum	sl	.	.	+	1	+	+	.	.	.	.	.	.	.	.	.	4
	Acer monspessulanum	hl	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	2
	Carex hallerana	hl	.	.	+	+	.	.	.	+	.	.	+	.	.	.	.	4
	Festuca heterophylla	hl	.	.	.	+	+	.	.	.	.	.	+	+	.	.	.	4
	Ostrya carpinifolia	t1	1	.	.	.	.	.	.	.	.	.	.	.	+	2	.	3
	Ostrya carpinifolia	sl	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	2
	Sorbus torminalis	sl	+	.	.	.	.	.	.	.	.	+	.	+	.	.	.	3
	Sorbus torminalis	hl	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1
	Euonymus verrucosus	sl	+	.	+	.	.	.	+	.	.	.	.	.	.	.	.	3
	Lathyrus laxiflorus var. *laxiflorus*	hl	.	.	.	+	+	.	.	.	.	.	.	.	.	.	+	3
	Quercus cerris	t1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	1
	Quercus cerris	sl	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	2
	Quercus cerris	hl	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1
	Asyneuma limonifolium	hl	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	2
	Lathyrus venetus	hl	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	2
	Orchis purpurea	hl	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	2
	Campanula spatulata ssp. *spruneriana*	hl	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	2
	Sesleria robusta	hl	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	2
	Sorbus aria	t2	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cornus mas	sl	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1
	Lathyrus laxiflorus var. *glabratus*	hl	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	1
	Ornithogalum pyrenaicum	hl	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	1
	Luzula forsteri	hl	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1
	Viola alba ssp. *thessala*	hl	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1
QF	***Querco-Fagetea***																	
	Hedera helix	sl	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	2
	Hedera helix	hl	2	.	+	.	.	.	.	.	.	.	.	.	.	.	+	3

	Relevé number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	Trifolium patulum	hl	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1
	Acer campestre	t1	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1
	Cephalanthera longifolia	hl	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1
F2	***Fagetalia sylvaticae***																	
	Brachypodium sylvaticum	hl	.	.	+	1	.	.	.	.	.	.	1	.	.	.	.	3
	Clematis vitalba	t1	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1
	Clematis vitalba	sl	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1
	Clematis vitalba	hl	.	.	.	.	.	.	.	.	.	+	.	.	.	2	.	2
	Epipactis helleborine	hl	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	2
	Epipactis microphylla	hl	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	2
	Cephalanthera damasonium	hl	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	2
	Viola reichenbachiana	hl	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	2
	Primula vulgaris	hl	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	2
	Rosa arvensis	sl	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1
	Rosa arvensis	hl	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1
	Lonicera etrusca	sl	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1
	Galium pseudaristatum	hl	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1
	Aremonia agrimonoides	hl	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1
	Platanthera chlorantha	hl	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1
	Lonicera caprifolium	sl	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	1
	Doronicum columnae	hl	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1
	Arum maculatum	hl	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1
FB	***Festuco-Brometea***																	
	Poa bulbosa	hl	.	+	.	+	+	.	.	.	.	+	+	+	+	.	.	7
	Thymus longicaulis var. *longicaulis*	hl	.	.	.	+	.	+	.	.	.	+	1	+	+	.	+	7
	Cerastium brachypetalum	hl	.	.	+	.	+	.	.	.	+	.	+	+	.	.	.	5
	Leontodon crispus ssp. *crispus*	hl	.	+	.	+	+	.	.	.	+	.	.	.	.	.	.	4
	Dorycnium herbaceum var. *macedonicum*	hl	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	2
	Helianthemum nummularium	hl	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	2
	Coronilla scorpioides	hl	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	2
	Brachypodium pinnatum	hl	.	.	.	.	1	.	.	.	.	1	.	.	.	.	.	2
	Sedum ochroleucum	hl	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	2
	Festuca valesiaca	hl	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	2
	Trifolium scabrum	hl	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Arabis sagittata	hl	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1
	Phleum phleoides	hl	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1
	Trifolium campestre	hl	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1
	Hieracium bauhinii	hl	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1
	Campanula lingulata	hl	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1
	Koeleria splendens	hl	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	1
	Valerianella turgida	hl	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	1
	Trinia glauca	hl	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1

	Relevé number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
GU	***Galio-Urticetea***																	
	Galium aparine	hl	.	.	.	.	+	.	.	.	.	+	.	+	.	+	.	4
	Cardamine hirsuta	hl	.	.	+	.	.	.	+	+	.	.	.	.	.	.	.	3
	Geranium lucidum	hl	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	2
	Geranium robertianum	hl	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cruciata laevipes	hl	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1
	Alliaria petiolata	hl	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	1
	Medicago falcata	hl	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1
TG	***Trifolio-Geranietea sanguinei***																	
	Silene italica	hl	.	.	.	1	+	2	1	.	.	+	1	.	+	.	1	8
	Teucrium chamaedrys	hl	+	.	+	.	+	+	.	.	.	.	.	+	+	.	.	6
	Poa angustifolia	hl	.	.	.	+	1	.	.	.	.	+	.	.	+	.	.	4
	Trifolium medium ssp. *balcanicum*	hl	.	.	+	.	.	.	.	.	.	.	.	+	+	.	.	3
	Clinopodium vulgare	hl	.	.	.	+	.	+	.	.	.	.	.	.	+	.	.	3
	Campanula bononiensis	hl	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1
	Astragalus glycyphyllos	hl	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1
	Hypericum perforatum var. *angustifolium*	hl	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	1
	Other species																	
	Dactylis glomerata	hl	+	+	1	1	2	+	+	.	1	.	+	+	.	.	2	11
	Veronica chamaedrys	hl	+	.	.	1	.	1	1	.	.	+	1	+	1	.	.	8
	Silene vulgaris	hl	.	1	1	+	.	.	+	+	+	.	.	+	+	.	.	8
	Galium rigidifolium	hl	+	+	1	+	.	.	.	.	.	.	.	+	.	.	+	6
	Acinos alpinus ssp. *meridionalis*	hl	.	.	+	+	+	.	.	.	+	.	+	+	.	.	.	6
	Trifolium physodes	hl	.	.	.	+	+	.	.	.	.	.	+	.	.	.	.	3
	Lathyrus aphaca	hl	.	.	.	.	1	.	.	.	+	.	.	.	.	.	+	3
	Fragaria vesca	hl	.	.	.	.	+	.	.	.	.	.	.	.	.	+	+	3
	Asplenium ceterach	hl	.	.	.	.	.	+	.	1	+	.	.	.	.	.	.	3
	Cardaminopsis halleri	hl	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Micromeria juliana	hl	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	2
	Bromus sterilis	hl	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	2
	Cynosurus echinatus	hl	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	2
	Trifolium angustifolium	hl	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	2
	Crepis vesicaria	hl	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	2
	Hypericum rumeliacum	hl	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	2

Other species with low frequency:

Juniperus communis [sl] 2: 1, [hl] 12: +; *Prunus cerasifera* [sl] 3: +, [hl] 5: +; *Rhamnus rhodopeus* [sl] 12: +, [hl] 12: +; *Carlina corymbosa* [hl] 2: +; *Convolvulus cantabrica* [hl] 2: +; *Melica transsilvanica* [hl] 2: +; *Sedum album* [hl] 2: +; *Arrhenatherum elatius* [hl] 3: +; *Poa compressa* [hl] 3: +; *Chamaecytisus tommasinii* [hl] 4: 1; *Orchis militaris* [hl] 4: +; *Polygala nicaeensis* ssp. *mediterranea* [hl] 4: +; *Ranunculus millefoliatus* [hl] 5: +;

Chamaecytisus heuffellii [hl] 5: +; *Colchicum autumnale* [hl] 5: +; *Fritillaria graeca* [hl] 5: +; *Lathyrus sphaericus* [hl] 5: +; *Orlaya daucoides* [hl] 5: +; *Platanthera bifolia* [hl] 5: +; *Trifolium striatum* [hl] 5: +; *Hypericum monbretii* [hl] 6: +; *Digitalis laevigata* [hl] 7: +; *Ferulago sylvatica* [hl] 7: +; *Sorbus domestica* [sl] 7: +; *Centaurea soskae* [hl] 8: +; *Ononis pusilla* [hl] 8: +; *Carduus thoermeri* [hl] 9: +; *Carex divulsa* [hl] 9: +; *Catapodium rigidum* [hl] 9: +; *Euphorbia graeca* [hl] 9: +; *Euphorbia phymatosperma* ssp. *cernua* [hl] 9: +; *Silene nutans* [hl] 9: +; *Steptorhamphus tuberosus* [hl] 9: +; *Stipa bromoides* [hl] 9: +; *Iris sintenisii* [hl] 10: +; *Symphytum tuberosum* ssp. *angustifolia* [hl] 10: +; *Lactuca viminea* [hl] 11: +; *Minuartia hybrida* [hl] 11: +; *Trisetum flavescens* [hl] 11: +; *Carex pairae* [hl] 12: +; *Lens nigricans* [hl] 12: +; *Prunus spinosa* [hl] 14: +; *Anthriscus cerefolium* var. *longiros* [hl] 14: +; *Bryonia alba* [hl] 14: +; *Myrrhoides nodosa* [hl] 14: +; *Stellaria media* [hl] 14: +; *Carex flacca* ssp. *flacca* [hl] 15: 3; *Elymus repens* [hl] 15: +; *Onobrychis alba* [hl] 15: +.

Localities and other characteristics are given in the Appendix.

Figure 81. Leaves and mature cones of *Juniperus oxycedrus* that remain red when they are ripe; it can be found in *Phillyreo latifoliae-Carpinetum orientalis*.

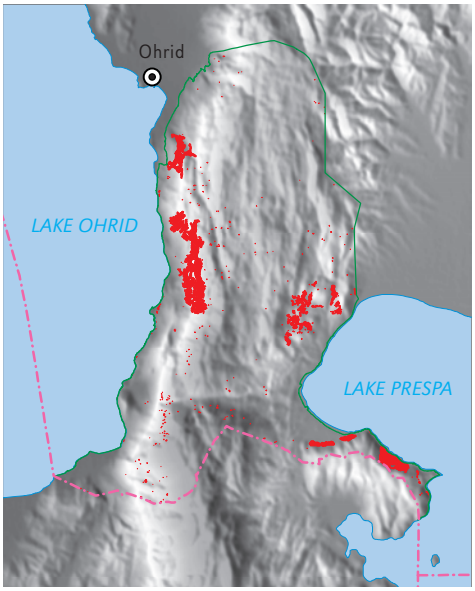


Figure 82. Distribution of the association *Querco pubescentis-Ostryetum carpinifoliae*.

***Querco pubescentis-Ostryetum carpinifoliae* Horvat 1938**

Above the belt of *Carpinus orientalis*, on the steep slopes over carbonate bedrock thrive *Ostrya carpinifolia* forests that are codominated by *Quercus pubescens* (Figure 83, 84). These steep, xerophilous forests are probably the potential natural vegetation of the site (Horvat 1938). Here we can find many species that can grow all over the year. In dense zonal forests of the region, e.g. *Quercetum frainetto-cerris* or various beech forests, the canopy is more or less closed during the summer. In these forests the species in herb layer should finish their reproductive cycle already in the spring, while later on the light availability is too low for their growth. But in these for-

Figure 83. *Querco pubescentis-Ostryetum carpinifoliae* on steep slopes.

ests the light availability is propitious throughout the year and the herb species can thrive till the late autumn. At the same time also the vegetation season begins earlier in these sites; the snow melts earlier and the sites are more exposed to sun radiation and therefore warmer. This also means that the summer drought is more pronounced on these sites.

On these sites appears *Sesleria robusta* that has already been discussed.

Diagnostic species: *Coronilla varia*, *Juniperus foetidissima*, *Juniperus oxycedrus*, *Quercus pubescens*, ***Rhamnus saxatilis***, *Sorbus aria*; ***Frangula rupestris***; *Asyneuma limonifolium*, *Campanula lingulata*, ***Dianthus cruentus*** **ssp.** ***cruentus***, ***Helictotrichon convolutum***, *Koeleria splendens*, *Laserpitium ochridanum*, *Polygonatum odoratum*, ***Sedum album***, *Trinia glauca*, *Vincetoxicum hirundinaria*.

Constant species: *Fraxinus ornus*, *Juniperus oxycedrus*, *Ostrya carpinifolia*, *Quercus pubescens*.

Dominant species: *Ostrya carpinifolia*, *Quercus pubescens*; *Sesleria robusta*.

These forests appear on steep slopes on Topola hill, below Klepiše, above St. Tanas, above Oteševo, on the hills of Golem rid, Prisoj, Propasna, Sladun, Polica, Margarina, and on the western part on Strnište, Šumjak, Raven, and Gumenci (Figure 82).

Figure 84. *Quercus pubescens* is a codominant species in *Querco pubescentis-Ostryetum carpinifoliae*.

Table 16. *Querco pubescentis-Ostryetum carpinifoliae* Horvat 1938

	Relevé number		1	2	3	4	5	6	
	Year		2010	2010	2010	2010	2010	2009	
	Date (mmdd)		0617	0617	0617	0617	0617	0615	
	Altitude (m)		1290	1340	1280	1300	1250	930	
	Aspect		SW	SWW	SW	SW	W	NNE	
	Slope (°)		38	32	27	34	31	25	
	Cover upper tree layer (%)		50	50	50	60	60	80	
	Cover lower tree layer (%)		0	0	0	0	0	0	
	Cover shrub layer (%)		20	30	10	30	30	30	
	Cover herb layer (%)		40	80	80	60	80	80	
	Cover moss layer (%)	Layer	3	20	5	10	30	0	Presence
	Cover bare rock (%)		50	70	40	70	60	0	
	Diagnostic species of the association								
	Quercus pubescens	t1	2	2	3	3	2	3	6
	Quercus pubescens	sl	+	.	+	+	+	.	4
	Quercus pubescens	hl	.	.	+	.	.	.	1
	Juniperus oxycedrus	sl	1	+	+	2	+	+	6
	Juniperus oxycedrus	hl	.	.	.	+	.	.	1
	Koeleria splendens	hl	+	+	+	+	.	.	4
	Helictotrichon convolutum	hl	2	.	1	2	2	.	4
	Sedum album	hl	+	.	+	+	+	.	4
	Sorbus aria	sl	.	.	.	+	+	+	3
	Sorbus aria	hl	+	.	.	+	.	.	2
	Dianthus cruentus ssp. *cruentus*	hl	+	1	+	.	.	.	3
	Trinia glauca	hl	+	+	.	.	+	.	3
	Frangula rupestris	sl	+	.	.	+	+	.	3
	Juniperus foetidissima	sl	.	1	.	+	+	.	3
	Coronilla varia	hl	1	1	+	.	.	.	3
	Asyneuma limonifolium	hl	.	+	+	.	.	+	3
	Rhamnus saxatilis	sl	+	.	.	.	.	.	1
	Rhamnus saxatilis	hl	.	+	.	.	+	.	2
	Campanula lingulata	hl	+	.	.	+	.	.	2
	Laserpitium ochridanum	hl	.	+	.	1	.	.	2
	Polygonatum odoratum	hl	.	.	2	1	.	.	2
	Vincetoxicum hirundinaria	hl	.	.	+	+	.	.	2
QP	***Carpinion orientalis*, *Quercetalia pubescenti-petraeae***								
	Ostrya carpinifolia	t1	3	2	2	1	2	2	6
	Ostrya carpinifolia	sl	.	.	.	+	+	1	3
	Fraxinus ornus	t1	.	+	+	.	1	1	4
	Fraxinus ornus	sl	2	1	+	.	1	1	5
	Fraxinus ornus	hl	+	+	.	+	.	+	4
	Sesleria robusta	hl	1	4	2	3	3	.	5
	Acer obtusatum	sl	.	.	+	+	.	+	3
	Acer obtusatum	hl	.	.	.	.	+	.	1

	Relevé number		1	2	3	4	5	6	
	Acer monspessulanum	sl	+	+	.	.	.	+	3
	Carex hallerana	hl	.	+	.	+	+	.	3
	Coronilla emerus ssp. *emeroides*	sl	1	.	.	.	.	2	2
	Coronilla emerus ssp. *emeroides*	hl	+	.	.	.	+	.	2
	Juniperus excelsa	t1	.	.	.	1	1	.	2
	Juniperus excelsa	sl	.	.	.	.	2	.	1
	Juniperus excelsa	hl	.	.	.	.	+	.	1
	Euonymus verrucosus	sl	.	.	.	.	.	+	1
	Euonymus verrucosus	hl	.	+	.	+	.	.	2
	Convallaria majalis	hl	.	.	2	.	.	.	1
	Festuca heterophylla	hl	.	.	.	.	.	2	1
	Poa nemoralis	hl	.	.	.	.	.	1	1
	Scutellaria columnae	hl	.	.	.	.	.	1	1
	Arabis turrita	hl	.	.	.	.	.	+	1
	Potentilla micrantha	hl	.	.	.	.	.	+	1
	Luzula forsteri	hl	.	.	.	.	.	+	1
	Lathyrus laxiflorus var. *laxiflorus*	hl	.	.	.	.	.	+	1
	Helleborus odorus	hl	.	.	.	.	.	+	1
	Viola alba ssp. *thessala*	hl	.	.	.	.	.	+	1
	Trifolium pignantii	hl	.	.	.	.	.	+	1
	Cornus mas	sl	.	.	.	.	.	+	1
	Melica uniflora	hl	.	.	.	.	.	+	1
	Physospermum cornubiense	hl	.	.	.	.	.	+	1
QF	***Querco-Fagetea***								
	Dryopteris filix-mas	hl	.	.	.	.	.	+	1
	Cephalanthera rubra	hl	.	.	.	.	.	+	1
F2	***Fagetalia sylvaticae***								
	Polygonatum multiflorum	hl	.	1	.	.	+	+	3
	Epipactis helleborine	hl	.	+	.	.	+	.	2
	Galium pseudaristatum	hl	.	+	.	.	.	+	2
	Lilium martagon	hl	.	.	1	+	.	.	2
	Abies borisii-regis	sl	.	+	.	.	.	.	1
	Abies borisii-regis	hl	.	.	.	+	.	.	1
	Acer platanoides	hl	.	+	.	.	.	.	1
	Primula veris ssp. *columnae*	hl	.	.	.	+	.	.	1
	Doronicum columnae	hl	.	.	.	.	.	+	1
	Elymus caninus	hl	.	.	.	.	.	+	1
	Rosa arvensis	sl	.	.	.	.	.	+	1
FB	***Festuco-Brometea***								
	Arabis sagittata	hl	+	+	+	.	.	.	3
	Helianthemum nummularium	hl	+	1	.	+	.	.	3
	Thymus longicaulis var. *longicaulis*	hl	1	1	.	.	.	1	3
	Erysimum diffusum	hl	+	.	.	+	+	.	3
	Brachypodium pinnatum	hl	.	+	1	.	.	.	2

	Relevé number		1	2	3	4	5	6	
	Asphodelus albus	hl	.	+	+	.	.	.	2
	Sedum ochroleucum	hl	.	+	.	+	.	.	2
	Thymus ciliatopubescens	hl	.	.	+	.	.	.	1
	Minuartia verna ssp. *collina*	hl	.	.	+	.	.	.	1
	Poa bulbosa	hl	.	.	.	.	.	1	1
	Cerastium brachypetalum	hl	.	.	.	.	.	+	1
GU	***Galio-Urticetea***								
	Geranium robertianum	hl	.	.	.	.	.	+	1
	Galium aparine	hl	.	.	.	.	.	+	1
	Geum urbanum	hl	.	.	.	.	.	+	1
	Cardamine hirsuta	hl	.	.	.	.	.	+	1
	Geranium lucidum	hl	.	.	.	.	.	+	1
TG	***Trifolio-Geranietea sanguinei***								
	Melampyrum heracleoticum	hl	1	1	1	+	1	.	5
	Teucrium chamaedrys	hl	+	1	.	1	1	1	5
	Silene italica	hl	.	+	+	.	+	2	4
	Origanum vulgare	hl	.	.	+	.	1	.	2
	Asperula purpurea	hl	.	+	.	.	.	.	1
	Thalictrum minus	hl	.	.	.	.	+	.	1
	Clinopodium vulgare	hl	.	.	.	.	.	1	1
	Trifolium alpestre	hl	.	.	.	.	.	+	1
	Other species								
	Iberis sempervirens	hl	1	+	1	1	1	.	5
	Leontodon crispus ssp. *crispus*	hl	+	+	+	+	+	.	5
	Acinos alpinus ssp. *meridionalis*	hl	1	+	+	+	.	.	4
	Silene vulgaris	hl	+	+	+	+	.	.	4
	Peucedanum austriacum	hl	+	1	+	.	.	+	4
	Sedum acre	hl	+	+	.	+	+	.	4
	Pimpinella tragium ssp. *lithophila*	hl	+	.	+	+	+	.	4
	Achillea holosericea	hl	+	+	.	+	.	.	3
	Galium rigidifolium	hl	+	.	.	.	+	+	3
	Linaria peloponnesiaca	hl	+	+	.	.	.	.	2
	Asperula aristata	hl	+	.	+	.	.	.	2
	Eryngium palmatum	hl	.	+	+	.	.	.	2
	Asplenium ceterach	hl	.	+	+	.	.	.	2
	Cyclamen hederifolium	hl	.	+	.	.	+	.	2
	Dactylis glomerata	hl	.	1	.	.	.	1	2
	Veronica chamaedrys	hl	.	.	.	.	+	1	2

Other species with low frequency:

Frangula alnus [sl] 3: +, [hl] 5: +; *Alyssum subvirescens* [hl] 1: +; *Paronychia macedonica* [hl] 1: +; *Draba athoa* [hl] 1: +; *Carex caryophyllea* [hl] 1: r; *Potentilla pedata* [hl] 2: +; *Gymnadenia conopsea* [hl] 2: +; *Petrorhagia illyrica* ssp. *illyrica* [hl] 2: +; *Campanula*

bononiensis [hl] 2: +; *Scabiosa fumarioides* [hl] 2: +; *Daphne oleoides* [sl] 2: +; *Anacamptis pyramidalis* [hl] 3: +; *Galium oreophilum* [hl] 3: +; *Rhamnus alpinus* ssp. *fallax* [hl] 4: +; *Coronilla coronata* [hl] 4: +; *Rhamnus rhodopeus* [hl] 4: +; *Iris sintenisii* [hl] 5: +; *Hypnum cupressiforme* [ml] 5: +; *Arrhenatherum elatius* [hl] 6: 1; *Cardamine graeca* [hl] 6: +; *Hypericum spruneri* [hl] 6: +; *Hieracium cymosum* [hl] 6: +; *Fragaria vesca* [hl] 6: +.

Localities and other characteristics are given in the Appendix.

Fraxino orni-Ostryion Tomažič 1940

This alliance is sometimes treated as an earlier (valid) synonym for the alliance *Carpinion orientalis* Horvat 1954, but the analysis conducted in recent years (Čarni et al. 2009) shows that two alliances could be distinguished. One containing the *Quercus pubescens*, *Carpinus orientalis*, and *Ostrya carpinolia* forests in parts of the Balkans under the influence of the Mediterranean sea, found in the coastal areas and also, extra-zonally, in inland areas (on steep southern slopes, around the lake where the climate is mitigated by the water body etc.). The other alliance *Fraxino orni-Ostryion* is found on steep slopes at higher altitudes, where *Quercus pubescens* and *Carpinus orientalis* cannot grow. In the northern part of the Balkans these forests are mixing with thermophilous pine forests of the class *Erico-Pinetea* Horvat 1959.

Seslerio robustae-Ostryetum **Matevski et al. ass. nova**

At higher altitudes, on steep slopes where (proto)rendzinas over carbonate bedrock appear and *Quercus pubescens* cannot thrive any more, the monodominant stands of *Ostrya carpinifolia* can be found (Figure 86). They appear as a succession phase of afforestation of dry grasslands in the area of *Aceri obtusati-Fagetum* or can be a permanent community on extreme (steep) sites. The community is geovicariant to *Seslerio autumnalis-Ostryetum carpinifoliae*, appearing in the wide range from the western Balkans till mount Bistra in the western part of Macedonia (Rizovski & Džekov 1990). The community is differentiated above all by the dominance of *Sesleria robusta* in the herb layer.

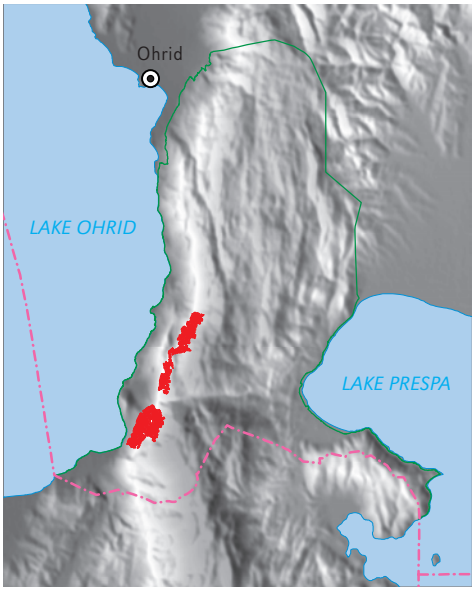


Figure 85. Distribution of the association *Seslerio robustae-Ostryetum*.

Figure 86. *Seslerio-Ostryetum* grows at higher elevations, where *Quercus pubescens* cannot appear.

Nomenclatural remark

Holotypus: Table 17/2 – *holotypus hoc loco*

Ecological circumstances: *Ostrya carpinifolia* dominated forests in the montane zone thriving on shallow soil horizons over carbonate bedrock.

Diagnostic species: ***Allium guttatum***, *Elymus repens*, *Iris sintenisii*, *Mercurialis perennis*, *Physospermum cornubiense*, *Sedum ochroleucum*, *Silene vulgaris*, *Teucrium chamaedrys*, ***Viola odorata***.

Constant species: *Fraxinus ornus*, *Ostrya carpinifolia*; *Galium rigidifolium*, *Polygonatum multiflorum*, *Sesleria robusta*, *Teucrium chamaedrys*.

Dominant species: *Ostrya carpinifolia*; *Sesleria robusta*.

Figure 87. In *Seslerio-Ostryetum* the southern Balkan endemic species *Lilium heldreichii* can be found.

These forests are found in the western part of Galičica, on Drzgine, Cero, Čaškine, and Lako Signoj above Trpejca (Figure 85).

Table 17. *Seslerio-Ostryetum* Matevski et al. ass. nova hoc loco

	Relevé number		1	2	3	4	
	Year		2009	2009	2009	2009	
	Date (mmdd)		0619	0621	0621	0621	
	Altitude (m)		1441	1255	1255	1435	
	Aspect		W	W	NWW	NW	
	Slope (°)		30	16	22	15	
	Cover upper tree layer (%)		80	80	60	30	
	Cover lower tree layer (%)		0	5	0	80	
	Cover shrub layer (%)		20	40	40	20	
	Cover herb layer (%)		80	70	40	70	
	Cover moss layer (%)	Layer	0	0	0	0	Presence
	Cover bare rock (%)		30	1	25	20	
	Diagnostic species of the association						
	Teucrium chamaedrys	hl	+	+	+	+	4
	Physospermum cornubiense	hl	+	1	1	.	3
	Elymus repens	hl	+	1	+	.	3
	Silene vulgaris	hl	1	.	+	+	3
	Mercurialis perennis	hl	+	1	.	.	2
	Allium guttatum	hl	+	.	+	.	2
	Sedum ochroleucum	hl	+	.	+	.	2
	Viola odorata	hl	+	.	.	+	2
	Iris sintenisii	hl	.	+	.	+	2
QP	***Fraxino orni-Ostryion*, *Quercetalia pubescenti-petraeae***						
	Fraxinus ornus	t1	1	+	1	+	4
	Fraxinus ornus	sl	.	+	1	+	3
	Fraxinus ornus	hl	.	.	.	+	1
	Sesleria robusta	hl	3	4	1	1	4
	Acer obtusatum	t1	.	1	.	.	1
	Acer obtusatum	t2	.	+	.	.	1
	Acer obtusatum	sl	+	2	+	.	3
	Acer obtusatum	hl	+	+	.	.	2
	Ostrya carpinifolia	t1	4	4	2	.	3
	Ostrya carpinifolia	t2	.	.	.	3	1
	Ostrya carpinifolia	hl	.	.	.	+	1
	Juniperus oxycedrus	t1	.	.	2	.	1
	Juniperus oxycedrus	sl	.	.	1	+	2
	Sorbus aria	sl	1	+	.	.	2
	Sorbus aria	hl	+	.	.	.	1

	Relevé number		1	2	3	4	
	Euonymus verrucosus	sl	.	1	+	.	2
	Euonymus verrucosus	hl	.	+	.	.	1
	Poa nemoralis	hl	+	+	.	.	2
	Convallaria majalis	hl	.	2	+	.	2
	Quercus trojana	sl	.	+	1	.	2
	Festuca heterophylla	hl	.	+	.	+	2
	Coronilla emerus ssp. *emeroides*	sl	.	.	+	.	1
	Coronilla emerus ssp. *emeroides*	hl	.	+	.	.	1
	Acer monspessulanum	t2	.	.	.	2	1
	Acer monspessulanum	sl	.	.	.	1	1
	Quercus cerris	t1	.	.	.	1	1
	Quercus cerris	hl	.	.	.	1	1
	Juniperus foetidissima	sl	+	.	.	.	1
	Asyneuma limonifolium	hl	.	.	+	.	1
	Carex hallerana	hl	.	.	+	.	1
	Melica uniflora	hl	.	.	.	2	1
	Helleborus odorus	hl	.	.	.	1	1
	Ornithogalum pyrenaicum	hl	.	.	.	+	1
	Potentilla micrantha	hl	.	.	.	+	1
	Quercus pubescens	t2	.	.	.	+	1
QF	***Querco-Fagetea* (incl. *Fagetalia sylvaticae*)**						
	Polygonatum multiflorum	hl	1	+	+	+	4
	Lilium martagon	hl	+	+	.	.	2
	Doronicum columnae	hl	+	+	.	.	2
	Primula veris ssp. *columnae*	hl	1	.	.	.	1
	Fagus sylvatica	sl	.	+	.	.	1
	Thalictrum aquilegiifolium	hl	.	+	.	.	1
	Quercus petraea	t1	.	+	.	.	1
	Rosa arvensis	hl	.	.	.	+	1
	Clematis vitalba	sl	.	.	.	+	1
FB	***Festuco-Brometea***						
	Thymus longicaulis var. *longicaulis*	hl	1	+	.	+	3
	Koeleria splendens	hl	+	.	1	.	2
	Helianthemum nummularium	hl	+	.	+	.	2
	Erysimum diffusum	hl	+	.	+	.	2
	Leontodon crispus ssp. *crispus*	hl	+	.	+	.	2
	Festuca galicicae	hl	1	.	.	.	1
	Minuartia verna ssp. *collina*	hl	+	.	.	.	1
	Potentilla laciniosa	hl	+	.	.	.	1
	Helictotrichon convolutum	hl	.	.	2	.	1
	Trinia glauca	hl	.	.	+	.	1
	Campanula lingulata	hl	.	.	+	.	1

	Relevé number		1	2	3	4	
	Phleum phleoides	hl	.	.	.	+	1
	Festuca valesiaca	hl	.	.	.	+	1
GU	***Galio-Urticetea***						
	Geranium robertianum	hl	.	.	.	+	1
	Geum urbanum	hl	.	.	.	+	1
	Cruciata laevipes	hl	.	.	.	+	1
TG	***Trifolio-Geranietea sanguinei***						
	Melampyrum heracleoticum	hl	+	.	2	.	2
	Trifolium alpestre	hl	.	+	.	+	2
	Coronilla varia	sl	.	.	+	.	1
	Coronilla varia	hl	.	.	+	.	1
	Clinopodium vulgare	hl	.	+	.	.	1
	Poa angustifolia	hl	.	.	.	1	1
	Other species						
	Galium rigidifolium	hl	+	+	+	+	4
	Peucedanum austriacum	hl	+	+	+	.	3
	Dactylis glomerata	hl	+	+	.	1	3
	Rhamnus alpinus ssp. *fallax*	sl	.	+	+	.	2
	Rhamnus alpinus ssp. *fallax*	hl	.	+	.	.	1
	Iberis sempervirens	hl	2	.	+	.	2
	Pimpinella tragium ssp. *lithophila*	hl	1	.	+	.	2
	Saponaria bellidifolia	hl	+	.	+	.	2
	Achillea holosericea	hl	+	.	+	.	2
	Acinos alpinus ssp. *meridionalis*	hl	+	.	+	.	2
	Sedum acre	hl	+	.	.	+	2

Other species with low frequency:

Laserpitium ochridanum [hl] 1: 2; *Rhamnus catharticus* [sl] 1: 1; *Thesium bavarum* [hl] 1: +; *Veronica chamaedrys* [hl] 1: +; *Vicia incana* [hl] 1: +; *Arabis alpina* [hl] 1: +; *Campanula persicifolia* [hl] 1: +; *Cerastium decalvans* [hl] 1: +; *Dianthus cruentus* [hl] 1: +; *Dianthus minutiflorus* [hl] 1: +; *Eryngium palmatum* [hl] 1: +; *Linaria peloponnesiaca* [hl] 1: +; *Plantago argentea* [hl] 1: +; *Polypodium vulgare* [hl] 1: +; *Juniperus communis* [sl] 2: 2; *Arabis hirsuta* [hl] 2: +; *Alyssum trichostachyum* [hl] 3: +; *Lactuca perennis* [hl] 3: +; *Sedum magellense* [hl] 3: +; *Erysimum cuspidatum* [hl] 4: +; *Euonymus europaeus* [hl] 4: +; *Fragaria moschata* [hl] 4: +; *Galium tricornutum* [hl] 4: +; *Hesperis laciniata* [hl] 4: +; *Lactuca viminea* [hl] 4: +; *Lamium garganicum* [hl] 4: +; *Lilium heldreichii* [hl] 4: +; *Orlaya daucoides* [hl] 4: +; *Prunus cerasifera* [sl] 4: +; *Rhamnus rhodopeus* [sl] 4: +; *Thlaspi perfoliatum* [hl] 4: +.

Localities and other characteristics are given in the Appendix.

Juniperion excelsae-foetidissimae Matevski et al. 2010

These communities can be found in the regions characterised by a submediterranean climate (dry period during summer, maximum precipitation in the period from October to February, mild winter). They thrive on the southern aspect over shallow, skeletal soils derived from carbonate bedrock. These extreme ecological conditions enable the development of forests dominated by coniferous vegetation in the zone of deciduous forests mainly dominated by zonal oaks (Matevski et al. 2010).

Juniperus excelsa (Figure 89) might have spread on the Balkan Peninsula during a warmer period of the early Pliocene, when there was also a land connection between Asia Minor and the Balkans. It survived the repeated climatic oscillations of the Pleistocene in a similar manner as did some token relicts such as *Aesculus hippocastaneum* (Figure 90), *Forsythia europaea*, *Haberlea rhodopensis*, *Ramonda serbica*, *R. nathaliae* in refugial habitats (Médail & Diadema 2009).

Pruno webii-Juniperetum excelsae Em 1962 n. nud.

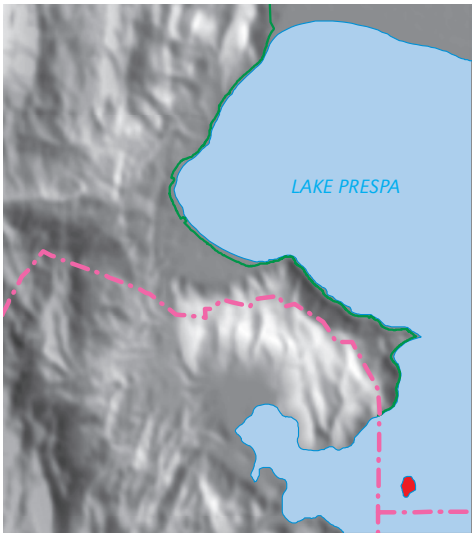


Figure 88. Distribution of the association *Pruno webii-Juniperetum excelsae.*

This association is found in many thermophilous localities in the Republic of Macedonia, near to the Vardar river and in the southern part of the Republic of Macedonia. With the increase in altitude, the Mediterranean species gradually disappear (*Quercus coccifera*, *Phillyrea latifolia*). There exists a disjunct population of this association on the island of Golem Grad on Lake Prespa at an altitude of 900 m, which was described as subassociation *celtetosum causacicae* (Em 1968) (Figure 91). Unfortunately, Em's description does not contain any vegetation relevé and is invalid according to the International Code of Phytosociological Nomenclature (Weber et al. 2000).

Diagnostic species: *Hedera helix*; ***Bromus sterilis***, ***Geranium lucidum***.
Constant species: *Hedera helix*, *Juniperus excelsa*; *Asparagus acutifolius*, *Bromus sterilis*, *Geranium lucidum*.
Dominant species: *Asparagus acutifolius*, *Hedera helix*, *Juniperus excelsa*.

These forests are found on the island of Golem Grad on Lake Prespa (Figure 88).

Figure 89. Settlement of cormorants (*Phalacrocorax carbo*) on *Juniperus excelsa* at Golem Grad.

Figure 90. One of the relict species *Aesculus hippocastaneum*, a rare woody species which can be found in the gorge of Zli Dol above Lake Ohrid.

Figure 91. View of *Pruno webii-Juniperetum excelsae*. The herb layer is scarce due to strong human impact and the high population of cormorants.

Figure 92. *Celtis glabrata* is a typical species in *Pruno webii-Juniperetum excelasae*. In Macedonia is found only in Golem Grad.

Table 18. *Pruno webii-Juniperetum excelsae* Em 1962

	Relevé number		1	2	
	Year		2009	2009	
	Date (mmdd)		0623	0622	
	Altitude (m)		877	891	
	Aspect		SWW	N	
	Slope (°)		4	2	
	Cover upper tree layer (%)		60	20	
	Cover lower tree layer (%)		0	80	
	Cover shrub layer (%)		50	30	
	Cover herb layer (%)		0	70	
	Cover moss layer (%)	Layer	0	10	Presence
	Cover bare rock (%)		0	0	
	Diagnostic species of the association				
	Hedera helix	t2	.	2	1
	Hedera helix	sl	+	2	2
	Hedera helix	hl	2	3	2
	Geranium lucidum	hl	+	1	2
	Bromus sterilis	hl	+	+	2
QP	***Quercetalia pubescenti-petraeae***				
	Asparagus acutifolius	sl	3	+	2
	Asparagus acutifolius	hl	1	.	1
	Prunus mahaleb	t2	.	2	1
	Prunus mahaleb	sl	+	.	1
	Prunus mahaleb	hl	.	1	1
	Celtis glabrata	t2	.	2	1
	Celtis glabrata	sl	+	.	1
	Cornus mas	t2	.	2	1
	Cornus mas	sl	.	1	1
	Crataegus monogyna	hl	+	.	1
	Tamus communis	hl	+	.	1
QF	***Juniperion excelsae-foetidissimae*, *Quercetalia pubescenti-petraeae*, *Querco-Fagetea***				
	Juniperus excelsa	t1	3	1	2
	Prunus domestica	hl	+	.	1
	Rosa arvensis	sl	.	+	1
FB	***Festuco-Brometea***				
	Eryngium campestre	hl	+	.	1
	Arenaria leptoclados var. *viscidula*	hl	+	.	1
	Cerastium brachypetalum	hl	+	.	1
	Medicago rigidula	hl	.	+	1
SM	***Stellarietea mediae***				
	Stellaria media	hl	1	.	1
	Myosotis arvensis	hl	+	.	1
	Lathyrus aphaca	hl	+	.	1
	Cynosurus echinatus	hl	+	.	1
	Other species				
	Geranium pusillum	hl	1	.	1
	Biarum tenuifolium	hl	1	.	1
	Ephedra fragilis ssp. *campylopoda*	sl	1	.	1
	Elymus repens	hl	+	.	1
	Silene italica	hl	+	.	1
	Medicago orbicularis	hl	+	.	1
	Anthriscus caucalis	hl	+	.	1
	Conium maculatum	hl	+	.	1
	Viola arvensis	hl	+	.	1
	Bryonia alba	sl	+	.	1
	Euphorbia characias ssp. *wulfenii*	hl	+	.	1
	Hordeum murinum ssp. *leporinum*	hl	+	.	1
	Medicago arabica	hl	+	.	1
	Draba muralis	hl	+	.	1
	Vulpia ciliata	hl	+	.	1
	Sternbergia lutea	hl	+	.	1
	Aegilops neglecta	hl	+	.	1
	Myosotis ramosissima	hl	+	.	1
	Lamium garganicum	hl	+	.	1
	Torilis nodosa	hl	.	+	1
	Erophila verna	hl	.	+	1

Localities and other characteristics are given in the Appendix.

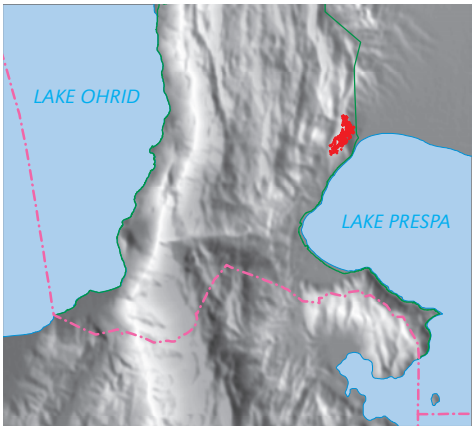


Figure 93. Distribution of the association *Querco trojanae-Juniperetum excelsae*.

Querco trojanae-Juniperetum excelsae **Matevski et al. 2010**

The stands of this association are found in well-insolated and warm habitats, having shallow soils derived from limestone bedrock. The extreme site conditions enable *Juniperus excelsa* to outcompete *Quercus trojana* and other oak species that dominate the oak forests in the neighbouring area (Figure 94) (Matevski et al. 2010). These stands are the most extreme stands in the region, in the sense of thermicity, where the deciduous tree species are outcompeted by conifers.

Diagnostic species: ***Lonicera etrusca***, *Rhamnus rhodopeus*; *Anthyllis vulneraria* ssp. *polyphylla*, ***Arabis pseudoturritis***, *Arenaria leptoclados* var. *viscidula*, *Cerastium brachypetalum*, ***Crucianella angustifolia***, ***Crupina vulgaris***, *Eryngium campestre*, ***Medicago minima***, *Medicago rigidula*, *Poa bulbosa*, ***Potentilla laciniosa***, *Scabiosa fumarioides*, ***Trifolium campestre***, ***Trifolium scabrum***.
Constant species: *Juniperus excelsa*, *Quercus trojana*, *Lonicera etrusca*.
Dominant species: ***Juniperus excelsa***, *Juniperus oxycedrus*; *Carex halleriana*.

Figure 94. *Querco trojanae-Juniperetum excelsae* on Sirhansko Kale.

Figure 95. A deep violet-blue flowering *Iris sintenisii*. The species is closely related with *Iris graminea*. *It has narrow, grass-like* leaves and is difficult to recognise without flower. It thrives in *Querco trojanae-Juniperetum excelsae* forests.

These forests can be found on Sirhansko Kale above the village of Sirhan and on some other warm areas on Galičica (Figure 93).

Table 19. *Querco trojanae-Juniperetum excelsae* Matevski et al. 2010

Relevé number		1	2	3	4	
Year		2009	2009	2009	2010	
Date (mmdd)		0623	0615	0617	0615	
Altitude (m)		1046	892	1118	1177	
Aspect		SWW	SEE	SEE	W	
Slope (°)		4	12	30	10	
Cover upper tree layer (%)		70	90	30	70	
Cover lower tree layer (%)		0	0	0	0	
Cover shrub layer (%)		60	20	90	40	
Cover herb layer (%)		20	40	95	80	
Cover moss layer (%)	Layer	0	10	0	80	Presence
Cover bare rock (%)		0	1	30	80	
Diagnostic species of the association						
Lonicera etrusca	sl	+	.	1	+	3
Lonicera etrusca	hl	+	1	.	.	2
Medicago minima	hl	+	+	+	.	3

	Relevé number		1	2	3	4	
	Poa bulbosa	hl	+	.	2	+	3
	Trifolium campestre	hl	+	.	+	+	3
	Cerastium brachypetalum	hl	+	.	+	+	3
	Crupina vulgaris	hl	.	+	+	+	3
	Arabis pseudoturritis	hl	.	+	+	+	3
	Crucianella angustifolia	hl	.	+	+	+	3
	Arenaria leptoclados var. *viscidula*	hl	+	.	+	.	2
	Potentilla laciniosa	hl	+	.	.	+	2
	Trifolium scabrum	hl	.	+	+	.	2
	Eryngium campestre	hl	.	+	+	.	2
	Scabiosa fumarioides	hl	.	+	+	.	2
	Anthyllis vulneraria ssp. *polyphylla*	hl	.	.	2	1	2
	Medicago rigidula	hl	.	.	+	+	2
QF	***Juniperion excelsae-foetidissimae*, *Quercetalia pubescenti-petraeae*, *Querco-Fagetea***						
	Juniperus excelsa	t1	3	4	3	4	4
	Juniperus excelsa	sl	.	1	4	2	3
	Juniperus oxycedrus	t1	.	1	.	.	1
	Juniperus oxycedrus	sl	3	2	2	.	3
	Juniperus oxycedrus	hl	+	.	.	.	1
	Quercus trojana	t1	.	+	.	+	2
	Quercus trojana	sl	1	.	+	+	3
	Fraxinus ornus	t1	.	.	.	1	1
	Fraxinus ornus	sl	.	.	+	1	2
	Fraxinus ornus	hl	.	.	.	+	1
	Quercus pubescens	sl	1	.	.	+	2
	Quercus pubescens	hl	.	+	.	.	1
	Quercus frainetto	t1	+	+	.	.	2
	Quercus frainetto	sl	1	.	.	.	1
	Rosa arvensis	sl	+	+	.	.	2
	Clematis vitalba	t1	.	+	.	.	1
	Clematis vitalba	hl	.	+	.	.	1
	Juniperus foetidissima	t1	1	.	.	.	1
	Quercus cerris	sl	+	.	.	.	1
	Helleborus odorus	hl	+	.	.	.	1
	Campanula spatulata ssp. *spruneriana*	hl	+	.	.	.	1
	Aremonia agrimonoides	hl	.	+	.	.	1
	Cornus mas	sl	.	+	.	.	1
	Carex hallerana	hl	.	.	3	.	1
FB	***Festuco-Brometea***						
	Sanguisorba minor ssp. *muricata*	hl	+	1	+	.	3
	Brachypodium pinnatum	hl	+	+	.	.	2
	Thymus longicaulis var. *longicaulis*	hl	+	+	.	.	2
	Melica ciliata	hl	.	.	+	2	2

	Relevé number		1	2	3	4	
	Phleum phleoides	hl	+	.	.	.	1
	Hieracium bauhinii	hl	.	+	.	.	1
	Koeleria splendens	hl	.	.	1	.	1
	Coronilla scorpioides	hl	.	.	+	.	1
	Minuartia verna ssp. *collina*	hl	.	.	.	+	1
	Erysimum diffusum	hl	.	.	.	+	1
	Euphorbia myrsinites	hl	.	.	.	+	1
	Valerianella turgida	hl	.	.	.	+	1
	Medicago lupulina	hl	.	.	.	+	1
	Helianthemum nummularium	hl	.	.	.	+	1
GU	***Galio-Urticetea***						
	Geum urbanum	hl	+	+	.	.	2
	Geranium lucidum	hl	+	.	.	2	2
	Galium aparine	hl	.	+	.	+	2
	Geranium purpureum	hl	.	.	1	+	2
	Geranium robertianum	hl	.	1	.	.	1
MA	***Molinio-Arrhenatheretea***						
	Dactylis glomerata	hl	+	1	+	.	3
	Arrhenatherum elatius	hl	1	.	.	.	1
	Poa trivialis ssp. *sylvicola*	hl	.	+	.	.	1
	Bellis perennis	hl	.	+	.	.	1
	Taraxacum officinale	hl	.	+	.	.	1
	Anthoxanthum odoratum	hl	.	.	.	1	1
	Silene vulgaris	hl	.	.	.	+	1
TG	***Trifolio-Geranietea sanguinei***						
	Teucrium chamaedrys	hl	.	+	+	1	3
	Silene italica	hl	.	2	.	+	2
	Clinopodium vulgare	hl	+	.	.	.	1
	Hypericum perforatum	hl	.	+	.	.	1
	Poa angustifolia	hl	.	+	.	.	1
	Asperula purpurea	hl	.	.	+	.	1
	Other species						
	Myosotis arvensis	hl	+	+	.	1	3
	Acinos alpinus ssp. *meridionalis*	hl	.	+	+	1	3
	Trifolium physodes	hl	+	+	.	.	2
	Veronica chamaedrys	hl	.	1	+	.	2
	Rhamnus rhodopeus	sl	.	+	+	.	2
	Bupleurum flavicans	hl	.	+	+	.	2
	Linum corymbulosum	hl	.	+	+	.	2
	Bromus sterilis	hl	.	.	1	+	2
	Sedum acre	hl	.	.	+	+	2
	Pimpinella tragium ssp. *lithophila*	hl	.	.	+	+	2

Other species with low frequency:

Fragaria vesca [hl] 1: 2; *Hieracium hoppeanum* [hl] 1: 1; *Galium tricornutum* [hl] 1: +; *Lathyrus sphaericus* [hl] 1: +; *Trifolium pratense* [hl] 1: +; *Vicia onobrychioides* [hl] 1: +; *Trifolium cherleri* [hl] 1: +; *Trifolium dalmaticum* [hl] 1: +; *Acinos suaveolens* [hl] 1: +; *Trifolium phleoides* [hl] 1: +; *Vicia dalmatica* [hl] 1: +; *Astragalus onobrychis* [hl] 2: 1; *Potentilla lacinosa* var. *subsericea* [hl] 2: +; *Carduus tmoleus* [hl] 2: +; *Prunus cerasifera* [sl] 2: +; *Iris sintenisii* [hl] 2: +; *Leontodon crispus* ssp. *crispus* [hl] 2: +; *Centaurea grisebachii* [hl] 2: +; *Tragopogon pratensis* [hl] 2: +; *Orchis morio* [hl] 2: +; *Thymus sibthorpii* [hl] 3: 1; *Stipa bromoides* [hl] 3: 1; *Orlaya daucoides* [hl] 3: +; *Anthriscus caucalis* [hl] 3: +; *Xeranthemum annuum* [hl] 3: +; *Turittis glabra* [hl] 3: +; *Iris attica* [hl] 3: +; *Oryzopsis virescens* [hl] 3: +; *Helianthemum salicifolium* [hl] 3: +; *Lithospermum incrassatum* [hl] 3: +; *Geranium columbinum* [hl] 3: +; *Scandix australis* [hl] 3: +; *Minuartia hybrida* [hl] 3: +; *Lathyrus cicera* [hl] 3: +; *Steptorhamphus tuberosus* [hl] 3: +; *Ophrys apifera* [hl] 3: +; *Nigella damascena* [hl] 3: +; *Linum austriacum* [hl] 3: +; *Helichrysum plicatum* [hl] 3: +; *Prunus spinosa* [sl] 3: +; *Arabis surculosa* [hl] 3: +; *Alyssum trichostachyum* [hl] 3: +; *Hypericum rumeliacum* [hl] 3: +; *Aethionema saxatile* [hl] 3: +; *Hieracium echioides* [hl] 4: 1; *Valeriana dioscoridis* [hl] 4: 1; *Rhamnus saxatilis* [hl] 4: 1; *Muscari racemosum* [hl] 4: +; *Ranunculus psilostachys* [hl] 4: +; *Valerianella coronata* [hl] 4: +; *Viola kitaibeliana* [hl] 4: +; *Festuca callieri* [hl] 4: +; *Lamium purpureum* [hl] 4: +; *Astragalus depressus* [hl] 4: +; *Cruciata pedemontana* [hl] 4: +; *Alkanna noneiformis* [hl] 4: +; *Eryngium serbicum* [hl] 4: +; *Hesperis laciniata* [hl] 4: +; *Thymus longicaulis* var. *intermedia* [hl] 4: +; *Leontodon cichoraceus* [hl] 4: +; *Achillea holosericea* [hl] 4: +; *Stellaria media* [hl] 4: +.

Localities and other characteristics are given in the Appendix.

Riverine forests

In the research area the water bodies are rare due to carbonate bedrock that is permeable for water. Rivers and other water bodies can be found in the lowlands, where we can find also non-carbonate bedrock. The riverine forests appear mainly in the lowland and form narrow fringes along water bodies. So their species composition is altered by human activities and invasion of allien species. The community is linked to the water course and therefore shows an azonal character. Because the variety of such communities in Europe is still not determinate at association level, it was decided to classify it in association *Salicetum albae* s. lat., that is further classified within the following syntaxa *Salicion albae* Soó 1930, *Salicetalia albae* Moor 1958, *Salicetea purpureae* Moor 1958.

Salicion albae Soó 1930 em. Moor 1958

***Salicetum albae* s. lat.**

This white willow community occurs along streams, where it develops under the direct influence of the stream, right above its mean water level, so it is frequently inundated. The soil is undeveloped, without clear soil horizons. Despite the considerable amount of litter and debris, there is little humus, because it is covered by new riverine sediments every year (Figure 97).

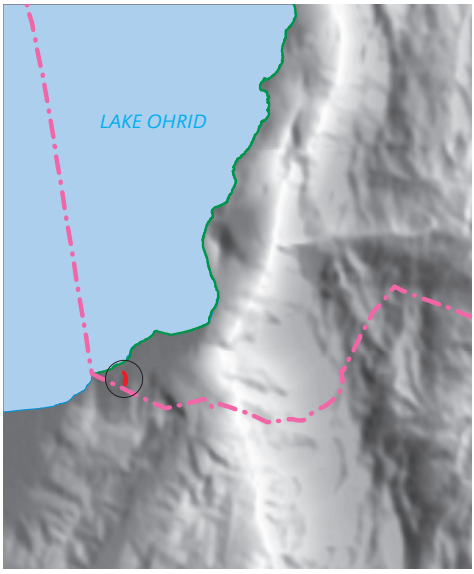


Figure 96. Distribution of the association *Salicetum albae*.

Diagnostic species: ***Cornus sanguinea***, ***Humulus lupulus*** (Figure 98), *Juglans regia*, *Prunus domestica*, ***Rubus sanguineus* var. *alnifolius***, ***Salix alba***, ***Sambucus nigra***, *Tamus communis*; ***Aegopodium podagraria***, ***Artemisia vulgaris***, ***Ballota nigra***, *Brachypodium sylvaticum*, ***Chaerophyllum aromaticum* var. *brevipilum***, ***Chelidonium majus***, *Elymus caninus*, ***Lapsana communis***, ***Parietaria officinalis***, ***Poa trivialis* ssp. *trivialis***, ***Rumex conglomeratus***, ***Saponaria officinalis***, ***Silene alba***, ***Urtica dioica***.

Figure 97. *Salicetum albae* extending along the river Čerava.

Figure 98. The flower cones of the *Humulus lupulus*, known as hops. Common hop is diagnostic species of the association *Salicetum albae*.

Constant species: *Clematis vitalba*, *Humulus lupulus*, *Salix alba*; *Parietaria officinalis*, *Urtica dioica*.

Dominant species: *Rubus sanguineus* var. *alnifolius*, ***Salix alba***; *Chaerophyllum temulum*, *Urtica dioica*.

This forest appears along the Čerava river near St. Naum below the hill Koštuna (Figure 96).

Table 20. *Salicetum albae* s. lat.

Relevé number		1	2	3	4	5	6	
Year		2009	2010	2010	2010	2010	2010	
Date (mmdd)		0621	0621	0622	0621	0621	0622	
Altitude (m)		716	730	720	730	735	720	
Aspect		W	–	–	–	–	–	
Slope (°)		2	–	–	–	–	–	
Cover upper tree layer (%)		30	50	60	70	60	60	
Cover lower tree layer (%)		80	40	40	20	10	5	
Cover shrub layer (%)		0	60	30	50	60	10	
Cover herb layer (%)		0	90	80	80	80	80	
Cover moss layer (%)	Layer	0	0	0	0	0	0	Presence
Cover bare rock (%)		0	0	0	0	0	0	
Diagnostic species of the association								
Humulus lupulus	t2	.	.	+	+	.	.	2
Humulus lupulus	sl	1	2	+	1	+	+	6
Humulus lupulus	hl	.	+	+	.	+	+	4
Urtica dioica	hl	1	1	3	4	4	4	6
Parietaria officinalis	hl	+	1	2	1	1	1	6
Salix alba	t1	.	3	3	4	4	4	5
Salix alba	t2	4	2	2	1	+	.	5
Salix alba	sl	.	.	.	+	+	.	2
Brachypodium sylvaticum	hl	.	2	+	1	+	+	5
Silene alba	hl	.	1	+	+	+	+	5
Sambucus nigra	sl	2	+	1	1	.	.	4
Sambucus nigra	hl	.	.	+	.	.	.	1
Chelidonium majus	hl	+	+	2	+	.	.	4
Lapsana communis	hl	.	+	1	.	+	+	4
Poa trivialis ssp. *trivialis*	hl	.	+	.	1	+	+	4
Aegopodium podagraria	hl	.	.	+	+	+	1	4
Juglans regia	t2	.	+	1	+	.	.	3
Juglans regia	sl	.	+	.	+	.	.	2
Rubus sanguineus var. *alnifolius*	sl	.	2	1	.	3	.	3
Rubus sanguineus var. *alnifolius*	hl	.	.	.	+	+	.	2
Cornus sanguinea	sl	+	2	+	.	.	.	3
Cornus sanguinea	hl	.	+	.	.	.	.	1

	Relevé number		1	2	3	4	5	6	
	Rumex conglomeratus	hl	.	+	+	+	.	.	3
	Chaerophyllum aromaticum var. *brevipila*	hl	.	+	.	1	1	.	3
	Artemisia vulgaris	hl	.	+	.	+	1	.	3
	Saponaria officinalis	hl	.	+	.	+	+	.	3
	Ballota nigra	hl	.	.	+	+	.	+	3
	Prunus domestica	t2	+	.	.	.	+	.	2
	Prunus domestica	sl	.	.	.	.	+	1	2
	Elymus caninus	hl	.	+	+	.	.	.	2
SA	***Salicion albae*, *Salicetalia purpureae*, *Salicetea purpureae***								
	Rubus caesius	sl	1	.	.	.	.	+	2
	Rubus caesius	hl	1	.	.	.	.	+	2
	Calystegia sepium	sl	.	.	.	+	.	.	1
	Calystegia sepium	hl	.	.	.	1	+	.	2
	Populus nigra	t1	1	.	1	.	.	.	2
	Cucubalus baccifer	hl	1	.	.	.	.	.	1
	Salix fragilis	t1	+	.	.	.	.	.	1
QP	***Quercetalia pubescenti-petraeae***								
	Ostrya carpinifolia	t2	.	.	.	.	.	+	1
	Ostrya carpinifolia	sl	+	.	.	.	.	.	1
	Coronilla emerus ssp. *emeroides*	sl	.	+	.	.	.	.	1
	Poa nemoralis	hl	.	.	.	+	.	.	1
F2	***Fagetalia sylvaticae***								
	Clematis vitalba	t1	.	.	.	.	.	1	1
	Clematis vitalba	t2	2	+	+	.	.	.	3
	Clematis vitalba	sl	2	2	+	+	+	.	5
	Clematis vitalba	hl	.	.	+	.	1	+	3
	Rosa arvensis	sl	+	.	+	+	.	.	3
	Arum maculatum	hl	+	.	.	.	.	.	1
	Acer pseudoplatanus	t2	.	+	.	.	.	.	1
	Aremonia agrimonoides	hl	.	+	.	.	.	.	1
	Moehringia trinervia	hl	.	.	.	.	.	+	1
QF	***Querco-Fagetea***								
	Tamus communis	sl	.	+	.	+	.	.	2
	Tamus communis	hl	.	+	.	.	.	.	1
	Hedera helix	hl	+	.	.	.	.	.	1
	Corylus avellana	sl	.	+	.	.	.	.	1
GU	***Galio-Urticetea***								
	Galium aparine	hl	1	+	+	+	.	.	4
	Chaerophyllum temulum	hl	2	3	2	.	.	2	4
	Alliaria petiolata	hl	+	+	+	.	.	+	4
	Geum urbanum	hl	.	+	.	+	+	.	3
	Cruciata laevipes	hl	.	.	.	+	+	.	2
	Sambucus ebulus	sl	1	.	.	.	.	.	1

	Relevé number		1	2	3	4	5	6	
	Chaerophyllum aromaticum	hl	+	.	.	.	.	.	1
	Geranium robertianum	hl	.	+	.	.	.	.	1
	Helianthus tuberosus	hl	.	.	.	+	.	.	1
	Geranium lucidum	hl	.	.	.	.	.	+	1
RP	***Rhamno-Prunetea***								
	Prunus cerasifera	t2	.	+	.	.	.	.	1
	Prunus cerasifera	sl	.	.	+	.	.	.	1
	Rubus sanguineus var. *sanguineus*	sl	2	.	.	.	.	.	1
	Euonymus europaeus	sl	+	.	.	.	.	.	1
	Prunus spinosa	sl	.	.	.	+	.	.	1
	Other species								
	Prunella vulgaris	hl	.	+	+	.	.	+	3
	Bromus sterilis	hl	.	1	.	+	.	+	3
	Dactylis glomerata	hl	.	+	.	.	.	+	2
	Holcus lanatus	hl	.	+	+	.	.	.	2
	Galium tricornutum	hl	.	.	.	.	+	+	2

Other species with low frequency:

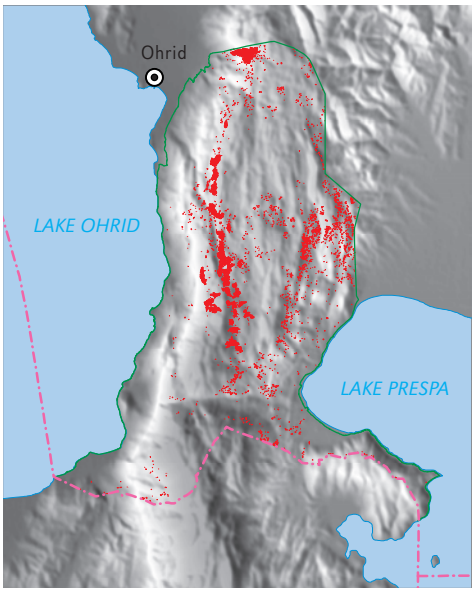
Robinia pseudacacia [t2] 3: +, [sl] 2: +, [hl] 2: +; *Agropyron caninum* [hl] 1: +; *Silene dioica* [hl] 2: +; *Festuca arundinacea* ssp. *orientalis* [hl] 2: +; *Pastinaca sativa* ssp. *urens* [hl] 2: +; *Poa pratensis* [hl] 2: +; *Medicago lupulina* [hl] 2: +; *Rubus discolor* [sl] 4: 3; *Geranium versicolor* [hl] 5: +; *Rumex obtusifolius* [hl] 6: +; *Euphorbia stricta* [hl] 6: +.

Localities and other characteristics are given in the Appendix.

Afforestation stage

Afforestation is one of the most progressive processes that takes place in the region. These processes have not been a topic of our elaboration, but we present only one case that is the most common feature in the area: afforestation of grasslands that takes place all over the Galičica mountain range.

Juniperus communis community [*Vaccinio-Piceetea*]



These communities appear on abandoned fields and pastures in the zone of oak and beech forest up to an altitude of 1500 m (Figure 100). Most commonly it is found on sites with a shallow soil horizon and is a pioneer community in the afforestation process (Džekov & Rizovski 1978).

Figure 99. Distribution of *Juniperus communis* community.

Diagnostic species: ***Frangula alnus***, ***Juniperus communis***; ***Arabis surculosa***, ***Campanula patula***, ***Centaurea grisebachii***, ***Festuca hirtovaginata***, ***Hieracium hoppeanum***, ***Linaria peloponnesiaca***, ***Minuartia verna***, ***Thalictrum minus***, ***Thymus ciliatopubescens***, ***Trisetum flavescens***.

Constant species: *Juniperus communis*; *Acinos alpinus* ssp. *meridionalis*, *Campanula patula*, *Festuca hirtovaginata*, *Leontodon crispus* ssp. *crispus*, *Pimpinella tragium* ssp. *lithophila*, *Trisetum flavescens*.

Dominant species: ***Juniperus communis***; *Brachypodium sylvaticum*.

These communities appear on Kosta bačilo, Djereka, Bojazon, Vetro Gumno, Golem Vrv, Grebenine, Dolno Studino, and above Konjsko, Velestovo, and Ohrid (Figure 99)

Figure 100. Grasslands on the carstic plateau are overgrown by *Juniperus communis* community.

Table 21. *Juniperus communis* community

	Layer				Presence
Relevé number		1	2	3	
Year		2009	2009	2009	
Date (mmdd)		0619	0618	0618	
Altitude (m)		1416	1468	1499	
Aspect		E	SE	SW	
Slope (°)		10	50	15	
Cover shrub layer (%)		100	100	60	
Cover herb layer (%)		20	20	90	
Cover moss layer (%)		20	0	0	
Cover bare rock (%)		40	70	10	
Diagnostic species of the community					
Juniperus communis	sl	5	5	4	3
Juniperus communis	hl	.	1	1	2
Festuca hirtovaginata	hl	+	+	1	3
Campanula patula	hl	+	+	+	3
Trisetum flavescens	hl	+	+	+	3
Frangula alnus	hl	+	+	.	2
Centaurea grisebachii	hl	+	+	.	2
Minuartia verna	hl	+	.	+	2
Arabis surculosa	hl	+	.	+	2
Linaria peloponnesiaca	hl	+	.	+	2

	Relevé number		1	2	3	
	Thymus ciliatopubescens	hl	.	+	+	2
	Thalictrum minus	hl	.	+	+	2
	Hieracium hoppeanum	hl	.	+	+	2
FB	***Festuco-Brometea***					
	Melica ciliata	hl	+	+	.	2
	Poa bulbosa	hl	+	.	+	2
	Sanguisorba minor ssp. *muricata*	hl	.	1	+	2
	Anthyllis vulneraria ssp. *polyphylla*	hl	1	.	.	1
	Koeleria splendens	hl	+	.	.	1
	Erysimum diffusum	hl	+	.	.	1
	Euphorbia myrsinites	hl	+	.	.	1
	Arabis sagittata	hl	+	.	.	1
	Crupina vulgaris	hl	+	.	.	1
	Thymus longicaulis var. *longicaulis*	hl	+	.	.	1
	Sedum ochroleucum	hl	+	.	.	1
	Eryngium campestre	hl	.	1	.	1
	Asphodelus albus	hl	.	.	1	1
	Festuca galicicae	hl	.	.	+	1
	Trinia glauca	hl	.	.	+	1
	Hieracium bauhinii	hl	.	.	+	1
	Filipendula vulgaris	hl	.	.	+	1
TG	***Trifolio-Geranietea sanguinei***					
	Teucrium chamaedrys	hl	.	2	+	2
	Silene italica	hl	.	+	+	2
	Vincetoxicum hirundinaria	hl	+	.	.	1
	Agrimonia eupatoria	hl	+	.	.	1
	Hypericum perforatum	hl	+	.	.	1
	Asperula purpurea	hl	.	.	+	1
	Coronilla varia	hl	.	.	+	1
QP	***Quercetalia pubescenti-petraeae***					
	Carex hallerana	hl	+	.	+	2
	Fraxinus ornus	hl	+	.	.	1
	Quercus cerris	hl	+	.	.	1
	Acer monspessulanum	hl	+	.	.	1
	Cornus mas	sl	+	.	.	1
	Other species					
	Acinos alpinus ssp. *meridionalis*	hl	1	+	+	3
	Leontodon crispus ssp. *crispus*	hl	+	+	+	3
	Pimpinella tragium ssp. *lithophila*	hl	+	+	+	3
	Salvia verbenaca	hl	+	+	.	2
	Fragaria vesca	hl	+	.	2	2
	Poa molineri	hl	+	.	+	2
	Myosotis arvensis	hl	+	.	+	2
	Dactylis glomerata	hl	+	.	+	2
	Asperula aristata ssp. *condensata*	hl	+	.	+	2

Relevé number		1	2	3	
Daphne oleoides	hl	.	1	1	2
Geum urbanum	hl	.	+	+	2
Polygala vulgaris	hl	.	+	+	2
Genista depressa	hl	.	+	+	2
Inula oculus-christi	hl	+	.	.	1
Onobrychis alba ssp. *calcarea*	hl	+	.	.	1
Cephalaria setulifera	hl	+	.	.	1
Satureja montana	hl	+	.	.	1
Sedum sartorianum	hl	.	+	.	1
Globularia meridionalis	hl	.	+	.	1
Hypericum barbatum	hl	.	+	.	1
Cotoneaster integerrimus	sl	.	+	.	1
Thesium linophyllon	hl	.	+	.	1
Erysimum kuemmerlei	hl	.	.	+	1
Helianthemum canum	hl	.	.	+	1
Potentilla detommasii var. *holosericea*	hl	.	.	+	1
Tragopogon balcanicus	hl	.	.	+	1
Linum catharticum	hl	.	.	+	1
Lychnis viscaria	hl	.	.	+	1
Plantago lanceolata	hl	.	.	+	1
Crataegus orientalis	sl	.	.	+	1
Salvia argentea	hl	.	.	+	1
Artemisia alba	hl	.	.	+	1
Centaurea deustiformis	hl	.	.	+	1

Other species with low frequency:

Clematis vitalba [sl] 1: +, [hl] 2: +; *Scandix australis* [hl] 1: +; *Cerastium glomeratum* [hl] 1: +; *Alkanna noneiformis* [hl] 1: +; *Arum maculatum* [hl] 1: +; *Sedum album* [hl] 1: +; *Galium rigidifolium* [hl] 1: +; *Alyssum trichostachyum* [hl] 1: +; *Lamium maculatum* [hl] 1: +; *Galium verum* [hl] 2: 1; *Cerastium decalvans* [hl] 2: +; *Draba athoa* [hl] 2: +; *Potentilla lacinosa* var. *subsericea* [hl] 2: +; *Echinops banaticus* [hl] 2: +; *Doronicum columnae* [hl] 2: +; *Prunus spinosa* [hl] 2: +; *Rhamnus rhodopeus* [sl] 2: +; *Aethionema saxatile* [hl] 2: +; *Brachypodium sylvaticum* [hl] 3: 3; *Verbascum chrysanthum* [hl] 3: +; *Eryngium serbicum* [hl] 3: +; *Elymus repens* [hl] 3: +; *Arabis muralis* [hl] 3: +; *Anthoxanthum odoratum* [hl] 3: +; *Frangula rupestris* [sl] 3: +; *Dianthus cruentus* [hl] 3: +; *Trifolium physodes* [hl] 3: +; *Galium oreophilum* [hl] 3: +.

Localities and other characteristics are given in the Appendix.

Conclusion

The book offers a detailed overview of forests of the Galičica mountain range, as well as integration of the latter in a wider southeast European frame. The authors wish that the book may attract readers and that they may enjoy their journey through the forests of the Galičica mountain range – this natural pearl of Macedonia. If they are encouraged to visit them, the goal of the book would be attained, even surpassed.

Acknowledgements

For the help during the field work, we owe thanks to the director of the Public Institution Galičica National Park, Zoran Angeloski, as well to Andon Bojadži, Bimbil Despotoski, Kico Užanoski, Laze Užanoski, Krste Sotiroski, and Til Dieterich (GFA Consulting Group), who offered us the logistic support during the field work. Iztok Sajko kindly prepared maps and formated the final version of the text.

For financial support we would like to thank the National park Galičica, Scientific Research Centre of the Slovenian Academy of Sciences and Arts, Slovenian Research Agency (project no. P1-0236 and L1-9737), and the Slovenian Book Agency.

Summary

The mountain of Galičica is situated in the southwestern part of the Republic of Macedonia, between two lakes: Lake Ohrid and Lake Prespa. To the north it is limited by lower mountains and to the south by the state border with Albania. On the Macedonian side of the mountain there is a National park founded in 1958.

The forests of the Galičica mountain range are quite diverse. They can be divided into two distinct groups, one with more or less mesophilous character, dominated by *Fagus sylvatica*, *Carpinus betulus*, *Corylus colurna*, and *Acer obtusatum*, and the other composed of thermophilous deciduous forests, dominated by various oaks (*Quercus cerris*, *Q. frainetto*, *Q. petraea*, *Q. pubescens*, *Q. trojana*), *Ostrya carpinifolia*, *Carpinus orientalis*, and *Juniperus excelsa*. There exist also riverine forests dominated by *Salix alba* (*Salicetum albae*) and on the karstic plateau a montane shrub community dominated by *Juniperus communis* that is a stage of afforestation in the area of beech forests.

Within mesophilous forests we can distinguish several groups: the zonal beech forests that range from submontane *Festuco heterophyllae-Fagetum* (on deep, fresh soil with plenty of nutrients, over carbonate and silicate bedrock), montane *Calamintho grandiflorae-Fagetum* (on deep and fresh soil), altimontane *Abieti-Fagetum* to subalpine *Asyneumo-Fagetum* (representing the timber line on Galičica), the thermophilous azonal *Aceri obtusati-Fagetum* (on steep southern slopes, shallow soil profile, over the carbonate bedrock), ravine forests *Corylo colurnae-Aceretum obtusati* (at lower altitudes, on steep slopes, the soil is more humid and propitious) and *Corylo colurnae--Ostryetum carpinifoliae* (at higher altitudes in the transitional zone between oak and beech forests, on shady sites, on steep, humid and stony soils rich in humus), and in the valleys *Corylo colurnae-Carpinetum betuli* (on deep and fresh soil).

The thermophilous deciduous forest can be divided into two groups. The first group comprises forests dominated by oak species, such as *Quercus frainetto*, *Quercus cerris*, and *Quercus petraea*. These forests build the zonal communities, such as *Quercetum frainetto-cerris* (appear at lower altitudes, the soil horizon is deep mainly over silicate bedrock), *Fraxino orni-Quercetum cerris* (on deeper soil horizon, over silicate bedrock), *Ostryo carpinifoliae-Quercetum cerris* (on shallow soils, where the carbonate outcrops are visible on the surface), and *Fraxino orni-Quercetum petraeae* (on the upper limit of the thermophilous deciduous forest).

In the other group we can find some other thermophilous forests mainly with nonzonal character. Next to the lakes, where the local climate is mitigated by the proximity of a water body, *Carpinus orientalis* dominated forests can be found (*Phillyreo-Carpinetum orientalis*). Above these forests we can find *Ostrya carpinifolia* dominated forests; on steep southern slopes xerophyllous *Querco pubescentis-Ostryetum carpinifoliae* appear, whereas at higher altitudes *Seslerio-Ostryetum* can be found. On the extreme warm, driest sites with a rather deep soil layer *Quercus trojana* dominated forests can be found (*Quercetum trojanae*), and on the most extreme sites in the region, in the sense of thermicity, over shallow, skeletal soils, we can find *Juniperus excelsa* dominated forests (*Pruno webii-Juniperetum excelsae* and *Querco trojanae-Juniperetum excelsae*).

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Appendix

Localities and other characteristics (relevé number – corresponds to the number in the table, Longitude (UTM system, zone 34T), Latitude (UTM system, zone 34T), Location, pH, organic matter (%), C (%), C/N (%), N (%), sand (%), clay (%), coarse silt (%), fine silt (%), total silt (%), texture class, Ca (mmol C+/100 g sample), Mg (mmol C+/100 g sample), K (mmol C+/100 g sample), Na (mmol C+/100 g sample), total exchangeable acidity (mmol C+/100 g sample), sum of base cations (mmol C+/100 g sample), cation exchange capacity (mmol C+/100 g sample), proportion of base cations (%), Ca (%), Mg (%), K (%), Na (%), total exchangeable acidity (%), Shannon-Wiener Index, Simpson Index, Life form: Chamaephyte (%), Geophyte (%), Hemicryptophyte (%), Hemicryptophyte (caesp) (%), Hemicryptophyte (ros) (%), Hemicryptophyte (scand) (%), Nano-Phanerophyte (%), Phanerophyte (%), Phanerophyte (caesp) (%), Phanerophyte (scap) (%), Therophyte (%), Chorotypes: Endemic (%), Stenomediterranean (%), Eurimediterranean (%), Mediterranean-montane (%), Eurasian (%), Paleotemperate (%), Eurasian (in sen. str.) (%), Pontic (%), Euro-Caucasian (%), Centroeuropean (%), South European Orophytes (%), Boreal (%), Adventitious (%), Balkan (%).

Table 2:

1: Longitude: 487065, Latitude: 4532730, Location: Volko Legalo, pH: 6.4, organic matter: 20.3, C: 11.8, C/N: 14.6, N: 0.81, sand: 6.8, clay: 36.5, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MGI, Ca: 27.37, Mg: 2.3, K: 0.56, Na: 0.25, total exchangeable acidity: 25.95, sum of base cations: 30.5, cation exchange capacity: 56.5, proportion of base cations (%): 54, Ca (%): 48.4, Mg (%): 4.1, K (%): 1, Na (%): 0.4, total exchangeable acidity (%): 45.9, Shannon-Wiener Index: 1.601, Simpson Index: 0.5742, Life form: Chamaephyte: 10.53, Geophyte: 31.58, Hemicryptophyte: 31.58, Hemicryptophyte (caesp): 5.26, Hemicryptophyte (ros): 5.26, Hemicryptophyte (scand): 21.05, Nano-Phanerophyte: 0, Phanerophyte: 26.32, Phanerophyte (caesp): 10.53, Phanerophyte (scap): 15.79, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 5.26, Eurimediterranean: 0, Mediterranean-montane: 5.26, Eurasian: 52.63, Paleotemperate: 5.26, Eurasian (in sen. str.): 0, Pontic: 0, Euro-Caucasian: 21.05, Centroeuropean: 21.05, South European Orophytes: 15.79, Boreal: 5.26, Adventitious: 10.53, Balkan: 5.26.

2: Longitude: 484752, Latitude: 4532929, Location: Dava Livada, pH: 6, organic matter: 12.2, C: 7.1, C/N: 12, N: 0.59, sand: 4.8, clay: 38, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MGI, Ca: 31.06, Mg: 5.83, K: 0.49, Na: 0.11, total exchangeable acidity: 20.6, sum of base cations: 37.5, cation exchange capacity: 58.1, proportion of base cations (%): 64.5, Ca (%): 53.5, Mg (%): 10, K (%): 0.8, Na (%): 0.2, total exchangeable acidity (%): 35.5, Shannon-Wiener Index: 1.297, Simpson Index: 0.4982, Life form: Chamaephyte: 14.29, Geophyte: 35.71, Hemicryptophyte: 28.57, Hemicryptophyte (caesp): 7.14, Hemicryptophyte (ros): 7.14, Hemicryptophyte (scand): 14.29, Nano-Phanerophyte: 0, Phanerophyte: 21.43, Phanerophyte (caesp): 0, Phanerophyte (scap): 21.43, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 7.14, Eurimediterranean: 0, Mediterranean-montane: 0, Eurasian: 78.57, Paleotemperate: 14.29, Eurasian (in sen. str.): 14.29, Pontic: 0, Euro-Caucasian: 21.43, Centroeuropean: 28.57, South European Orophytes: 7.14, Boreal: 7.14, Adventitious: 0, Balkan: 0.

3: Longitude: 486899, Latitude: 4532578, Location: Volko Legalo, pH: 5.3, organic matter: 12.7, C: 7.4, C/N: 11.2, N: 0.66, sand: 9.2, clay: 33.4, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MGI, Ca: 18.38, Mg: 1.89, K: 0.48, Na: 0.17, total exchangeable acidity: 26.55, sum of base cations: 20.9, cation exchange capacity: 47.5, proportion of base cations (%): 44, Ca (%):

38.7, Mg (%): 4, K (%): 1, Na (%): 0.4, total exchangeable acidity (%): 55.9, Shannon-Wiener Index: 2.090, Simpson Index: 0.7025, Life form: Chamaephyte: 7.41, Geophyte: 25.93, Hemicryptophyte: 33.33, Hemicryptophyte (caesp): 7.41, Hemicryptophyte (ros): 3.7, Hemicryptophyte (scand): 22.22, Nano-Phanerophyte: 3.7, Phanerophyte: 29.63, Phanerophyte (caesp): 14.81, Phanerophyte (scap): 14.81, Therophyte: 0, Chorotypes: Endemic: 3.7, Stenomediterranean: 3.7, Eurimediterranean: 0, Mediterranean-montane: 7.41, Eurasian: 51.85, Paleotemperate: 11.11, Eurasian (in sen. str.): 3.7, Pontic: 0, Euro-Caucasian: 14.81, Centroeuropean: 18.52, South European Orophytes: 14.81, Boreal: 11.11, Adventitious: 0, Balkan: 7.41.

4: Longitude: 486160, Latitude: 4533033, Location: Stara Galičica, pH: 4.9, organic matter: 23.6, C: 13.7, C/N: 13.8, N: 0.99, sand: 11.1, clay: 30.3, coarse silt: 25, fine silt: 34, total silt: 59, texture class: MGI, Ca: 23.52, Mg: 1.27, K: 0.49, Na: 0.14, total exchangeable acidity: 32.95, sum of base cations: 25.4, cation exchange capacity: 58.4, proportion of base cations (%): 43.5, Ca (%): 40.3, Mg (%): 2.2, K (%): 0.8, Na (%): 0.2, total exchangeable acidity (%): 56.4, Shannon-Wiener Index: 2.327, Simpson Index: 0.727, Life form: Chamaephyte: 5.88, Geophyte: 32.35, Hemicryptophyte: 35.29, Hemicryptophyte (caesp): 8.82, Hemicryptophyte (ros): 8.82, Hemicryptophyte (scand): 17.65, Nano-Phanerophyte: 5.88, Phanerophyte: 17.65, Phanerophyte (caesp): 5.88, Phanerophyte (scap): 11.76, Therophyte: 2.94, Chorotypes: Endemic: 2.94, Stenomediterranean: 5.88, Eurimediterranean: 0, Mediterranean-montane: 2.94, Eurasian: 47.06, Paleotemperate: 5.88, Eurasian (in sen. str.): 14.71, Pontic: 0, Euro-Caucasian: 8.82, Centroeuropean: 11.76, South European Orophytes: 11.76, Boreal: 20.59, Adventitious: 2.94, Balkan: 5.88.

5: Longitude: 485950, Latitude: 4532587, Location: Stara Galičica, pH: 5.4, organic matter: 27.9, C: 16.2, C/N: 18, N: 0.9, sand: 14.4, clay: 30.8, coarse silt: 20, fine silt: 34, total silt: 55, texture class: MGI, Ca: 36.25, Mg: 3, K: 0.64, Na: 0.19, total exchangeable acidity: 30.15, sum of base cations: 40.1, cation exchange capacity: 70.3, proportion of base cations (%): 57, Ca (%): 51.6, Mg (%): 4.3, K (%): 0.9, Na (%): 0.3, total exchangeable acidity (%): 42.9, Shannon--Wiener Index: 2.126, Simpson Index: 0.7333, Life form: Chamaephyte: 3.33, Geophyte: 10, Hemicryptophyte: 46.67, Hemicryptophyte (caesp): 6.67, Hemicryptophyte (ros): 16.67, Hemicryptophyte (scand): 23.33, Nano-Phanerophyte: 10, Phanerophyte: 26.67, Phanerophyte (caesp): 10, Phanerophyte (scap): 16.67, Therophyte: 3.33, Chorotypes: Endemic: 3.33, Stenomediterranean: 3.33, Eurimediterranean: 10, Mediterranean-montane: 0, Eurasian: 26.67, Paleotemperate: 6.67, Eurasian (in sen. str.): 6.67, Pontic: 0, Euro-Caucasian: 0, Centroeuropean: 13.33, South European Orophytes: 20, Boreal: 26.67, Adventitious: 0, Balkan: 6.67.

Table 3:

1: Longitude: 486855, Latitude: 4532994, Location: Volko Legalo, pH: 5.1, organic matter: 14.3, C: 8.3, C/N: 14.1, N: 0.59, sand: 9.1, clay: 37.3, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MGI, Ca: 3.75, Mg: 1.72, K: 0.31, Na: 0.13, total exchangeable acidity: 27.1, sum of base cations: 25.9, cation exchange capacity: 53, proportion of base cations (%): 48.9, Ca (%): 44.8, Mg (%): 3.2, K (%): 0.6, Na (%): 0.2, total exchangeable acidity (%): 51.1, Shannon-Wiener Index: 2.119, Simpson Index: 0.7408, Life form: Chamaephyte: 5.56, Geophyte: 11.11, Hemicryptophyte: 16.67, Hemicryptophyte (caesp): 0, Hemicryptophyte (ros): 11.11, Hemicryptophyte (scand): 5.56, Nano-Phanerophyte: 0, Phanerophyte: 66.67, Phanerophyte (caesp): 11.11, Phanerophyte (scap): 55.56, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 5.56, Eurimediterranean: 0, Mediterranean-montane: 5.56, Eurasian: 61.11, Paleotemperate: 11.11, Eurasian (in sen. str.): 0, Pontic: 0, Euro-Caucasian: 16.67, Centroeuropean: 27.78, South European Orophytes: 0, Boreal: 5.56, Adventitious: 5.56, Balkan: 16.67.

2: Longitude: 486284, Latitude: 4533379, Location: Volko Legalo, pH: 6, organic matter: 19.2, C: 11.1, C/N: 12.1, N: 0.92, sand: 14.7, clay: 33, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MGI, Ca: 49.47, Mg: 2.38, K: 0.72, Na: 0.24, total exchangeable acidity: 23.3, sum of base cations: 52.8, cation exchange capacity: 76.1, proportion of base cations (%): 69.4, Ca (%): 65, Mg (%): 3.1, K (%): 0.9, Na (%): 0.3, total exchangeable acidity (%): 30.6, Shannon-Wiener Index: 1.731, Simpson Index: 0.6891, Life form: Chamaephyte: 7.69, Geophyte: 15.38, Hemicryptophyte: 23.08, Hemicryptophyte (caesp): 0, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 23.08, Nano-Phanerophyte: 0, Phanerophyte: 53.85, Phanerophyte (caesp): 0, Phanerophyte (scap): 53.85, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 0, Eurimediterranean: 0, Mediterranean-montane: 0, Eurasian: 46.15, Paleotemperate: 0, Eurasian (in sen. str.): 0, Pontic: 7.69, Euro-Caucasian: 7.69, Centroeuropean: 30.77, South European Orophytes: 7.69, Boreal: 15.38, Adventitious: 0, Balkan: 30.77.

3: Longitude: 485967, Latitude: 4533070, Location: Stara Galičica, pH: 4.6, organic matter: 19.3, C: 11.2, C/N: 14.7, N: 0.76, sand: 11.6, clay: 40.4, coarse silt: 16, fine silt: 33, total silt: 48, texture class: MG-MGI, Ca: 16.71, Mg: 1.52, K: 0.64, Na: 0.18, total exchangeable acidity: 33.9, sum of base cations: 19.1, cation exchange capacity: 53, proportion of base cations (%): 36, Ca (%): 31.5, Mg (%): 2.9, K (%): 1.2, Na (%): 0.3, total exchangeable acidity (%): 64, Shannon-Wiener Index: 1.995, Simpson Index: 0.6842, Life form: Chamaephyte: 12, Geophyte: 20, Hemicryptophyte: 44, Hemicryptophyte (caesp): 8, Hemicryptophyte (ros): 8, Hemicryptophyte (scand): 28, Nano-Phanerophyte: 0, Phanerophyte: 24, Phanerophyte (caesp): 0, Phanerophyte (scap): 24, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 4, Eurimediterranean: 4, Mediterranean-montane: 8, Eurasian: 48, Paleotemperate: 4, Eurasian (in sen. str.): 4, Pontic: 4, Euro-Caucasian: 16, Centroeuropean: 16, South European Orophytes: 8, Boreal: 8, Adventitious: 4, Balkan: 16.

4: Longitude: 486065, Latitude: 4533091, Location: Stara Galičica, pH: 5, organic matter: 25.5, C: 14.8, C/N: 13.2, N: 1.12, sand: 7.8, clay: 26.3, coarse silt: 26, fine silt: 40, total silt: 66, texture class: MI-MGI, Ca: 28.44, Mg: 1.97, K: 0.49, Na: 0.18, total exchangeable acidity: 33.45, sum of base cations: 31.1, cation exchange capacity: 64.6, proportion of base cations (%): 48.1, Ca (%): 44, Mg (%): 3, K (%): 0.8, Na (%): 0.3, total exchangeable acidity (%): 51.8, Shannon-Wiener Index: 2.123, Simpson Index: 0.6894, Life form: Chamaephyte: 6.9, Geophyte: 20.69, Hemicryptophyte: 27.59, Hemicryptophyte (caesp): 3.45, Hemicryptophyte (ros): 3.45, Hemicryptophyte (scand): 20.69, Nano-Phanerophyte: 6.9, Phanerophyte: 34.48, Phanerophyte (caesp): 10.34, Phanerophyte (scap): 24.14, Therophyte: 3.45, Chorotypes: Endemic: 3.45, Stenomediterranean: 3.45, Eurimediterranean: 0, Mediterranean-montane: 6.9, Eurasian: 55.17, Paleotemperate: 6.9, Eurasian (in sen. str.): 10.34, Pontic: 0, Euro-Caucasian: 13.79, Centroeuropean: 17.24, South European Orophytes: 13.79, Boreal: 6.9, Adventitious: 0, Balkan: 10.34.

5: Longitude: 486747, Latitude: 4532818, Location: Volko Legalo, pH: 5.1, organic matter: 16.5, C: 9.6, C/N: 10.7, N: 0.9, sand: 7.6, clay: 35.1, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MGI, Ca: 23.57, Mg: 1.27, K: 0.58, Na: 0.17, total exchangeable acidity: 29.15, sum of base cations: 25.6, cation exchange capacity: 54.8, proportion of base cations (%): 46.7, Ca (%): 43, Mg (%): 2.3, K (%): 1.1, Na (%): 0.3, total exchangeable acidity (%): 53.2, Shannon-Wiener Index: 2.142, Simpson Index: 0.7127, Life form: Chamaephyte: 7.14, Geophyte: 17.86, Hemicryptophyte: 25, Hemicryptophyte (caesp): 7.14, Hemicryptophyte (ros): 3.57, Hemicryptophyte (scand): 14.29, Nano-Phanerophyte: 14.29, Phanerophyte: 35.71, Phanerophyte (caesp): 17.86, Phanerophyte (scap): 17.86, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 3.57, Eurimediterranean: 0, Mediterranean-montane: 3.57, Eurasian:

60.71, Paleotemperate: 7.14, Eurasian (in sen. str.): 3.57, Pontic: 7.14, Euro-Caucasian: 21.43, Centroeuropean: 17.86, South European Orophytes: 10.71, Boreal: 14.29, Adventitious: 3.57, Balkan: 3.57.

6: Longitude: 485941, Latitude: 4533055, Location: Stara Galičica, pH: 4.7, organic matter: 32.7, C: 18.9, C/N: 11.5, N: 1.64, sand: 42.7, clay: 15.1, coarse silt: 18, fine silt: 25, total silt: 42, texture class: I, Ca: 49.75, Mg: 2.59, K: 0.52, Na: 0.31, total exchangeable acidity: 36.1, sum of base cations: 53.2, cation exchange capacity: 89.3, proportion of base cations (%): 59.6, Ca (%): 55.7, Mg (%): 2.9, K (%): 0.6, Na (%): 0.3, total exchangeable acidity (%): 40.4, Shannon-Wiener Index: 2.216, Simpson Index: 0.6835, Life form: Chamaephyte: 15.15, Geophyte: 15.15, Hemicryptophyte: 33.33, Hemicryptophyte (caesp): 6.06, Hemicryptophyte (ros): 9.09, Hemicryptophyte (scand): 18.18, Nano-Phanerophyte: 12.12, Phanerophyte: 24.24, Phanerophyte (caesp): 12.12, Phanerophyte (scap): 12.12, Therophyte: 0, Chorotypes: Endemic: 3.03, Stenomediterranean: 6.06, Eurimediterranean: 0, Mediterranean-montane: 6.06, Eurasian: 33.33, Paleotemperate: 3.03, Eurasian (in sen. str.): 3.03, Pontic: 6.06, Euro-Caucasian: 12.12, Centroeuropean: 9.09, South European Orophytes: 15.15, Boreal: 24.24, Adventitious: 6.06, Balkan: 6.06.

Table 4:
1: Longitude: 486328, Latitude: 4533459, Location: Volko Legalo, pH: 5.4, organic matter: 14.8, C: 8.6, C/N: 11, N: 0.78, sand: 8.3, clay: 30.4, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MGI, Ca: 25.67, Mg: 2.34, K: 0.75, Na: 0.22, total exchangeable acidity: 27.35, sum of base cations: 29, cation exchange capacity: 56.4, proportion of base cations (%): 51.4, Ca (%): 45.5, Mg (%): 4.1, K (%): 1.3, Na (%): 0.4, total exchangeable acidity (%): 48.5, Shannon-Wiener Index: 1.819, Simpson Index: 0.651, Life form: Chamaephyte: 9.52, Geophyte: 28.57, Hemicryptophyte: 23.81, Hemicryptophyte (caesp): 4.76, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 19.05, Nano-Phanerophyte: 0, Phanerophyte: 33.33, Phanerophyte (caesp): 0, Phanerophyte (scap): 33.33, Therophyte: 4.76, Chorotypes: Endemic: 0, Stenomediterranean: 0, Eurimediterranean: 0, Mediterranean-montane: 0, Eurasian: 80.95, Paleotemperate: 9.52, Eurasian (in sen. str.): 9.52, Pontic: 4.76, Euro-Caucasian: 23.81, Centroeuropean: 33.33, South European Orophytes: 0, Boreal: 4.76, Adventitious: 9.52, Balkan: 4.76.

2: Longitude: 492632, Latitude: 4543277, Location: Ramni Dol, Lomje, pH: 5.7, organic matter: 15.7, C: 9.1, C/N: 15.2, N: 0.6, sand: 5.6, clay: 33.9, coarse silt: 14, fine silt: 46, total silt: 61, texture class: MGI, Ca: 28.94, Mg: 2.34, K: 0.89, Na: 0.08, total exchangeable acidity: 20.15, sum of base cations: 32.3, cation exchange capacity: 52.5, proportion of base cations (%): 61.5, Ca (%): 55.1, Mg (%): 4.5, K (%): 1.7, Na (%): 0.2, total exchangeable acidity (%): 38.4, Shannon-Wiener Index: 1.923, Simpson Index: 0.6937, Life form: Chamaephyte: 0, Geophyte: 33.33, Hemicryptophyte: 33.33, Hemicryptophyte (caesp): 14.29, Hemicryptophyte (ros): 4.76, Hemicryptophyte (scand): 14.29, Nano-Phanerophyte: 0, Phanerophyte: 33.33, Phanerophyte (caesp): 4.76, Phanerophyte (scap): 28.57, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 0, Eurimediterranean: 4.76, Mediterranean-montane: 0, Eurasian: 80.95, Paleotemperate: 19.05, Eurasian (in sen. str.): 4.76, Pontic: 9.52, Euro-Caucasian: 4.76, Centroeuropean: 23.81, South European Orophytes: 0, Boreal: 9.52, Adventitious: 4.76, Balkan: 0.

3: Longitude: 488341, Latitude: 4550548, Location: Galičica, under Niski Vrv-Letnica, pH: 5.4, organic matter: 18.4, C: 10.7, C/N: 16.7, N: 0.64, sand: 17.1, clay: 21.4, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MI, Ca: 2.53, Mg: 2.17, K: 0.92, Na: 0.14, total exchangeable acidity: 21.6, sum of base cations: 45.8, cation exchange capacity: 67.4, proportion of base cations

(%): 68, Ca (%): 63.1, Mg (%): 3.2, K (%): 1.4, Na (%): 0.2, total exchangeable acidity (%): 32, Shannon-Wiener Index: 1.325, Simpson Index: 0.6137, Life form: Chamaephyte: 0, Geophyte: 40, Hemicryptophyte: 0, Hemicryptophyte (caesp): 0, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 0, Nano-Phanerophyte: 20, Phanerophyte: 40, Phanerophyte (caesp): 0, Phanerophyte (scap): 40, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 10, Eurimediterranean: 0, Mediterranean-montane: 0, Eurasian: 80, Paleotemperate: 0, Eurasian (in sen. str.): 0, Pontic: 10, Euro-Caucasian: 10, Centroeuropean: 60, South European Orophytes: 0, Boreal: 10, Adventitious: 0, Balkan: 0.

4: Longitude: 493940, Latitude: 4545019, Location: Kukulj, pH: 5, organic matter: 9.6, C: 5.6, C/N: 12.4, N: 0.45, sand: 24.7, clay: 31.6, coarse silt: 13, fine silt: 31, total silt: 44, texture class: GI, Ca: 10.95, Mg: 1.27, K: 0.56, Na: 0.07, total exchangeable acidity: 20.45, sum of base cations: 12.9, cation exchange capacity: 33.4, proportion of base cations (%): 38.6, Ca (%): 32.8, Mg (%): 3.8, K (%): 1.7, Na (%): 0.2, total exchangeable acidity (%): 61.2, Shannon-Wiener Index: 1.407, Simpson Index: 0.5544, Life form: Chamaephyte: 0, Geophyte: 56.25, Hemicryptophyte: 6.25, Hemicryptophyte (caesp): 6.25, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 0, Nano-Phanerophyte: 6.25, Phanerophyte: 25, Phanerophyte (caesp): 0, Phanerophyte (scap): 25, Therophyte: 6.25, Chorotypes: Endemic: 0, Stenomediterranean: 0, Eurimediterranean: 6.25, Mediterranean-montane: 6.25, Eurasian: 75, Paleotemperate: 12.5, Eurasian (in sen. str.): 6.25, Pontic: 6.25, Euro-Caucasian: 12.5, Centroeuropean: 31.25, South European Orophytes: 0, Boreal: 0, Adventitious: 12.5, Balkan: 0.

5: Longitude: 487225, Latitude: 4540049, Location: Galičica, Bojazon, pH: 5.8, organic matter: 17.1, C: 9.9, C/N: 11.4, N: 0.87, sand: 15.9, clay: 33, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MGI, Ca: 6, Mg: 1.9, K: 0.61, Na: 0.13, total exchangeable acidity: 24.15, sum of base cations: 58.6, cation exchange capacity: 82.8, proportion of base cations (%): 70.8, Ca (%): 67.6, Mg (%): 2.3, K (%): 0.7, Na (%): 0.2, total exchangeable acidity (%): 29.2, Shannon-Wiener Index: 2.103, Simpson Index: 0.7694, Life form: Chamaephyte: 4.17, Geophyte: 33.33, Hemicryptophyte: 37.5, Hemicryptophyte (caesp): 8.33, Hemicryptophyte (ros): 8.33, Hemicryptophyte (scand): 20.83, Nano-Phanerophyte: 0, Phanerophyte: 25, Phanerophyte (caesp): 8.33, Phanerophyte (scap): 16.67, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 4.17, Eurimediterranean: 0, Mediterranean-montane: 4.17, Eurasian: 66.67, Paleotemperate: 8.33, Eurasian (in sen. str.): 4.17, Pontic: 0, Euro-Caucasian: 25, Centroeuropean: 25, South European Orophytes: 4.17, Boreal: 20.83, Adventitious: 0, Balkan: 0.

6: Longitude: 489612, Latitude: 4543886, Location: Galičica, Gorna, pH: 5, organic matter: 16, C: 9.3, C/N: 13.5, N: 0.69, sand: 16.2, clay: 23, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MI, Ca: 5.87, Mg: 2.3, K: 0.97, Na: 0.11, total exchangeable acidity: 29.65, sum of base cations: 29.3, cation exchange capacity: 59, proportion of base cations (%): 49.7, Ca (%): 43.8, Mg (%): 3.9, K (%): 1.6, Na (%): 0.2, total exchangeable acidity (%): 50.3, Shannon-Wiener Index: 1.758, Simpson Index: 0.7072, Life form: Chamaephyte: 5.88, Geophyte: 23.53, Hemicryptophyte: 35.29, Hemicryptophyte (caesp): 11.76, Hemicryptophyte (ros): 5.88, Hemicryptophyte (scand): 17.65, Nano-Phanerophyte: 0, Phanerophyte: 29.41, Phanerophyte (caesp): 0, Phanerophyte (scap): 29.41, Therophyte: 5.88, Chorotypes: Endemic: 0, Stenomediterranean: 5.88, Eurimediterranean: 0, Mediterranean-montane: 0, Eurasian: 88.24, Paleotemperate: 11.76, Eurasian (in sen. str.): 17.65, Pontic: 0, Euro-Caucasian: 17.65, Centroeuropean: 41.18, South European Orophytes: 0, Boreal: 5.88, Adventitious: 0, Balkan: 0.

7: Longitude: 482700, Latitude: 4535128, Location: above the village of Trpejca, pH: 7, organic matter: 1.5, C: 0.9, C/N: 18, N: 0.05, sand: 79, clay: 4.3, coarse silt: 10, fine silt: 7,

total silt: 17, texture class: IP, Ca: 12.59, Mg: 0.82, K: 0.31, Na: 0.04, total exchangeable acidity: 0.8, sum of base cations: 13.8, cation exchange capacity: 14.6, proportion of base cations (%): 94.5, Ca (%): 86.2, Mg (%): 5.6, K (%): 2.1, Na (%): 0.3, total exchangeable acidity (%): 5.5, Shannon-Wiener Index: 2.044, Simpson Index: 0.7854, Life form: Chamaephyte: 5.26, Geophyte: 21.05, Hemicryptophyte: 21.05, Hemicryptophyte (caesp): 10.53, Hemicryptophyte (ros): 5.26, Hemicryptophyte (scand): 5.26, Nano-Phanerophyte: 0, Phanerophyte: 52.63, Phanerophyte (caesp): 5.26, Phanerophyte (scap): 47.37, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 5.26, Eurimediterranean: 5.26, Mediterranean-montane: 0, Eurasian: 78.95, Paleotemperate: 5.26, Eurasian (in sen. str.): 5.26, Pontic: 0, Euro-Caucasian: 26.32, Centroeuropean: 26.32, South European Orophytes: 5.26, Boreal: 5.26, Adventitious: 0, Balkan: 0.

Table 5:

1: Longitude: 488161, Latitude: 4535043, Location: on the path to Tomoros, pH: 6.4, organic matter: 9.3, C: 5.4, C/N: 12.6, N: 0.43, sand: 7.4, clay: 39.6, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MG-MGI, Ca: 33.75, Mg: 1.02, K: 0.52, Na: 0.1, total exchangeable acidity: 15.4, sum of base cations: 35.4, cation exchange capacity: 50.8, proportion of base cations (%): 69.7, Ca (%): 66.4, Mg (%): 2, K (%): 1, Na (%): 0.2, total exchangeable acidity (%): 30.3, Shannon-Wiener Index: 1.500, Simpson Index: 0.5145, Life form: Chamaephyte: 0, Geophyte: 21.05, Hemicryptophyte: 21.05, Hemicryptophyte (caesp): 5.26, Hemicryptophyte (ros): 5.26, Hemicryptophyte (scand): 10.53, Nano-Phanerophyte: 0, Phanerophyte: 57.89, Phanerophyte (caesp): 5.26, Phanerophyte (scap): 52.63, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 5.26, Eurimediterranean: 10.53, Mediterranean-montane: 5.26, Eurasian: 68.42, Paleotemperate: 5.26, Eurasian (in sen. str.): 0, Pontic: 15.79, Euro-Caucasian: 0, Centroeuropean: 21.05, South European Orophytes: 0, Boreal: 10.53, Adventitious: 0, Balkan: 0.

2: Longitude: 489020, Latitude: 4532957, Location: Urvalj, pH: 5.8, organic matter: 11, C: 6.4, C/N: 11.9, N: 0.54, sand: 9, clay: 37.3, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MGI, Ca: 1.9, Mg: 2.42, K: 1.1, Na: 0.17, total exchangeable acidity: 19.3, sum of base cations: 35.6, cation exchange capacity: 54.9, proportion of base cations (%): 64.8, Ca (%): 58.1, Mg (%): 4.4, K (%): 2, Na (%): 0.3, total exchangeable acidity (%): 35.2, Shannon-Wiener Index: 1.784, Simpson Index: 0.5928, Life form: Chamaephyte: 4.35, Geophyte: 13.04, Hemicryptophyte: 13.04, Hemicryptophyte (caesp): 8.7, Hemicryptophyte (ros): 4.35, Hemicryptophyte (scand): 0, Nano-Phanerophyte: 0, Phanerophyte: 69.57, Phanerophyte (caesp): 21.74, Phanerophyte (scap): 43.48, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 4.35, Eurimediterranean: 8.7, Mediterranean-montane: 0, Eurasian: 82.61, Paleotemperate: 4.35, Eurasian (in sen. str.): 4.35, Pontic: 17.39, Euro-Caucasian: 21.74, Centroeuropean: 17.39, South European Orophytes: 0, Boreal: 0, Adventitious: 4.35, Balkan: 0.

3: Longitude: 482790, Latitude: 4530468, Location: Galičica, under Propast, pH: 6, organic matter: 25.1, C: 14.5, C/N: 12.3, N: 1.18, sand: 0, clay: 0, coarse silt: 0, fine silt: 0, total silt: 0, texture class: Ca: 1.29, Mg: 3.57, K: 1.21, Na: 0.13, total exchangeable acidity: 26.75, sum of base cations: 106.2, cation exchange capacity: 133, proportion of base cations (%): 79.8, Ca (%): 76.2, Mg (%): 2.7, K (%): 0.9, Na (%): 0.1, total exchangeable acidity (%): 20.1, Shannon-Wiener Index: 2.086, Simpson Index: 0.7779, Life form: Chamaephyte: 13.64, Geophyte: 13.64, Hemicryptophyte: 31.82, Hemicryptophyte (caesp): 18.18, Hemicryptophyte (ros): 4.55, Hemicryptophyte (scand): 9.09, Nano-Phanerophyte: 0, Phanerophyte: 40.91, Phanerophyte (caesp): 4.55, Phanerophyte (scap): 36.36, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 4.55, Eurimediterranean: 0, Mediterranean-montane: 0, Eurasian: 81.82,

Paleotemperate: 9.09, Eurasian (in sen. str.): 4.55, Pontic: 13.64, Euro-Caucasian: 13.64, Centroeuropean: 22.73, South European Orophytes: 0, Boreal: 9.09, Adventitious: 0, Balkan: 0.

4: Longitude: 487638, Latitude: 4550993, Location: Ramnište, house number 1, pH: 5.7, organic matter: 22.3, C: 12.9, C/N: 19.3, N: 0.67, sand: 16.9, clay: 37.9, coarse silt: 12, fine silt: 34, total silt: 45, texture class: MGI, Ca: 27.07, Mg: 2.42, K: 0.91, Na: 0.08, total exchangeable acidity: 19.4, sum of base cations: 30.5, cation exchange capacity: 49.9, proportion of base cations (%): 61.1, Ca (%): 54.2, Mg (%): 4.8, K (%): 1.8, Na (%): 0.2, total exchangeable acidity (%): 38.9, Shannon-Wiener Index: 2.538, Simpson Index: 0.8243, Life form: Chamaephyte: 0, Geophyte: 19.44, Hemicryptophyte: 30.56, Hemicryptophyte (caesp): 11.11, Hemicryptophyte (ros): 11.11, Hemicryptophyte (scand): 8.33, Nano-Phanerophyte: 2.78, Phanerophyte: 47.22, Phanerophyte (caesp): 22.22, Phanerophyte (scap): 22.22, Therophyte: 0, Chorotypes: Endemic: 5.56, Stenomediterranean: 5.56, Eurimediterranean: 2.78, Mediterranean-montane: 2.78, Eurasian: 72.22, Paleotemperate: 8.33, Eurasian (in sen. str.): 5.56, Pontic: 19.44, Euro-Caucasian: 16.67, Centroeuropean: 16.67, South European Orophytes: 0, Boreal: 8.33, Adventitious: 0, Balkan: 0.

5: Longitude: 488105, Latitude: 4535365, Location: Galičica, Leskoski Uši, pH: 5.8, organic matter: 34, C: 19.7, C/N: 15.9, N: 1.24, sand: 18.3, clay: 25.4, coarse silt: 22, fine silt: 34, total silt: 56, texture class: MI, Ca: 41.56, Mg: 3.61, K: 0.87, Na: 0.14, total exchangeable acidity: 26.15, sum of base cations: 46.2, cation exchange capacity: 72.4, proportion of base cations (%): 63.8, Ca (%): 57.4, Mg (%): 5, K (%): 1.2, Na (%): 0.2, total exchangeable acidity (%): 36.1, Shannon-Wiener Index: 2.889, Simpson Index: 0.9099, Life form: Chamaephyte: 6.25, Geophyte: 18.75, Hemicryptophyte: 28.13, Hemicryptophyte (caesp): 9.38, Hemicryptophyte (ros): 3.13, Hemicryptophyte (scand): 15.63, Nano-Phanerophyte: 3.13, Phanerophyte: 43.75, Phanerophyte (caesp): 12.5, Phanerophyte (scap): 31.25, Therophyte: 0, Chorotypes: Endemic: 3.13, Stenomediterranean: 3.13, Eurimediterranean: 0, Mediterranean-montane: 3.13, Eurasian: 75, Paleotemperate: 9.38, Eurasian (in sen. str.): 6.25, Pontic: 12.5, Euro-Caucasian: 18.75, Centroeuropean: 15.63, South European Orophytes: 6.25, Boreal: 9.38, Adventitious: 0, Balkan: 0.

6: Longitude: 487007, Latitude: 4550743, Location: Galičica, above the village of Ramne, pH: 5.1, organic matter: 13.2, C: 7.6, C/N: 15.2, N: 0.5, sand: 15, clay: 30.6, coarse silt: 12, fine silt: 42, total silt: 54, texture class: MGI, Ca: 12.05, Mg: 1.52, K: 0.52, Na: 0.1, total exchangeable acidity: 19.25, sum of base cations: 14.2, cation exchange capacity: 33.5, proportion of base cations (%): 42.4, Ca (%): 36, Mg (%): 4.5, K (%): 1.6, Na (%): 0.3, total exchangeable acidity (%): 57.5, Shannon-Wiener Index: 1.892, Simpson Index: 0.7281, Life form: Chamaephyte: 10, Geophyte: 20, Hemicryptophyte: 45, Hemicryptophyte (caesp): 25, Hemicryptophyte (ros): 10, Hemicryptophyte (scand): 10, Nano-Phanerophyte: 0, Phanerophyte: 25, Phanerophyte (caesp): 5, Phanerophyte (scap): 20, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 0, Eurimediterranean: 10, Mediterranean-montane: 0, Eurasian: 75, Paleotemperate: 10, Eurasian (in sen. str.): 0, Pontic: 15, Euro-Caucasian: 15, Centroeuropean: 30, South European Orophytes: 0, Boreal: 10, Adventitious: 0, Balkan: 0.

7: Longitude: 486942, Latitude: 4550733, Location: above the village of Ramne, Vakovska Branejnca, pH: 5.1, organic matter: 13.2, C: 7.6, C/N: 15.2, N: 0.5, sand: 15, clay: 30.6, coarse silt: 12, fine silt: 42, total silt: 54, texture class: MGI, Ca: 12.05, Mg: 1.52, K: 0.52, Na: 0.1, total exchangeable acidity: 19.25, sum of base cations: 14.2, cation exchange capacity: 33.5, proportion of base cations (%): 42.4, Ca (%): 36, Mg (%): 4.5, K (%): 1.6, Na (%): 0.3, total exchangeable acidity (%): 57.5, Shannon-Wiener Index: 2.441, Simpson Index: 0.7746,

Life form: Chamaephyte: 2.86, Geophyte: 14.29, Hemicryptophyte: 42.86, Hemicryptophyte (caesp): 14.29, Hemicryptophyte (ros): 8.57, Hemicryptophyte (scand): 20, Nano-Phanerophyte: 5.71, Phanerophyte: 34.29, Phanerophyte (caesp): 14.29, Phanerophyte (scap): 17.14, Therophyte: 0, Chorotypes: Endemic: 2.86, Stenomediterranean: 8.57, Eurimediterranean: 5.71, Mediterranean-montane: 0, Eurasian: 62.86, Paleotemperate: 11.43, Eurasian (in sen. str.): 2.86, Pontic: 14.29, Euro-Caucasian: 17.14, Centroeuropean: 11.43, South European Orophytes: 2.86, Boreal: 17.14, Adventitious: 0, Balkan: 0.

8: Longitude: 487079, Latitude: 4541274, Location: Galičica, Gorno Studino-Bavčine, pH: 5.1, organic matter: 33.3, C: 19.3, C/N: 11.2, N: 1.72, sand: 0, clay: 0, coarse silt: 0, fine silt: 0, total silt: 0, texture class: Ca: 7.37, Mg: 5.05, K: 1.43, Na: 0.23, total exchangeable acidity: 31.85, sum of base cations: 84.1, cation exchange capacity: 116, proportion of base cations (%): 72.5, Ca (%): 66.7, Mg (%): 4.4, K (%): 1.2, Na (%): 0.2, total exchangeable acidity (%): 27.5, Shannon-Wiener Index: 1.804, Simpson Index: 0.6466, Life form: Chamaephyte: 9.52, Geophyte: 14.29, Hemicryptophyte: 33.33, Hemicryptophyte (caesp): 14.29, Hemicryptophyte (ros): 4.76, Hemicryptophyte (scand): 14.29, Nano-Phanerophyte: 0, Phanerophyte: 38.1, Phanerophyte (caesp): 19.05, Phanerophyte (scap): 19.05, Therophyte: 4.76, Chorotypes: Endemic: 0, Stenomediterranean: 4.76, Eurimediterranean: 4.76, Mediterranean-montane: 4.76, Eurasian: 57.14, Paleotemperate: 4.76, Eurasian (in sen. str.): 0, Pontic: 4.76, Euro-Caucasian: 14.29, Centroeuropean: 28.57, South European Orophytes: 9.52, Boreal: 14.29, Adventitious: 4.76, Balkan: 0.

9: Longitude: 488299, Latitude: 4535922, Location: Galičica, Leskoski Uši, pH: 6.4, organic matter: 17.4, C: 10.1, C/N: 13.6, N: 0.74, sand: 12, clay: 26.9, coarse silt: 18, fine silt: 44, total silt: 61, texture class: MGI-MI, Ca: 33.28, Mg: 2.54, K: 1.6, Na: 0.11, total exchangeable acidity: 13.55, sum of base cations: 37.5, cation exchange capacity: 51.1, proportion of base cations (%): 73.4, Ca (%): 65.1, Mg (%): 5, K (%): 3.1, Na (%): 0.2, total exchangeable acidity (%): 26.5, Shannon-Wiener Index: 2.601, Simpson Index: 0.8541, Life form: Chamaephyte: 2.94, Geophyte: 14.71, Hemicryptophyte: 47.06, Hemicryptophyte (caesp): 17.65, Hemicryptophyte (ros): 2.94, Hemicryptophyte (scand): 26.47, Nano-Phanerophyte: 5.88, Phanerophyte: 29.41, Phanerophyte (caesp): 5.88, Phanerophyte (scap): 23.53, Therophyte: 0, Chorotypes: Endemic: 2.94, Stenomediterranean: 2.94, Eurimediterranean: 17.65, Mediterranean-montane: 2.94, Eurasian: 61.76, Paleotemperate: 8.82, Eurasian (in sen. str.): 8.82, Pontic: 2.94, Euro-Caucasian: 11.76, Centroeuropean: 14.71, South European Orophytes: 0, Boreal: 8.82, Adventitious: 2.94, Balkan: 0.

10: Longitude: 483816, Latitude: 4533058, Location: above Zli Dol, pH: 8, organic matter: 15.5, C: 9, C/N: 11.1, N: 0.81, sand: 26.7, clay: 19, coarse silt: 17, fine silt: 37, total silt: 54, texture class: MI, Ca: 61.15, Mg: 1.76, K: 0.56, Na: 0.1, total exchangeable acidity: 6.7, sum of base cations: 63.6, cation exchange capacity: 70.3, proportion of base cations (%): 90.5, Ca (%): 87, Mg (%): 2.5, K (%): 0.8, Na (%): 0.1, total exchangeable acidity (%): 9.5, Shannon-Wiener Index: 3.683, Simpson Index: 0.9671, Life form: Chamaephyte: 4.44, Geophyte: 20, Hemicryptophyte: 40, Hemicryptophyte (caesp): 8.89, Hemicryptophyte (ros): 8.89, Hemicryptophyte (scand): 22.22, Nano-Phanerophyte: 4.44, Phanerophyte: 31.11, Phanerophyte (caesp): 11.11, Phanerophyte (scap): 20, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 2.22, Eurimediterranean: 2.22, Mediterranean-montane: 4.44, Eurasian: 55.56, Paleotemperate: 2.22, Eurasian (in sen. str.): 8.89, Pontic: 8.89, Euro-Caucasian: 11.11, Centroeuropean: 11.11, South European Orophytes: 8.89, Boreal: 17.78, Adventitious: 4.44, Balkan: 2.22.

Table 6:
1: Longitude: 483244, Latitude: 4532050, Location: Galičica, under the road, pH: 6.6, organic matter: 46.9, C: 27.2, C/N: 22.3, N: 1.22, sand: 27.3, clay: 22.7, coarse silt: 0, fine silt: 0, total silt: 0, texture class: I-MI, Ca: 68.36, Mg: 2.96, K: 1.63, Na: 0.15, total exchangeable acidity: 14.45, sum of base cations: 73.1, cation exchange capacity: 87.6, proportion of base cations (%): 83.4, Ca (%): 78, Mg (%): 3.4, K (%): 1.9, Na (%): 0.2, total exchangeable acidity (%): 16.5, Shannon-Wiener Index: 2.469, Simpson Index: 0.8138, Life form: Chamaephyte: 10.53, Geophyte: 13.16, Hemicryptophyte: 34.21, Hemicryptophyte (caesp): 7.89, Hemicryptophyte (ros): 2.63, Hemicryptophyte (scand): 21.05, Nano-Phanerophyte: 2.63, Phanerophyte: 39.47, Phanerophyte (caesp): 21.05, Phanerophyte (scap): 18.42, Therophyte: 0, Chorotypes: Endemic: 5.26, Stenomediterranean: 2.63, Eurimediterranean: 13.16, Mediterranean-montane: 7.89, Eurasian: 55.26, Paleotemperate: 10.53, Eurasian (in sen. str.): 5.26, Pontic: 15.79, Euro-Caucasian: 2.63, Centroeuropean: 7.89, South European Orophytes: 5.26, Boreal: 5.26, Adventitious: 0, Balkan: 0.

2: Longitude: 484779, Latitude: 4535409, Location: below Crven kamen, first turn from a vantage point to Ohrid, pH: 6.4, organic matter: 27.3, C: 15.8, C/N: 25.9, N: 0.61, sand: 19.4, clay: 39.2, coarse silt: 12, fine silt: 29, total silt: 41, texture class: MGI-MG, Ca: 54.44, Mg: 1.85, K: 1.17, Na: 0.12, total exchangeable acidity: 17.75, sum of base cations: 57.6, cation exchange capacity: 75.4, proportion of base cations (%): 76.4, Ca (%): 72.2, Mg (%): 2.5, K (%): 1.6, Na (%): 0.2, total exchangeable acidity (%): 23.5, Shannon-Wiener Index: 1.970, Simpson Index: 0.657, Life form: Chamaephyte: 7.69, Geophyte: 7.69, Hemicryptophyte: 46.15, Hemicryptophyte (caesp): 15.38, Hemicryptophyte (ros): 3.85, Hemicryptophyte (scand): 23.08, Nano-Phanerophyte: 0, Phanerophyte: 34.62, Phanerophyte (caesp): 15.38, Phanerophyte (scap): 19.23, Therophyte: 3.85, Chorotypes: Endemic: 3.85, Stenomediterranean: 0, Eurimediterranean: 19.23, Mediterranean-montane: 3.85, Eurasian: 57.69, Paleotemperate: 3.85, Eurasian (in sen. str.): 3.85, Pontic: 11.54, Euro-Caucasian: 19.23, Centroeuropean: 15.38, South European Orophytes: 3.85, Boreal: 3.85, Adventitious: 3.85, Balkan: 0.

3: Longitude: 484940, Latitude: 4535642, Location: above Koritski Rid, pH: 6.8, organic matter: 27.6, C: 16, C/N: 21.1, N: 0.76, sand: 15.8, clay: 32.8, coarse silt: 14, fine silt: 37, total silt: 51, texture class: MGI, Ca: 61.32, Mg: 2.63, K: 0.97, Na: 0.1, total exchangeable acidity: 12.8, sum of base cations: 65, cation exchange capacity: 77.8, proportion of base cations (%): 83.5, Ca (%): 78.8, Mg (%): 3.4, K (%): 1.2, Na (%): 0.1, total exchangeable acidity (%): 16.5, Shannon-Wiener Index: 2.227, Simpson Index: 0.7107, Life form: Chamaephyte: 6.45, Geophyte: 12.9, Hemicryptophyte: 45.16, Hemicryptophyte (caesp): 12.9, Hemicryptophyte (ros): 3.23, Hemicryptophyte (scand): 25.81, Nano-Phanerophyte: 3.23, Phanerophyte: 32.26, Phanerophyte (caesp): 12.9, Phanerophyte (scap): 19.35, Therophyte: 0, Chorotypes: Endemic: 6.45, Stenomediterranean: 6.45, Eurimediterranean: 3.23, Mediterranean-montane: 6.45, Eurasian: 61.29, Paleotemperate: 6.45, Eurasian (in sen. str.): 6.45, Pontic: 6.45, Euro-Caucasian: 16.13, Centroeuropean: 9.68, South European Orophytes: 6.45, Boreal: 9.68, Adventitious: 0, Balkan: 0.

4: Longitude: 484470, Latitude: 4534876, Location: above Koritski Rid, pH: 6.4, organic matter: 10.9, C: 6.3, C/N: 19.1, N: 0.33, sand: 10.3, clay: 57.3, coarse silt: 9, fine silt: 24, total silt: 32, texture class: G, Ca: 35.52, Mg: 1.56, K: 1.17, Na: 0.12, total exchangeable acidity: 12.7, sum of base cations: 38.4, cation exchange capacity: 51.1, proportion of base cations (%): 75.1, Ca (%): 69.5, Mg (%): 3.1, K (%): 2.3, Na (%): 0.2, total exchangeable acidity (%): 24.9, Shannon-Wiener Index: 2.356, Simpson Index: 0.7991, Life form: Chamaephyte: 9.68, Geophyte: 12.9, Hemicryptophyte: 29.03, Hemicryptophyte (caesp): 6.45, Hemicryptophyte

(ros): 6.45, Hemicryptophyte (scand): 12.9, Nano-Phanerophyte: 9.68, Phanerophyte: 32.26, Phanerophyte (caesp): 12.9, Phanerophyte (scap): 19.35, Therophyte: 6.45, Chorotypes: Endemic: 9.68, Stenomediterranean: 9.68, Eurimediterranean: 9.68, Mediterranean-montane: 3.23, Eurasian: 48.39, Paleotemperate: 6.45, Eurasian (in sen. str.): 3.23, Pontic: 12.9, Euro-Caucasian: 9.68, Centroeuropean: 12.9, South European Orophytes: 3.23, Boreal: 9.68, Adventitious: 3.23, Balkan: 0.

5: Longitude: 484781, Latitude: 4535259, Location: above Koritski Rid, pH: 6.4, organic matter: 27.3, C: 15.8, C/N: 25.9, N: 0.61, sand: 19.4, clay: 39.2, coarse silt: 12, fine silt: 29, total silt: 41, texture class: MGI-MG, Ca: 54.44, Mg: 1.85, K: 1.17, Na: 0.12, total exchangeable acidity: 17.75, sum of base cations: 57.6, cation exchange capacity: 75.4, proportion of base cations (%): 76.4, Ca (%): 72.2, Mg (%): 2.5, K (%): 1.6, Na (%): 0.2, total exchangeable acidity (%): 23.5, Shannon-Wiener Index: 2.372, Simpson Index: 0.7587, Life form: Chamaephyte: 10, Geophyte: 6.67, Hemicryptophyte: 26.67, Hemicryptophyte (caesp): 6.67, Hemicryptophyte (ros): 10, Hemicryptophyte (scand): 10, Nano-Phanerophyte: 6.67, Phanerophyte: 46.67, Phanerophyte (caesp): 16.67, Phanerophyte (scap): 30, Therophyte: 3.33, Chorotypes: Endemic: 3.33, Stenomediterranean: 10, Eurimediterranean: 20, Mediterranean-montane: 6.67, Eurasian: 43.33, Paleotemperate: 0, Eurasian (in sen. str.): 0, Pontic: 3.33, Euro-Caucasian: 16.67, Centroeuropean: 13.33, South European Orophytes: 3.33, Boreal: 6.67, Adventitious: 0, Balkan: 0.

Table 7:

1: Longitude: 492316, Latitude: 4540210, Location: Galičica, Lomje, pH: 5.7, organic matter: 10.2, C: 5.9, C/N: 10.9, N: 0.54, sand: 6.2, clay: 39.7, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MG-MGI, Ca: 1.94, Mg: 2.13, K: 1.13, Na: 0.18, total exchangeable acidity: 20.7, sum of base cations: 45.4, cation exchange capacity: 66.1, proportion of base cations (%): 68.7, Ca (%): 63.4, Mg (%): 3.2, K (%): 1.7, Na (%): 0.3, total exchangeable acidity (%): 31.3, Shannon-Wiener Index: 2.612, Simpson Index: 0.7829, Life form: Chamaephyte: 0, Geophyte: 22.22, Hemicryptophyte: 36.11, Hemicryptophyte (caesp): 8.33, Hemicryptophyte (ros): 11.11, Hemicryptophyte (scand): 16.67, Nano-Phanerophyte: 2.78, Phanerophyte: 33.33, Phanerophyte (caesp): 11.11, Phanerophyte (scap): 22.22, Therophyte: 5.56, Chorotypes: Endemic: 0, Stenomediterranean: 5.56, Eurimediterranean: 13.89, Mediterranean-montane: 5.56, Eurasian: 58.33, Paleotemperate: 8.33, Eurasian (in sen. str.): 8.33, Pontic: 8.33, Euro-Caucasian: 22.22, Centroeuropean: 5.56, South European Orophytes: 5.56, Boreal: 8.33, Adventitious: 0, Balkan: 0.

2: Longitude: 490744, Latitude: 4532744, Location: Galičica, above the village of Leskoec, Prespa, pH: 4.7, organic matter: 4.9, C: 2.8, C/N: 10.8, N: 0.26, sand: 37.4, clay: 17.8, coarse silt: 0, fine silt: 0, total silt: 0, texture class: I, Ca: 5.73, Mg: 2.05, K: 0.41, Na: 0.07, total exchangeable acidity: 14.85, sum of base cations: 8.3, cation exchange capacity: 23.2, proportion of base cations (%): 35.8, Ca (%): 24.7, Mg (%): 8.8, K (%): 1.8, Na (%): 0.3, total exchangeable acidity (%): 64, Shannon-Wiener Index: 2.566, Simpson Index: 0.7658, Life form: Chamaephyte: 7.32, Geophyte: 21.95, Hemicryptophyte: 39.02, Hemicryptophyte (caesp): 12.2, Hemicryptophyte (ros): 7.32, Hemicryptophyte (scand): 17.07, Nano-Phanerophyte: 4.88, Phanerophyte: 19.51, Phanerophyte (caesp): 4.88, Phanerophyte (scap): 14.63, Therophyte: 7.32, Chorotypes: Endemic: 0, Stenomediterranean: 9.76, Eurimediterranean: 7.32, Mediterranean-montane: 0, Eurasian: 56.1, Paleotemperate: 4.88, Eurasian (in sen. str.): 14.63, Pontic: 7.32, Euro-Caucasian: 17.07, Centroeuropean: 7.32, South European Orophytes: 4.88, Boreal: 12.2, Adventitious: 2.44, Balkan: 0.

3: Longitude: 491457, Latitude: 4535866, Location: Vison, pH: 6.2, organic matter: 10.5, C: 6.1, C/N: 11.1, N: 0.55, sand: 34.1, clay: 23.9, coarse silt: 10, fine silt: 32, total silt: 42, texture class: I, Ca: 19.06, Mg: 3.74, K: 1.22, Na: 0.13, total exchangeable acidity: 14.95, sum of base cations: 24.1, cation exchange capacity: 39.1, proportion of base cations (%): 61.6, Ca (%): 48.7, Mg (%): 9.6, K (%): 3.1, Na (%): 0.3, total exchangeable acidity (%): 38.2, Shannon-Wiener Index: 2.243, Simpson Index: 0.6875, Life form: Chamaephyte: 2.94, Geophyte: 11.76, Hemicryptophyte: 26.47, Hemicryptophyte (caesp): 5.88, Hemicryptophyte (ros): 8.82, Hemicryptophyte (scand): 11.76, Nano-Phanerophyte: 2.94, Phanerophyte: 35.29, Phanerophyte (caesp): 0, Phanerophyte (scap): 35.29, Therophyte: 20.59, Chorotypes: Endemic: 0, Stenomediterranean: 8.82, Eurimediterranean: 5.88, Mediterranean-montane: 2.94, Eurasian: 64.71, Paleotemperate: 2.94, Eurasian (in sen. str.): 8.82, Pontic: 8.82, Euro-Caucasian: 20.59, Centroeuropean: 5.88, South European Orophytes: 5.88, Boreal: 5.88, Adventitious: 5.88, Balkan: 0.

4: Longitude: 492532, Latitude: 4542135, Location: Ramni Dol, Lomje, pH: 6.4, organic matter: 23.8, C: 13.8, C/N: 14.8, N: 0.93, sand: 10.8, clay: 30, coarse silt: 20, fine silt: 40, total silt: 59, texture class: MGI, Ca: 49.4, Mg: 3.16, K: 1.23, Na: 0.08, total exchangeable acidity: 16.4, sum of base cations: 53.9, cation exchange capacity: 70.3, proportion of base cations (%): 76.7, Ca (%): 70.3, Mg (%): 4.5, K (%): 1.7, Na (%): 0.1, total exchangeable acidity (%): 23.3, Shannon-Wiener Index: 3.236, Simpson Index: 0.934, Life form: Chamaephyte: 1.89, Geophyte: 16.98, Hemicryptophyte: 37.74, Hemicryptophyte (caesp): 7.55, Hemicryptophyte (ros): 9.43, Hemicryptophyte (scand): 20.75, Nano-Phanerophyte: 3.77, Phanerophyte: 33.96, Phanerophyte (caesp): 13.21, Phanerophyte (scap): 16.98, Therophyte: 5.66, Chorotypes: Endemic: 1.89, Stenomediterranean: 5.66, Eurimediterranean: 9.43, Mediterranean-montane: 3.77, Eurasian: 56.6, Paleotemperate: 1.89, Eurasian (in sen. str.): 15.09, Pontic: 18.87, Euro-Caucasian: 11.32, Centroeuropean: 1.89, South European Orophytes: 9.43, Boreal: 9.43, Adventitious: 1.89, Balkan: 0.

5: Longitude: 492459, Latitude: 4541841, Location: Ramni Dol, Lomje, pH: 6.3, organic matter: 28.1, C: 16.3, C/N: 14.7, N: 1.11, sand: 11.8, clay: 31.5, coarse silt: 22, fine silt: 34, total silt: 57, texture class: MGI, Ca: 44.06, Mg: 2.42, K: 1.26, Na: 0.1, total exchangeable acidity: 18.1, sum of base cations: 47.8, cation exchange capacity: 65.9, proportion of base cations (%): 72.5, Ca (%): 66.9, Mg (%): 3.7, K (%): 1.9, Na (%): 0.2, total exchangeable acidity (%): 27.5, Shannon-Wiener Index: 3.236, Simpson Index: 0.9147, Life form: Chamaephyte: 1.64, Geophyte: 18.03, Hemicryptophyte: 36.07, Hemicryptophyte (caesp): 8.2, Hemicryptophyte (ros): 4.92, Hemicryptophyte (scand): 22.95, Nano-Phanerophyte: 1.64, Phanerophyte: 32.79, Phanerophyte (caesp): 11.48, Phanerophyte (scap): 18.03, Therophyte: 9.84, Chorotypes: Endemic: 1.64, Stenomediterranean: 3.28, Eurimediterranean: 8.2, Mediterranean-montane: 3.28, Eurasian: 57.38, Paleotemperate: 4.92, Eurasian (in sen. str.): 9.84, Pontic: 13.11, Euro-Caucasian: 19.67, Centroeuropean: 3.28, South European Orophytes: 6.56, Boreal: 11.48, Adventitious: 4.92, Balkan: 0.

Table 8:
1: Longitude: 491447, Latitude: 4535885, Location: Vison, pH: 6.4, organic matter: 14.6, C: 8.5, C/N: 15.7, N: 0.54, sand: 31.2, clay: 20.1, coarse silt: 12, fine silt: 37, total silt: 49, texture class: I-MI, Ca: 25.14, Mg: 3.41, K: 0.71, Na: 0.11, total exchangeable acidity: 11.4, sum of base cations: 29.4, cation exchange capacity: 40.8, proportion of base cations (%): 72.1, Ca (%): 61.6, Mg (%): 8.4, K (%): 1.7, Na (%): 0.3, total exchangeable acidity (%): 27.9, Shannon-Wiener Index: 1.966, Simpson Index: 0.6802, Life form: Chamaephyte: 0, Geophyte: 20.83, Hemicryptophyte: 20.83, Hemicryptophyte (caesp): 0, Hemicryptophyte (ros): 0, Hemicryp-

tophyte (scand): 20.83, Nano-Phanerophyte: 0, Phanerophyte: 54.17, Phanerophyte (caesp): 8.33, Phanerophyte (scap): 45.83, Therophyte: 4.17, Chorotypes: Endemic: 0, Stenomediterranean: 0, Eurimediterranean: 8.33, Mediterranean-montane: 0, Eurasian: 70.83, Paleotemperate: 4.17, Eurasian (in sen. str.): 8.33, Pontic: 4.17, Euro-Caucasian: 25, Centroeuropean: 8.33, South European Orophytes: 12.5, Boreal: 0, Adventitious: 8.33, Balkan: 0.

2: Longitude: 489492, Latitude: 4532720, Location: Vršinana, pH: 7, organic matter: 33.5, C: 19.4, C/N: 14.5, N: 1.34, sand: 18.3, clay: 20.9, coarse silt: 27, fine silt: 34, total silt: 61, texture class: MI, Ca: 63.04, Mg: 5.67, K: 1.09, Na: 0.09, total exchangeable acidity: 9, sum of base cations: 69.9, cation exchange capacity: 78.9, proportion of base cations (%): 88.6, Ca (%): 79.9, Mg (%): 7.2, K (%): 1.4, Na (%): 0.1, total exchangeable acidity (%): 11.4, Shannon-Wiener Index: 2.736, Simpson Index: 0.8652, Life form: Chamaephyte: 0, Geophyte: 17.5, Hemicryptophyte: 37.5, Hemicryptophyte (caesp): 7.5, Hemicryptophyte (ros): 5, Hemicryptophyte (scand): 22.5, Nano-Phanerophyte: 0, Phanerophyte: 40, Phanerophyte (caesp): 15, Phanerophyte (scap): 17.5, Therophyte: 5, Chorotypes: Endemic: 2.5, Stenomediterranean: 2.5, Eurimediterranean: 7.5, Mediterranean-montane: 7.5, Eurasian: 55, Paleotemperate: 15, Eurasian (in sen. str.): 5, Pontic: 10, Euro-Caucasian: 10, Centroeuropean: 2.5, South European Orophytes: 10, Boreal: 12.5, Adventitious: 2.5, Balkan: 0.

3: Longitude: 492705, Latitude: 4541003, Location: above the village of Sirhan, pH: 6.6, organic matter: 3, C: 1.7, C/N: 1.3, N: 1.28, sand: 11.6, clay: 16.6, coarse silt: 27, fine silt: 44, total silt: 72, texture class: MI, Ca: 62.37, Mg: 2.91, K: 0.92, Na: 0.13, total exchangeable acidity: 17.1, sum of base cations: 66.3, cation exchange capacity: 83.4, proportion of base cations (%): 79.5, Ca (%): 74.8, Mg (%): 3.5, K (%): 1.1, Na (%): 0.2, total exchangeable acidity (%): 20.5, Shannon-Wiener Index: 3.704, Simpson Index: 0.964, Life form: Chamaephyte: 9.09, Geophyte: 5.45, Hemicryptophyte: 38.18, Hemicryptophyte (caesp): 10.91, Hemicryptophyte (ros): 7.27, Hemicryptophyte (scand): 16.36, Nano-Phanerophyte: 3.64, Phanerophyte: 38.18, Phanerophyte (caesp): 18.18, Phanerophyte (scap): 20, Therophyte: 5.45, Chorotypes: Endemic: 1.82, Stenomediterranean: 7.27, Eurimediterranean: 18.18, Mediterranean-montane: 3.64, Eurasian: 41.82, Paleotemperate: 3.64, Eurasian (in sen. str.): 5.45, Pontic: 16.36, Euro-Caucasian: 5.45, Centroeuropean: 3.64, South European Orophytes: 7.27, Boreal: 14.55, Adventitious: 1.82, Balkan: 0.

4: Longitude: 492518, Latitude: 4541336, Location: Čeremušana, pH: 6.5, organic matter: 10.8, C: 6.3, C/N: 12.9, N: 0.49, sand: 7.3, clay: 40.4, coarse silt: 14, fine silt: 39, total silt: 52, texture class: MG-MGI, Ca: 43.26, Mg: 2.42, K: 0.91, Na: 0.11, total exchangeable acidity: 13.55, sum of base cations: 46.7, cation exchange capacity: 60.3, proportion of base cations (%): 77.4, Ca (%): 71.7, Mg (%): 4, K (%): 1.5, Na (%): 0.2, total exchangeable acidity (%): 22.5, Shannon-Wiener Index: 3.302, Simpson Index: 0.9166, Life form: Chamaephyte: 1.85, Geophyte: 12.96, Hemicryptophyte: 22.22, Hemicryptophyte (caesp): 3.7, Hemicryptophyte (ros): 5.56, Hemicryptophyte (scand): 12.96, Nano-Phanerophyte: 1.85, Phanerophyte: 55.56, Phanerophyte (caesp): 18.52, Phanerophyte (scap): 31.48, Therophyte: 5.56, Chorotypes: Endemic: 0, Stenomediterranean: 3.7, Eurimediterranean: 12.96, Mediterranean-montane: 3.7, Eurasian: 59.26, Paleotemperate: 7.41, Eurasian (in sen. str.): 5.56, Pontic: 12.96, Euro-Caucasian: 16.67, Centroeuropean: 5.56, South European Orophytes: 9.26, Boreal: 11.11, Adventitious: 0, Balkan: 0.

Table 9:

1: Longitude: 483724, Latitude: 4533112, Location: Krvov Kamen, under the rock block, pH: 8, organic matter: 15.5, C: 9, C/N: 11.1, N: 0.81, sand: 26.7, clay: 19, coarse silt: 17, fine silt: 37,

total silt: 54, texture class: MI, Ca: 61.15, Mg: 1.76, K: 0.56, Na: 0.1, total exchangeable acidity: 6.7, sum of base cations: 63.6, cation exchange capacity: 70.3, proportion of base cations (%): 90.5, Ca (%): 87, Mg (%): 2.5, K (%): 0.8, Na (%): 0.1, total exchangeable acidity (%): 9.5, Shannon-Wiener Index: 3.158, Simpson Index: 0.9273, Life form: Chamaephyte: 2.44, Geophyte: 21.95, Hemicryptophyte: 31.71, Hemicryptophyte (caesp): 7.32, Hemicryptophyte (ros): 4.88, Hemicryptophyte (scand): 17.07, Nano-Phanerophyte: 2.44, Phanerophyte: 39.02, Phanerophyte (caesp): 14.63, Phanerophyte (scap): 21.95, Therophyte: 2.44, Chorotypes: Endemic: 2.44, Stenomediterranean: 4.88, Eurimediterranean: 2.44, Mediterranean-montane: 7.32, Eurasian: 51.22, Paleotemperate: 2.44, Eurasian (in sen. str.): 4.88, Pontic: 9.76, Euro-Caucasian: 19.51, Centroeuropean: 4.88, South European Orophytes: 12.2, Boreal: 12.2, Adventitious: 2.44, Balkan: 4.88.

2: Longitude: 483715, Latitude: 4533097, Location: Krvov Kamen, pH: 7.2, organic matter: 54.1, C: 31.3, C/N: 14, N: 2.23, sand: 14.9, clay: 17.7, coarse silt: 28, fine silt: 39, total silt: 67, texture class: MI, Ca: 90.66, Mg: 6.33, K: 0.82, Na: 0.09, total exchangeable acidity: 9.95, sum of base cations: 97.9, cation exchange capacity: 107.9, proportion of base cations (%): 90.7, Ca (%): 84, Mg (%): 5.9, K (%): 0.8, Na (%): 0.1, total exchangeable acidity (%): 9.2, Shannon-Wiener Index: 2.719, Simpson Index: 0.8239, Life form: Chamaephyte: 0, Geophyte: 28.57, Hemicryptophyte: 30.95, Hemicryptophyte (caesp): 7.14, Hemicryptophyte (ros): 7.14, Hemicryptophyte (scand): 14.29, Nano-Phanerophyte: 0, Phanerophyte: 38.1, Phanerophyte (caesp): 14.29, Phanerophyte (scap): 21.43, Therophyte: 2.38, Chorotypes: Endemic: 2.38, Stenomediterranean: 2.38, Eurimediterranean: 4.76, Mediterranean-montane: 11.9, Eurasian: 47.62, Paleotemperate: 2.38, Eurasian (in sen. str.): 4.76, Pontic: 4.76, Euro-Caucasian: 23.81, Centroeuropean: 2.38, South European Orophytes: 14.29, Boreal: 9.52, Adventitious: 2.38, Balkan: 4.76.

Table 10:
1: Longitude: 494428, Latitude: 4544163, Location: Galičica, Kukulj, pH: 4.7, organic matter: 8.7, C: 5, C/N: 12.5, N: 0.4, sand: 29.4, clay: 29.5, coarse silt: 0, fine silt: 0, total silt: 0, texture class: GI, Ca: 7.11, Mg: 1.56, K: 0.74, Na: 0.09, total exchangeable acidity: 22.05, sum of base cations: 9.5, cation exchange capacity: 31.6, proportion of base cations (%): 30.1, Ca (%): 22.5, Mg (%): 4.9, K (%): 2.3, Na (%): 0.3, total exchangeable acidity (%): 69.8, Shannon-Wiener Index: 2.455, Simpson Index: 0.8138, Life form: Chamaephyte: 8.82, Geophyte: 17.65, Hemicryptophyte: 52.94, Hemicryptophyte (caesp): 20.59, Hemicryptophyte (ros): 8.82, Hemicryptophyte (scand): 17.65, Nano-Phanerophyte: 2.94, Phanerophyte: 17.65, Phanerophyte (caesp): 2.94, Phanerophyte (scap): 14.71, Therophyte: 0, Chorotypes: Endemic: 5.88, Stenomediterranean: 0, Eurimediterranean: 17.65, Mediterranean-montane: 0, Eurasian: 52.94, Paleotemperate: 5.88, Eurasian (in sen. str.): 5.88, Pontic: 8.82, Euro-Caucasian: 11.76, Centroeuropean: 5.88, South European Orophytes: 2.94, Boreal: 11.76, Adventitious: 0, Balkan: 5.88.

2: Longitude: 494194, Latitude: 4545739, Location: Buka, pH: 5.3, organic matter: 7.7, C: 4.5, C/N: 16.1, N: 0.28, sand: 38.1, clay: 18.6, coarse silt: 9, fine silt: 34, total silt: 43, texture class: I, Ca: 7.98, Mg: 1.76, K: 0.55, Na: 0.05, total exchangeable acidity: 12.85, sum of base cations: 10.3, cation exchange capacity: 23.2, proportion of base cations (%): 44.4, Ca (%): 34.4, Mg (%): 7.6, K (%): 2.4, Na (%): 0.2, total exchangeable acidity (%): 55.4, Shannon-Wiener Index: 2.788, Simpson Index: 0.8943, Life form: Chamaephyte: 9.09, Geophyte: 9.09, Hemicryptophyte: 36.36, Hemicryptophyte (caesp): 24.24, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 12.12, Nano-Phanerophyte: 6.06, Phanerophyte: 33.33, Phanerophyte (caesp): 3.03, Phanerophyte (scap): 30.3, Therophyte: 6.06, Chorotypes: Endemic: 12.12, Stenomediterrane-

an: 0, Eurimediterranean: 21.21, Mediterranean-montane: 6.06, Eurasian: 54.55, Paleotemperate: 9.09, Eurasian (in sen. str.): 6.06, Pontic: 12.12, Euro-Caucasian: 9.09, Centroeuropean: 6.06, South European Orophytes: 0, Boreal: 6.06, Adventitious: 0, Balkan: 0.

3: Longitude: 484862, Latitude: 4544540, Location: Trugašovo, pH: 5.3, organic matter: 11.1, C: 6.4, C/N: 16.8, N: 0.38, sand: 52.9, clay: 13.6, coarse silt: 12, fine silt: 21, total silt: 34, texture class: PI-I, Ca: 8.63, Mg: 2.22, K: 0.88, Na: 0.1, total exchangeable acidity: 13.55, sum of base cations: 11.8, cation exchange capacity: 25.4, proportion of base cations (%): 46.5, Ca (%): 34, Mg (%): 8.7, K (%): 3.5, Na (%): 0.4, total exchangeable acidity (%): 53.3, Shannon-Wiener Index: 2.824, Simpson Index: 0.8934, Life form: Chamaephyte: 2.63, Geophyte: 10.53, Hemicryptophyte: 39.47, Hemicryptophyte (caesp): 10.53, Hemicryptophyte (ros): 7.89, Hemicryptophyte (scand): 18.42, Nano-Phanerophyte: 2.63, Phanerophyte: 23.68, Phanerophyte (caesp): 5.26, Phanerophyte (scap): 18.42, Therophyte: 21.05, Chorotypes: Endemic: 10.53, Stenomediterranean: 5.26, Eurimediterranean: 18.42, Mediterranean-montane: 5.26, Eurasian: 36.84, Paleotemperate: 5.26, Eurasian (in sen. str.): 5.26, Pontic: 5.26, Euro-Caucasian: 7.89, Centroeuropean: 0, South European Orophytes: 5.26, Boreal: 7.89, Adventitious: 5.26, Balkan: 2.63.

4: Longitude: 483569, Latitude: 4529221, Location: Galičica, above the spring of St. Naum (Kreka), pH: 6.9, organic matter: 11.4, C: 6.6, C/N: 12.5, N: 0.53, sand: 20.1, clay: 23.9, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MI, Ca: 1.08, Mg: 2.09, K: 1.77, Na: 0.08, total exchangeable acidity: 7.8, sum of base cations: 85, cation exchange capacity: 92.8, proportion of base cations (%): 91.6, Ca (%): 87.4, Mg (%): 2.3, K (%): 1.9, Na (%): 0.1, total exchangeable acidity (%): 8.4, Shannon-Wiener Index: 3.043, Simpson Index: 0.8704, Life form: Chamaephyte: 8.16, Geophyte: 4.08, Hemicryptophyte: 53.06, Hemicryptophyte (caesp): 26.53, Hemicryptophyte (ros): 2.04, Hemicryptophyte (scand): 18.37, Nano-Phanerophyte: 0, Phanerophyte: 24.49, Phanerophyte (caesp): 10.2, Phanerophyte (scap): 14.29, Therophyte: 10.2, Chorotypes: Endemic: 4.08, Stenomediterranean: 0, Eurimediterranean: 18.37, Mediterranean-montane: 4.08, Eurasian: 53.06, Paleotemperate: 14.29, Eurasian (in sen. str.): 6.12, Pontic: 14.29, Euro-Caucasian: 6.12, Centroeuropean: 0, South European Orophytes: 2.04, Boreal: 10.2, Adventitious: 2.04, Balkan: 4.08.

Table 11:

1: Longitude: 489776, Latitude: 4533987, Location: Leskoec, pH: 6.5, organic matter: 22.5, C: 13, C/N: 14.1, N: 0.92, sand: 21.9, clay: 32.6, coarse silt: 17, fine silt: 29, total silt: 46, texture class: GI, Ca: 56.08, Mg: 1.93, K: 1.06, Na: 0.14, total exchangeable acidity: 13.3, sum of base cations: 59.2, cation exchange capacity: 72.5, proportion of base cations (%): 81.7, Ca (%): 77.4, Mg (%): 2.7, K (%): 1.5, Na (%): 0.2, total exchangeable acidity (%): 18.3, Shannon-Wiener Index: 3.779, Simpson Index: 0.9668, Life form: Chamaephyte: 5.26, Geophyte: 12.28, Hemicryptophyte: 28.07, Hemicryptophyte (caesp): 7.02, Hemicryptophyte (ros): 5.26, Hemicryptophyte (scand): 14.04, Nano-Phanerophyte: 7.02, Phanerophyte: 47.37, Phanerophyte (caesp): 19.3, Phanerophyte (scap): 21.05, Therophyte: 0, Chorotypes: Endemic: 3.51, Stenomediterranean: 8.77, Eurimediterranean: 21.05, Mediterranean-montane: 0, Eurasian: 47.37, Paleotemperate: 3.51, Eurasian (in sen. str.): 1.75, Pontic: 12.28, Euro-Caucasian: 14.04, Centroeuropean: 3.51, South European Orophytes: 1.75, Boreal: 12.28, Adventitious: 5.26, Balkan: 0.

2: Longitude: 488055, Latitude: 4534955, Location: Galičica, Ski Center, pH: 5.6, organic matter: 16.8, C: 9.7, C/N: 17.3, N: 0.56, sand: 8.5, clay: 42.2, coarse silt: 14, fine silt: 35, total

silt: 49, texture class: MG, Ca: 24.42, Mg: 0.22, K: 0.97, Na: 0.06, total exchangeable acidity: 23.5, sum of base cations: 25.7, cation exchange capacity: 49.2, proportion of base cations (%): 52.2, Ca (%): 49.6, Mg (%): 0.4, K (%): 2, Na (%): 0.1, total exchangeable acidity (%): 47.8, Shannon-Wiener Index: 2.953, Simpson Index: 0.8726, Life form: Chamaephyte: 4.65, Geophyte: 13.95, Hemicryptophyte: 46.51, Hemicryptophyte (caesp): 18.6, Hemicryptophyte (ros): 4.65, Hemicryptophyte (scand): 20.93, Nano-Phanerophyte: 2.33, Phanerophyte: 30.23, Phanerophyte (caesp): 13.95, Phanerophyte (scap): 16.28, Therophyte: 2.33, Chorotypes: Endemic: 0, Stenomediterranean: 4.65, Eurimediterranean: 11.63, Mediterranean-montane: 4.65, Eurasian: 51.16, Paleotemperate: 6.98, Eurasian (in sen. str.): 6.98, Pontic: 9.3, Euro-Caucasian: 9.3, Centroeuropean: 2.33, South European Orophytes: 6.98, Boreal: 16.28, Adventitious: 0, Balkan: 0.

3: Longitude: 489747, Latitude: 4533946, Location: Leskoec, pH: 6.9, organic matter: 16.3, C: 9.4, C/N: 14, N: 0.67, sand: 18.6, clay: 34.9, coarse silt: 12, fine silt: 34, total silt: 47, texture class: MGI, Ca: 50.8, Mg: 1.93, K: 0.75, Na: 0.06, total exchangeable acidity: 8.6, sum of base cations: 53.5, cation exchange capacity: 62.1, proportion of base cations (%): 86.2, Ca (%): 81.8, Mg (%): 3.1, K (%): 1.2, Na (%): 0.1, total exchangeable acidity (%): 13.8, Shannon-Wiener Index: 3.270, Simpson Index: 0.9168, Life form: Chamaephyte: 6.52, Geophyte: 15.22, Hemicryptophyte: 28.26, Hemicryptophyte (caesp): 8.7, Hemicryptophyte (ros): 6.52, Hemicryptophyte (scand): 10.87, Nano-Phanerophyte: 8.7, Phanerophyte: 41.3, Phanerophyte (caesp): 15.22, Phanerophyte (scap): 23.91, Therophyte: 0, Chorotypes: Endemic: 6.52, Stenomediterranean: 6.52, Eurimediterranean: 23.91, Mediterranean-montane: 0, Eurasian: 43.48, Paleotemperate: 4.35, Eurasian (in sen. str.): 8.7, Pontic: 13.04, Euro-Caucasian: 2.17, Centroeuropean: 4.35, South European Orophytes: 0, Boreal: 10.87, Adventitious: 2.17, Balkan: 2.17.

4: Longitude: 489788, Latitude: 4533921, Location: Leskoec, pH: 6.9, organic matter: 19.4, C: 11.2, C/N: 15.1, N: 0.74, sand: 15.4, clay: 33.1, coarse silt: 17, fine silt: 34, total silt: 52, texture class: MGI, Ca: 51.7, Mg: 1.68, K: 1.03, Na: 0.07, total exchangeable acidity: 9, sum of base cations: 54.5, cation exchange capacity: 63.5, proportion of base cations (%): 85.8, Ca (%): 81.4, Mg (%): 2.6, K (%): 1.6, Na (%): 0.1, total exchangeable acidity (%): 14.2, Shannon--Wiener Index: 3.277, Simpson Index: 0.9132, Life form: Chamaephyte: 6.67, Geophyte: 8.89, Hemicryptophyte: 28.89, Hemicryptophyte (caesp): 8.89, Hemicryptophyte (ros): 4.44, Hemicryptophyte (scand): 15.56, Nano-Phanerophyte: 6.67, Phanerophyte: 44.44, Phanerophyte (caesp): 24.44, Phanerophyte (scap): 17.78, Therophyte: 4.44, Chorotypes: Endemic: 4.44, Stenomediterranean: 4.44, Eurimediterranean: 22.22, Mediterranean-montane: 0, Eurasian: 53.33, Paleotemperate: 6.67, Eurasian (in sen. str.): 2.22, Pontic: 13.33, Euro-Caucasian: 11.11, Centroeuropean: 4.44, South European Orophytes: 0, Boreal: 8.89, Adventitious: 6.67, Balkan: 0.

5: Longitude: 495299, Latitude: 4530710, Location: Prečna planina, pH: 5.8, organic matter: 10.7, C: 6.2, C/N: 12.4, N: 0.5, sand: 8.4, clay: 44.8, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MG, Ca: 3.2, Mg: 4.19, K: 0.72, Na: 0.17, total exchangeable acidity: 19.55, sum of base cations: 38.3, cation exchange capacity: 57.9, proportion of base cations (%): 66.1, Ca (%): 57.3, Mg (%): 7.2, K (%): 1.2, Na (%): 0.3, total exchangeable acidity (%): 33.8, Shannon-Wiener Index: 2.973, Simpson Index: 0.8749, Life form: Chamaephyte: 4, Geophyte: 20, Hemicryptophyte: 34, Hemicryptophyte (caesp): 12, Hemicryptophyte (ros): 8, Hemicryptophyte (scand): 10, Nano-Phanerophyte: 6, Phanerophyte: 36, Phanerophyte (caesp): 20, Phanerophyte (scap): 16, Therophyte: 0, Chorotypes: Endemic: 4, Stenomediterranean: 4, Eurimediterranean: 10, Mediterranean-montane: 0, Eurasian: 62, Paleotemperate: 10, Eurasian (in sen. str.): 8, Pontic: 18, Euro-Caucasian: 12, Centroeuropean: 2, South European Orophytes: 2, Boreal: 10, Adventitious: 0, Balkan: 0.

Table 12:
1: Longitude: 489689, Latitude: 4534506, Location: Leskoec, pH: 5.9, organic matter: 14.4, C: 8.3, C/N: 20.8, N: 0.4, sand: 23.4, clay: 40.6, coarse silt: 12, fine silt: 24, total silt: 36, texture class: G-GI, Ca: 29.84, Mg: 1.72, K: 0.9, Na: 0.12, total exchangeable acidity: 17.35, sum of base cations: 32.6, cation exchange capacity: 50, proportion of base cations (%): 65.2, Ca (%): 59.7, Mg (%): 3.4, K (%): 1.8, Na (%): 0.2, total exchangeable acidity (%): 34.7, Shannon-Wiener Index: 3.353, Simpson Index: 0.9335, Life form: Chamaephyte: 10.42, Geophyte: 14.58, Hemicryptophyte: 33.33, Hemicryptophyte (caesp): 12.5, Hemicryptophyte (ros): 6.25, Hemicryptophyte (scand): 14.58, Nano-Phanerophyte: 8.33, Phanerophyte: 31.25, Phanerophyte (caesp): 12.5, Phanerophyte (scap): 18.75, Therophyte: 2.08, Chorotypes: Endemic: 4.17, Stenomediterranean: 6.25, Eurimediterranean: 33.33, Mediterranean-montane: 2.08, Eurasian: 45.83, Paleotemperate: 6.25, Eurasian (in sen. str.): 6.25, Pontic: 14.58, Euro-Caucasian: 6.25, Centroeuropean: 0, South European Orophytes: 0, Boreal: 6.25, Adventitious: 0, Balkan: 0.

2: Longitude: 490244, Latitude: 4535841, Location: above the village of Leskoec, Kletovnik, pH: 6.4, organic matter: 14.4, C: 8.3, C/N: 13, N: 0.64, sand: 12.6, clay: 44.2, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MG, Ca: 9.42, Mg: 2.3, K: 1.31, Na: 0.19, total exchangeable acidity: 15.95, sum of base cations: 53.2, cation exchange capacity: 69.2, proportion of base cations (%): 76.9, Ca (%): 71.4, Mg (%): 3.3, K (%): 1.9, Na (%): 0.3, total exchangeable acidity (%): 23, Shannon-Wiener Index: 2.610, Simpson Index: 0.8235, Life form: Chamaephyte: 8.82, Geophyte: 14.71, Hemicryptophyte: 44.12, Hemicryptophyte (caesp): 11.76, Hemicryptophyte (ros): 5.88, Hemicryptophyte (scand): 23.53, Nano-Phanerophyte: 2.94, Phanerophyte: 29.41, Phanerophyte (caesp): 2.94, Phanerophyte (scap): 26.47, Therophyte: 0, Chorotypes: Endemic: 2.94, Stenomediterranean: 2.94, Eurimediterranean: 17.65, Mediterranean-montane: 0, Eurasian: 64.71, Paleotemperate: 2.94, Eurasian (in sen. str.): 5.88, Pontic: 11.76, Euro-Caucasian: 17.65, Centroeuropean: 2.94, South European Orophytes: 0, Boreal: 5.88, Adventitious: 0, Balkan: 0.

3: Longitude: 492996, Latitude: 4537754, Location: Kaleto, pH: 6.4, organic matter: 17.7, C: 10.2, C/N: 15, N: 0.68, sand: 11.1, clay: 23.1, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MI, Ca: 7.41, Mg: 7.77, K: 1.24, Na: 0.11, total exchangeable acidity: 12.5, sum of base cations: 66.5, cation exchange capacity: 79, proportion of base cations (%): 84.2, Ca (%): 72.7, Mg (%): 9.8, K (%): 1.6, Na (%): 0.1, total exchangeable acidity (%): 15.8, Shannon-Wiener Index: 3.129, Simpson Index: 0.8891, Life form: Chamaephyte: 5.36, Geophyte: 10.71, Hemicryptophyte: 46.43, Hemicryptophyte (caesp): 17.86, Hemicryptophyte (ros): 8.93, Hemicryptophyte (scand): 19.64, Nano-Phanerophyte: 1.79, Phanerophyte: 33.93, Phanerophyte (caesp): 10.71, Phanerophyte (scap): 19.64, Therophyte: 1.79, Chorotypes: Endemic: 1.79, Stenomediterranean: 7.14, Eurimediterranean: 25, Mediterranean-montane: 1.79, Eurasian: 57.14, Paleotemperate: 7.14, Eurasian (in sen. str.): 10.71, Pontic: 16.07, Euro-Caucasian: 16.07, Centroeuropean: 1.79, South European Orophytes: 1.79, Boreal: 5.36, Adventitious: 0, Balkan: 0.

4: Longitude: 492923, Latitude: 4540763, Location: Galičica, Čermuša, above the hunting lodge, pH: 6.4, organic matter: 14.1, C: 8.2, C/N: 9, N: 0.91, sand: 12.6, clay: 29.2, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MGI, Ca: 7.51, Mg: 4.35, K: 1.19, Na: 0.17, total exchangeable acidity: 18.1, sum of base cations: 73.2, cation exchange capacity: 91.3, proportion of base cations (%): 80.2, Ca (%): 73.9, Mg (%): 4.8, K (%): 1.3, Na (%): 0.2, total exchangeable acidity (%): 19.8, Shannon-Wiener Index: 2.921, Simpson Index: 0.8609, Life form: Chamaephyte: 6.98, Geophyte: 13.95, Hemicryptophyte: 32.56, Hemicryptophyte (caesp): 4.65, Hemicryptophyte (ros): 2.33, Hemicryptophyte (scand): 23.26, Nano-Phanerophyte: 4.65, Phanerophyte: 39.53, Phanerophyte (caesp): 20.93, Phanerophyte (scap): 18.6, Thero-

phyte: 2.33, Chorotypes: Endemic: 2.33, Stenomediterranean: 4.65, Eurimediterranean: 25.58, Mediterranean-montane: 2.33, Eurasian: 41.86, Paleotemperate: 9.3, Eurasian (in sen. str.): 2.33, Pontic: 16.28, Euro-Caucasian: 0, Centroeuropean: 2.33, South European Orophytes: 11.63, Boreal: 9.3, Adventitious: 0, Balkan: 0.

5: Longitude: 493056, Latitude: 4540692, Location: Lomje, pH: 6, organic matter: 17.4, C: 10.1, C/N: 14.9, N: 0.68, sand: 9.2, clay: 51.9, coarse silt: 10, fine silt: 29, total silt: 39, texture class: MG-G, Ca: 29.34, Mg: 1.8, K: 0.93, Na: 0.07, total exchangeable acidity: 19.2, sum of base cations: 32.1, cation exchange capacity: 51.3, proportion of base cations (%): 62.6, Ca (%): 57.2, Mg (%): 3.5, K (%): 1.8, Na (%): 0.1, total exchangeable acidity (%): 37.4, Shannon-Wiener Index: 2.925, Simpson Index: 0.8782, Life form: Chamaephyte: 4.35, Geophyte: 15.22, Hemicryptophyte: 41.3, Hemicryptophyte (caesp): 8.7, Hemicryptophyte (ros): 6.52, Hemicryptophyte (scand): 23.91, Nano-Phanerophyte: 2.17, Phanerophyte: 34.78, Phanerophyte (caesp): 19.57, Phanerophyte (scap): 15.22, Therophyte: 2.17, Chorotypes: Endemic: 2.17, Stenomediterranean: 6.52, Eurimediterranean: 21.74, Mediterranean-montane: 2.17, Eurasian: 47.83, Paleotemperate: 4.35, Eurasian (in sen. str.): 13.04, Pontic: 10.87, Euro-Caucasian: 8.7, Centroeuropean: 0, South European Orophytes: 0, Boreal: 13.04, Adventitious: 4.35, Balkan: 0.

6: Longitude: 484543, Latitude: 4544301, Location: above the village Lagadin, pH: 6.1, organic matter: 5.2, C: 3, C/N: 10.7, N: 0.28, sand: 56.8, clay: 7.5, coarse silt: 0, fine silt: 0, total silt: 0, texture class: I-PI, Ca: 5.74, Mg: 2.71, K: 0.62, Na: 0.07, total exchangeable acidity: 6.4, sum of base cations: 19.1, cation exchange capacity: 25.5, proportion of base cations (%): 74.9, Ca (%): 61.7, Mg (%): 10.6, K (%): 2.4, Na (%): 0.3, total exchangeable acidity (%): 25.1, Shannon-Wiener Index: 2.588, Simpson Index: 0.8094, Life form: Chamaephyte: 2.94, Geophyte: 14.71, Hemicryptophyte: 47.06, Hemicryptophyte (caesp): 23.53, Hemicryptophyte (ros): 5.88, Hemicryptophyte (scand): 14.71, Nano-Phanerophyte: 2.94, Phanerophyte: 23.53, Phanerophyte (caesp): 11.76, Phanerophyte (scap): 11.76, Therophyte: 8.82, Chorotypes: Endemic: 2.94, Stenomediterranean: 2.94, Eurimediterranean: 32.35, Mediterranean-montane: 0, Eurasian: 41.18, Paleotemperate: 11.76, Eurasian (in sen. str.): 2.94, Pontic: 5.88, Euro-Caucasian: 11.76, Centroeuropean: 2.94, South European Orophytes: 0, Boreal: 8.82, Adventitious: 8.82, Balkan: 0.

Table 13:

1: Longitude: 490874, Latitude: 4535803, Location: Dolovi, pH: 6, organic matter: 9.8, C: 5.7, C/N: 11.9, N: 0.48, sand: 10.3, clay: 49.1, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MG, Ca: 0.4, Mg: 2.05, K: 0.6, Na: 0.08, total exchangeable acidity: 18.3, sum of base cations: 33.1, cation exchange capacity: 51.4, proportion of base cations (%): 64.4, Ca (%): 59.1, Mg (%): 4, K (%): 1.2, Na (%): 0.2, total exchangeable acidity (%): 35.6, Shannon-Wiener Index: 2.970, Simpson Index: 0.8914, Life form: Chamaephyte: 7.32, Geophyte: 17.07, Hemicryptophyte: 41.46, Hemicryptophyte (caesp): 14.63, Hemicryptophyte (ros): 2.44, Hemicryptophyte (scand): 19.51, Nano-Phanerophyte: 2.44, Phanerophyte: 29.27, Phanerophyte (caesp): 7.32, Phanerophyte (scap): 21.95, Therophyte: 2.44, Chorotypes: Endemic: 4.88, Stenomediterranean: 4.88, Eurimediterranean: 26.83, Mediterranean-montane: 0, Eurasian: 46.34, Paleotemperate: 7.32, Eurasian (in sen. str.): 4.88, Pontic: 14.63, Euro-Caucasian: 7.32, Centroeuropean: 0, South European Orophytes: 2.44, Boreal: 9.76, Adventitious: 2.44, Balkan: 0.

2: Longitude: 490242, Latitude: 4535843, Location: Dolovi, pH: 6.3, organic matter: 12.4, C: 7.2, C/N: 12.4, N: 0.58, sand: 5.7, clay: 46.8, coarse silt: 0, fine silt: 0, total silt: 0, texture

class: MG, Ca: 2.71, Mg: 1.85, K: 0.85, Na: 0.08, total exchangeable acidity: 17.45, sum of base cations: 45.5, cation exchange capacity: 63, proportion of base cations (%): 72.2, Ca (%): 67.8, Mg (%): 2.9, K (%): 1.3, Na (%): 0.1, total exchangeable acidity (%): 27.7, Shannon-Wiener Index: 3.260, Simpson Index: 0.9174, Life form: Chamaephyte: 6.67, Geophyte: 13.33, Hemicryptophyte: 48.89, Hemicryptophyte (caesp): 11.11, Hemicryptophyte (ros): 4.44, Hemicryptophyte (scand): 28.89, Nano-Phanerophyte: 2.22, Phanerophyte: 22.22, Phanerophyte (caesp): 4.44, Phanerophyte (scap): 17.78, Therophyte: 6.67, Chorotypes: Endemic: 4.44, Stenomediterranean: 4.44, Eurimediterranean: 17.78, Mediterranean-montane: 2.22, Eurasian: 48.89, Paleotemperate: 8.89, Eurasian (in sen. str.): 11.11, Pontic: 11.11, Euro-Caucasian: 4.44, Centroeuropean: 0, South European Orophytes: 2.22, Boreal: 11.11, Adventitious: 4.44, Balkan: 0.

3: Longitude: 490970, Latitude: 4530842, Location: Petrov Dol, clearing 1982/1983, silicate bedrock, pH: 6.4, organic matter: 17.4, C: 10.1, C/N: 13.5, N: 0.75, sand: 17.6, clay: 42.4, coarse silt: 0, fine silt: 0, total silt: 0, texture class: G-MG, Ca: 1.87, Mg: 2.46, K: 1.74, Na: 0.1, total exchangeable acidity: 14.5, sum of base cations: 56.2, cation exchange capacity: 70.7, proportion of base cations (%): 79.5, Ca (%): 73.4, Mg (%): 3.5, K (%): 2.5, Na (%): 0.1, total exchangeable acidity (%): 20.5, Shannon-Wiener Index: 3.079, Simpson Index: 0.9104, Life form: Chamaephyte: 9.09, Geophyte: 13.64, Hemicryptophyte: 43.18, Hemicryptophyte (caesp): 11.36, Hemicryptophyte (ros): 6.82, Hemicryptophyte (scand): 20.45, Nano-Phanerophyte: 0, Phanerophyte: 34.09, Phanerophyte (caesp): 13.64, Phanerophyte (scap): 20.45, Therophyte: 0, Chorotypes: Endemic: 2.27, Stenomediterranean: 2.27, Eurimediterranean: 29.55, Mediterranean-montane: 0, Eurasian: 54.55, Paleotemperate: 6.82, Eurasian (in sen. str.): 4.55, Pontic: 15.91, Euro-Caucasian: 6.82, Centroeuropean: 0, South European Orophytes: 0, Boreal: 6.82, Adventitious: 2.27, Balkan: 0.

4: Longitude: 490430, Latitude: 4534160, Location: Leskoec, next to the stream, pH: 7.1, organic matter: 10.4, C: 6, C/N: 11.8, N: 0.51, sand: 41.4, clay: 18.9, coarse silt: 0, fine silt: 0, total silt: 0, texture class: I, Ca: 6.74, Mg: 9.33, K: 0.61, Na: 0.15, total exchangeable acidity: 5.9, sum of base cations: 36.8, cation exchange capacity: 42.7, proportion of base cations (%): 86.2, Ca (%): 62.6, Mg (%): 21.9, K (%): 1.4, Na (%): 0.4, total exchangeable acidity (%): 13.8, Shannon-Wiener Index: 3.170, Simpson Index: 0.9102, Life form: Chamaephyte: 7.14, Geophyte: 14.29, Hemicryptophyte: 30.95, Hemicryptophyte (caesp): 7.14, Hemicryptophyte (ros): 4.76, Hemicryptophyte (scand): 16.67, Nano-Phanerophyte: 4.76, Phanerophyte: 33.33, Phanerophyte (caesp): 4.76, Phanerophyte (scap): 21.43, Therophyte: 9.52, Chorotypes: Endemic: 2.38, Stenomediterranean: 7.14, Eurimediterranean: 23.81, Mediterranean-montane: 4.76, Eurasian: 52.38, Paleotemperate: 9.52, Eurasian (in sen. str.): 7.14, Pontic: 19.05, Euro-Caucasian: 7.14, Centroeuropean: 2.38, South European Orophytes: 0, Boreal: 2.38, Adventitious: 7.14, Balkan: 0.

5: Longitude: 493726, Latitude: 4537556, Location: Galičica, between Sirhan and Oteševo, pH: 5.5, organic matter: 6.6, C: 3.8, C/N: 10.9, N: 0.35, sand: 39.2, clay: 21.2, coarse silt: 0, fine silt: 0, total silt: 0, texture class: I, Ca: 3.89, Mg: 3.2, K: 0.74, Na: 0.08, total exchangeable acidity: 13.15, sum of base cations: 17.9, cation exchange capacity: 31.1, proportion of base cations (%): 57.6, Ca (%): 44.7, Mg (%): 10.3, K (%): 2.4, Na (%): 0.3, total exchangeable acidity (%): 42.3, Shannon-Wiener Index: 2.586, Simpson Index: 0.8691, Life form: Chamaephyte: 0, Geophyte: 12.5, Hemicryptophyte: 33.33, Hemicryptophyte (caesp): 12.5, Hemicryptophyte (ros): 4.17, Hemicryptophyte (scand): 16.67, Nano-Phanerophyte: 12.5, Phanerophyte: 41.67, Phanerophyte (caesp): 4.17, Phanerophyte (scap): 37.5, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 4.17, Eurimediterranean: 29.17, Mediterranean-montane: 0, Eurasian:

54.17, Paleotemperate: 8.33, Eurasian (in sen. str.): 8.33, Pontic: 4.17, Euro-Caucasian: 16.67, Centroeuropean: 0, South European Orophytes: 0, Boreal: 8.33, Adventitious: 4.17, Balkan: 0.

6: Longitude: 484866, Latitude: 4543385, Location: Galičica, Konjsko, Šumjak, pH: 5, organic matter: 5.8, C: 3.4, C/N: 13.6, N: 0.25, sand: 43.8, clay: 13.4, coarse silt: 0, fine silt: 0, total silt: 0, texture class: I, Ca: 0.27, Mg: 1.56, K: 0.59, Na: 0.08, total exchangeable acidity: 12.8, sum of base cations: 12.5, cation exchange capacity: 25.3, proportion of base cations (%): 49.4, Ca (%): 40.6, Mg (%): 6.2, K (%): 2.3, Na (%): 0.3, total exchangeable acidity (%): 50.6, Shannon-Wiener Index: 2.966, Simpson Index: 0.901, Life form: Chamaephyte: 2.86, Geophyte: 20, Hemicryptophyte: 34.29, Hemicryptophyte (caesp): 17.14, Hemicryptophyte (ros): 5.71, Hemicryptophyte (scand): 8.57, Nano-Phanerophyte: 2.86, Phanerophyte: 37.14, Phanerophyte (caesp): 2.86, Phanerophyte (scap): 34.29, Therophyte: 2.86, Chorotypes: Endemic: 2.86, Stenomediterranean: 0, Eurimediterranean: 25.71, Mediterranean-montane: 0, Eurasian: 51.43, Paleotemperate: 11.43, Eurasian (in sen. str.): 2.86, Pontic: 2.86, Euro-Caucasian: 11.43, Centroeuropean: 0, South European Orophytes: 5.71, Boreal: 11.43, Adventitious: 0, Balkan: 0.

7: Longitude: 492996, Latitude: 4537754, Location: above the village of Oteševo, pH: 6.4, organic matter: 14.6, C: 8.5, C/N: 15.7, N: 0.54, sand: 31.2, clay: 20.1, coarse silt: 12, fine silt: 37, total silt: 49, texture class: I-MI, Ca: 25.14, Mg: 3.41, K: 0.71, Na: 0.11, total exchangeable acidity: 11.4, sum of base cations: 29.4, cation exchange capacity: 40.8, proportion of base cations (%): 72.1, Ca (%): 61.6, Mg (%): 8.4, K (%): 1.7, Na (%): 0.3, total exchangeable acidity (%): 27.9, Shannon-Wiener Index: 2.582, Simpson Index: 0.7807, Life form: Chamaephyte: 2.44, Geophyte: 17.07, Hemicryptophyte: 46.34, Hemicryptophyte (caesp): 14.63, Hemicryptophyte (ros): 7.32, Hemicryptophyte (scand): 21.95, Nano-Phanerophyte: 2.44, Phanerophyte: 21.95, Phanerophyte (caesp): 9.76, Phanerophyte (scap): 12.2, Therophyte: 9.76, Chorotypes: Endemic: 7.32, Stenomediterranean: 0, Eurimediterranean: 14.63, Mediterranean-montane: 2.44, Eurasian: 63.41, Paleotemperate: 7.32, Eurasian (in sen. str.): 9.76, Pontic: 14.63, Euro-Caucasian: 12.2, Centroeuropean: 0, South European Orophytes: 2.44, Boreal: 2.44, Adventitious: 2.44, Balkan: 0.

8: Longitude: 492993, Latitude: 4537751, Location: Oteševo, pH: 4.7, organic matter: 5.2, C: 3, C/N: 12.5, N: 0.24, sand: 33.6, clay: 21.8, coarse silt: 0, fine silt: 0, total silt: 0, texture class: I, Ca: 2.94, Mg: 1.27, K: 0.36, Na: 0.19, total exchangeable acidity: 15.45, sum of base cations: 4.8, cation exchange capacity: 20.3, proportion of base cations (%): 23.6, Ca (%): 14.5, Mg (%): 6.3, K (%): 1.8, Na (%): 0.9, total exchangeable acidity (%): 76.1, Shannon-Wiener Index: 1.742, Simpson Index: 0.6026, Life form: Chamaephyte: 0, Geophyte: 15.79, Hemicryptophyte: 36.84, Hemicryptophyte (caesp): 15.79, Hemicryptophyte (ros): 5.26, Hemicryptophyte (scand): 10.53, Nano-Phanerophyte: 5.26, Phanerophyte: 42.11, Phanerophyte (caesp): 15.79, Phanerophyte (scap): 26.32, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 5.26, Eurimediterranean: 36.84, Mediterranean-montane: 5.26, Eurasian: 47.37, Paleotemperate: 0, Eurasian (in sen. str.): 5.26, Pontic: 5.26, Euro-Caucasian: 21.05, Centroeuropean: 0, South European Orophytes: 0, Boreal: 0, Adventitious: 0, Balkan: 0.

9: Longitude: 491795, Latitude: 4535469, Location: above the village of Oteševo, pH: 5, organic matter: 3.8, C: 2.2, C/N: 11.6, N: 0.19, sand: 41.4, clay: 22.1, coarse silt: 0, fine silt: 0, total silt: 0, texture class: I, Ca: 3.54, Mg: 2.54, K: 0.48, Na: 0.16, total exchangeable acidity: 13.6, sum of base cations: 6.7, cation exchange capacity: 20.3, proportion of base cations (%): 33, Ca (%): 17.4, Mg (%): 12.5, K (%): 2.4, Na (%): 0.8, total exchangeable acidity (%): 67, Shannon-Wiener Index: 2.013, Simpson Index: 0.7393, Life form: Chamaephyte: 0, Geophyte: 8.7, Hemicryptophyte: 39.13, Hemicryptophyte (caesp): 21.74, Hemicryptophyte (ros): 0, Hemicryp-

tophyte (scand): 13.04, Nano-Phanerophyte: 4.35, Phanerophyte: 8.7, Phanerophyte (caesp): 0, Phanerophyte (scap): 8.7, Therophyte: 39.13, Chorotypes: Endemic: 8.7, Stenomediterranean: 0, Eurimediterranean: 21.74, Mediterranean-montane: 0, Eurasian: 52.17, Paleotemperate: 17.39, Eurasian (in sen. str.): 8.7, Pontic: 8.7, Euro-Caucasian: 8.7, Centroeuropean: 0, South European Orophytes: 4.35, Boreal: 4.35, Adventitious: 8.7, Balkan: 0.

Table 14:
1: Longitude: 481955, Latitude: 4532749, Location: Golem Osoj, along the path, very stony, only 1, cm of soil, pH: 6.5, organic matter: 19.2, C: 11.1, C/N: 10.3, N: 1.08, sand: 18.6, clay: 31.3, coarse silt: 0, fine silt: 0, total silt: 0, texture class: GI, Ca: 57.08, Mg: 3.49, K: 1.04, Na: 0.15, total exchangeable acidity: 12.3, sum of base cations: 61.8, cation exchange capacity: 74.1, proportion of base cations (%): 83.4, Ca (%): 77, Mg (%): 4.7, K (%): 1.4, Na (%): 0.2, total exchangeable acidity (%): 16.6, Shannon-Wiener Index: 3.183, Simpson Index: 0.8988, Life form: Chamaephyte: 7.02, Geophyte: 8.77, Hemicryptophyte: 31.58, Hemicryptophyte (caesp): 7.02, Hemicryptophyte (ros): 7.02, Hemicryptophyte (scand): 12.28, Nano-Phanerophyte: 0, Phanerophyte: 19.3, Phanerophyte (caesp): 12.28, Phanerophyte (scap): 7.02, Therophyte: 33.33, Chorotypes: Endemic: 1.75, Stenomediterranean: 8.77, Eurimediterranean: 40.35, Mediterranean-montane: 0, Eurasian: 38.6, Paleotemperate: 7.02, Eurasian (in sen. str.): 5.26, Pontic: 15.79, Euro-Caucasian: 8.77, Centroeuropean: 0, South European Orophytes: 0, Boreal: 1.75, Adventitious: 5.26, Balkan: 0.

2: Longitude: 482299, Latitude: 4532434, Location: Golem Osoj, pH: 6.3, organic matter: 51, C: 29.5, C/N: 22, N: 1.34, sand: 19.7, clay: 28.9, coarse silt: 23, fine silt: 29, total silt: 51, texture class: MGI, Ca: 64.57, Mg: 4.68, K: 1.39, Na: 0.16, total exchangeable acidity: 16.9, sum of base cations: 70.8, cation exchange capacity: 87.7, proportion of base cations (%): 80.7, Ca (%): 73.6, Mg (%): 5.3, K (%): 1.6, Na (%): 0.2, total exchangeable acidity (%): 19.3, Shannon-Wiener Index: 3.051, Simpson Index: 0.8736, Life form: Chamaephyte: 10.42, Geophyte: 2.08, Hemicryptophyte: 45.83, Hemicryptophyte (caesp): 18.75, Hemicryptophyte (ros): 6.25, Hemicryptophyte (scand): 16.67, Nano-Phanerophyte: 4.17, Phanerophyte: 29.17, Phanerophyte (caesp): 12.5, Phanerophyte (scap): 16.67, Therophyte: 8.33, Chorotypes: Endemic: 2.08, Stenomediterranean: 12.5, Eurimediterranean: 20.83, Mediterranean-montane: 2.08, Eurasian: 52.08, Paleotemperate: 12.5, Eurasian (in sen. str.): 6.25, Pontic: 14.58, Euro-Caucasian: 8.33, Centroeuropean: 2.08, South European Orophytes: 2.08, Boreal: 4.17, Adventitious: 0, Balkan: 0.

3: Longitude: 482627, Latitude: 4533129, Location: Trpejca, pH: 6.2, organic matter: 17.8, C: 10.3, C/N: 14.5, N: 0.71, sand: 9.6, clay: 43.9, coarse silt: 16, fine silt: 30, total silt: 47, texture class: MG, Ca: 39.27, Mg: 3.04, K: 1.87, Na: 0.09, total exchangeable acidity: 14.5, sum of base cations: 44.3, cation exchange capacity: 58.8, proportion of base cations (%): 75.3, Ca (%): 66.8, Mg (%): 5.2, K (%): 3.2, Na (%): 0.2, total exchangeable acidity (%): 24.7, Shannon--Wiener Index: 3.317, Simpson Index: 0.9112, Life form: Chamaephyte: 3.13, Geophyte: 7.81, Hemicryptophyte: 40.63, Hemicryptophyte (caesp): 14.06, Hemicryptophyte (ros): 7.81, Hemicryptophyte (scand): 17.19, Nano-Phanerophyte: 1.56, Phanerophyte: 34.38, Phanerophyte (caesp): 20.31, Phanerophyte (scap): 9.38, Therophyte: 12.5, Chorotypes: Endemic: 1.56, Stenomediterranean: 9.38, Eurimediterranean: 28.13, Mediterranean-montane: 1.56, Eurasian: 46.88, Paleotemperate: 12.5, Eurasian (in sen. str.): 3.13, Pontic: 15.63, Euro-Caucasian: 10.94, Centroeuropean: 0, South European Orophytes: 0, Boreal: 7.81, Adventitious: 1.56, Balkan: 0.

4: Longitude: 490479, Latitude: 4536540, Location: Golem Rid, pH: 6.2, organic matter: 33.5, C: 19.4, C/N: 17.6, N: 1.1, sand: 17.6, clay: 31.5, coarse silt: 20, fine silt: 31, total silt: 51, tex-

ture class: MGI, Ca: 54.64, Mg: 7.15, K: 1.63, Na: 0.12, total exchangeable acidity: 18.8, sum of base cations: 63.5, cation exchange capacity: 82.3, proportion of base cations (%): 77.2, Ca (%): 66.4, Mg (%): 8.7, K (%): 2, Na (%): 0.1, total exchangeable acidity (%): 22.8, Shannon-Wiener Index: 3.093, Simpson Index: 0.8479, Life form: Chamaephyte: 11.54, Geophyte: 11.54, Hemicryptophyte: 51.92, Hemicryptophyte (caesp): 9.62, Hemicryptophyte (ros): 1.92, Hemicryptophyte (scand): 34.62, Nano-Phanerophyte: 1.92, Phanerophyte: 15.38, Phanerophyte (caesp): 5.77, Phanerophyte (scap): 9.62, Therophyte: 7.69, Chorotypes: Endemic: 3.85, Stenomediterranean: 5.77, Eurimediterranean: 13.46, Mediterranean-montane: 11.54, Eurasian: 46.15, Paleotemperate: 11.54, Eurasian (in sen. str.): 5.77, Pontic: 13.46, Euro-Caucasian: 7.69, Centroeuropean: 0, South European Orophytes: 1.92, Boreal: 7.69, Adventitious: 1.92, Balkan: 1.92.

5: Longitude: 490497, Latitude: 4536005, Location: Galičica, Krivina, pH: 6.2, organic matter: 33.5, C: 19.4, C/N: 17.6, N: 1.1, sand: 17.6, clay: 31.5, coarse silt: 20, fine silt: 31, total silt: 51, texture class: MGI, Ca: 54.64, Mg: 7.15, K: 1.63, Na: 0.12, total exchangeable acidity: 18.8, sum of base cations: 63.5, cation exchange capacity: 82.3, proportion of base cations (%): 77.2, Ca (%): 66.4, Mg (%): 8.7, K (%): 2, Na (%): 0.1, total exchangeable acidity (%): 22.8, Shannon-Wiener Index: 3.025, Simpson Index: 0.8839, Life form: Chamaephyte: 6.52, Geophyte: 10.87, Hemicryptophyte: 39.13, Hemicryptophyte (caesp): 10.87, Hemicryptophyte (ros): 6.52, Hemicryptophyte (scand): 19.57, Nano-Phanerophyte: 4.35, Phanerophyte: 36.96, Phanerophyte (caesp): 21.74, Phanerophyte (scap): 15.22, Therophyte: 2.17, Chorotypes: Endemic: 4.35, Stenomediterranean: 13.04, Eurimediterranean: 19.57, Mediterranean-montane: 0, Eurasian: 54.35, Paleotemperate: 13.04, Eurasian (in sen. str.): 6.52, Pontic: 13.04, Euro-Caucasian: 10.87, Centroeuropean: 0, South European Orophytes: 0, Boreal: 0, Adventitious: 2.17, Balkan: 0.

6: Longitude: 492547, Latitude: 4538175, Location: Galičica, above the village of Oteševo, under the Propast, pH: 6.5, organic matter: 8, C: 4.6, C/N: 6.7, N: 0.69, sand: 10.8, clay: 37.3, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MGI, Ca: 2.41, Mg: 0.75, K: 2, Na: 0.19, total exchangeable acidity: 11.75, sum of base cations: 45.3, cation exchange capacity: 57.1, proportion of base cations (%): 79.3, Ca (%): 74.3, Mg (%): 1.3, K (%): 3.5, Na (%): 0.3, total exchangeable acidity (%): 20.6, Shannon-Wiener Index: 2.967, Simpson Index: 0.8962, Life form: Chamaephyte: 2.44, Geophyte: 7.32, Hemicryptophyte: 29.27, Hemicryptophyte (caesp): 12.2, Hemicryptophyte (ros): 7.32, Hemicryptophyte (scand): 7.32, Nano-Phanerophyte: 2.44, Phanerophyte: 56.1, Phanerophyte (caesp): 12.2, Phanerophyte (scap): 34.15, Therophyte: 2.44, Chorotypes: Endemic: 0, Stenomediterranean: 12.2, Eurimediterranean: 14.63, Mediterranean-montane: 2.44, Eurasian: 56.1, Paleotemperate: 7.32, Eurasian (in sen. str.): 2.44, Pontic: 12.2, Euro-Caucasian: 17.07, Centroeuropean: 4.88, South European Orophytes: 0, Boreal: 9.76, Adventitious: 0, Balkan: 2.44.

Table 15:

1: Longitude: 483575, Latitude: 4545068, Location: Konjsko, above the hotel Metropol, pH: 6.9, organic matter: 9.5, C: 5.5, C/N: 15.3, N: 0.36, sand: 25.5, clay: 31.4, coarse silt: 0, fine silt: 0, total silt: 0, texture class: GI, Ca: 7.01, Mg: 1.85, K: 0.87, Na: 0.11, total exchangeable acidity: 5.55, sum of base cations: 69.8, cation exchange capacity: 75.4, proportion of base cations (%): 92.6, Ca (%): 88.9, Mg (%): 2.5, K (%): 1.2, Na (%): 0.1, total exchangeable acidity (%): 7.4, Shannon-Wiener Index: 2.298, Simpson Index: 0.7916, Life form: Chamaephyte: 11.54, Geophyte: 3.85, Hemicryptophyte: 23.08, Hemicryptophyte (caesp): 7.69, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 11.54, Nano-Phanerophyte: 7.69, Phanerophyte: 53.85,

Phanerophyte (caesp): 34.62, Phanerophyte (scap): 11.54, Therophyte: 0, Chorotypes: Endemic: 0, Stenomediterranean: 0, Eurimediterranean: 15.38, Mediterranean-montane: 0, Eurasian: 69.23, Paleotemperate: 19.23, Eurasian (in sen. str.): 0, Pontic: 23.08, Euro-Caucasian: 11.54, Centroeuropean: 11.54, South European Orophytes: 0, Boreal: 3.85, Adventitious: 0, Balkan: 0.

2: Longitude: 481269, Latitude: 4530730, Location: Ljubaništa, at autocamp, pH: 7, organic matter: 0, C: 0, C/N: 0, N: 0, sand: 0, clay: 0, coarse silt: 0, fine silt: 0, total silt: 0, texture class: Ca: 0, Mg: 0, K: 0, Na: 0, total exchangeable acidity: 0, sum of base cations: 0, cation exchange capacity: 0, proportion of base cations (%): 0, Ca (%): 0, Mg (%): 0, K (%): 0, Na (%): 0, total exchangeable acidity (%): 0, Shannon-Wiener Index: 2.791, Simpson Index: 0.9106, Life form: Chamaephyte: 13.64, Geophyte: 0, Hemicryptophyte: 40.91, Hemicryptophyte (caesp): 9.09, Hemicryptophyte (ros): 4.55, Hemicryptophyte (scand): 18.18, Nano-Phanerophyte: 9.09, Phanerophyte: 27.27, Phanerophyte (caesp): 18.18, Phanerophyte (scap): 9.09, Therophyte: 9.09, Chorotypes: Endemic: 0, Stenomediterranean: 22.73, Eurimediterranean: 18.18, Mediterranean-montane: 0, Eurasian: 45.45, Paleotemperate: 13.64, Eurasian (in sen. str.): 0, Pontic: 13.64, Euro-Caucasian: 9.09, Centroeuropean: 9.09, South European Orophytes: 0, Boreal: 4.55, Adventitious: 4.55, Balkan: 0.

3: Longitude: 484929, Latitude: 4548579, Location: under the village of Velestovo, above Rače (Ohria), pH: 6.7, organic matter: 25.8, C: 14.9, C/N: 19.6, N: 0.76, sand: 10.6, clay: 41.3, coarse silt: 13, fine silt: 36, total silt: 48, texture class: MG, Ca: 49.32, Mg: 2.79, K: 1.66, Na: 0.06, total exchangeable acidity: 9.3, sum of base cations: 53.8, cation exchange capacity: 63.1, proportion of base cations (%): 85.3, Ca (%): 78.2, Mg (%): 4.4, K (%): 2.6, Na (%): 0.1, total exchangeable acidity (%): 14.7, Shannon-Wiener Index: 2.768, Simpson Index: 0.8627, Life form: Chamaephyte: 5.56, Geophyte: 8.33, Hemicryptophyte: 33.33, Hemicryptophyte (caesp): 13.89, Hemicryptophyte (ros): 5.56, Hemicryptophyte (scand): 8.33, Nano-Phanerophyte: 5.56, Phanerophyte: 36.11, Phanerophyte (caesp): 27.78, Phanerophyte (scap): 2.78, Therophyte: 11.11, Chorotypes: Endemic: 0, Stenomediterranean: 0, Eurimediterranean: 30.56, Mediterranean-montane: 0, Eurasian: 52.78, Paleotemperate: 11.11, Eurasian (in sen. str.): 2.78, Pontic: 8.33, Euro-Caucasian: 11.11, Centroeuropean: 5.56, South European Orophytes: 2.78, Boreal: 5.56, Adventitious: 5.56, Balkan: 0.

4: Longitude: 485232, Latitude: 4540490, Location: Elšani, pH: 6.6, organic matter: 35.1, C: 20.3, C/N: 17.5, N: 1.16, sand: 15.5, clay: 28.1, coarse silt: 19, fine silt: 38, total silt: 56, texture class: MGI, Ca: 73.45, Mg: 2.63, K: 1.44, Na: 0.08, total exchangeable acidity: 10.85, sum of base cations: 77.6, cation exchange capacity: 88.4, proportion of base cations (%): 87.8, Ca (%): 83.1, Mg (%): 3, K (%): 1.6, Na (%): 0.1, total exchangeable acidity (%): 12.3, Shannon-Wiener Index: 2.935, Simpson Index: 0.8653, Life form: Chamaephyte: 6.12, Geophyte: 12.24, Hemicryptophyte: 36.73, Hemicryptophyte (caesp): 14.29, Hemicryptophyte (ros): 6.12, Hemicryptophyte (scand): 14.29, Nano-Phanerophyte: 8.16, Phanerophyte: 32.65, Phanerophyte (caesp): 20.41, Phanerophyte (scap): 8.16, Therophyte: 4.08, Chorotypes: Endemic: 2.04, Stenomediterranean: 4.08, Eurimediterranean: 28.57, Mediterranean-montane: 0, Eurasian: 55.1, Paleotemperate: 12.24, Eurasian (in sen. str.): 6.12, Pontic: 16.33, Euro-Caucasian: 8.16, Centroeuropean: 4.08, South European Orophytes: 2.04, Boreal: 6.12, Adventitious: 0, Balkan: 0.

5: Longitude: 484034, Latitude: 4539440, Location: Peštani, mobile antenna (stadion), pH: 6.6, organic matter: 17.9, C: 10.4, C/N: 16.8, N: 0.62, sand: 10, clay: 53.4, coarse silt: 10, fine silt: 26, total silt: 37, texture class: G, Ca: 37.1, Mg: 2.38, K: 1.57, Na: 0.08, total exchangeable acidity: 10.15, sum of base cations: 41.1, cation exchange capacity: 51.3, proportion of base

cations (%): 80.1, Ca (%): 72.3, Mg (%): 4.6, K (%): 3.1, Na (%): 0.2, total exchangeable acidity (%): 19.8, Shannon-Wiener Index: 2.971, Simpson Index: 0.8341, Life form: Chamaephyte: 5.56, Geophyte: 7.41, Hemicryptophyte: 29.63, Hemicryptophyte (caesp): 11.11, Hemicryptophyte (ros): 9.26, Hemicryptophyte (scand): 9.26, Nano-Phanerophyte: 9.26, Phanerophyte: 25.93, Phanerophyte (caesp): 16.67, Phanerophyte (scap): 7.41, Therophyte: 22.22, Chorotypes: Endemic: 5.56, Stenomediterranean: 7.41, Eurimediterranean: 31.48, Mediterranean--montane: 3.7, Eurasian: 38.89, Paleotemperate: 11.11, Eurasian (in sen. str.): 3.7, Pontic: 9.26, Euro-Caucasian: 5.56, Centroeuropean: 5.56, South European Orophytes: 1.85, Boreal: 9.26, Adventitious: 1.85, Balkan: 0.

6: Longitude: 481220, Latitude: 4533881, Location: Osoj, pH: 6.6, organic matter: 12.7, C: 7.4, C/N: 15.7, N: 0.47, sand: 24.8, clay: 30.9, coarse silt: 15, fine silt: 29, total silt: 44, texture class: GI, Ca: 25.24, Mg: 2.34, K: 1.05, Na: 0.07, total exchangeable acidity: 6.7, sum of base cations: 28.7, cation exchange capacity: 35.4, proportion of base cations (%): 81.1, Ca (%): 71.3, Mg (%): 6.6, K (%): 3, Na (%): 0.2, total exchangeable acidity (%): 18.9, Shannon-Wiener Index: 2.707, Simpson Index: 0.826, Life form: Chamaephyte: 5.41, Geophyte: 5.41, Hemicryptophyte: 37.84, Hemicryptophyte (caesp): 13.51, Hemicryptophyte (ros): 8.11, Hemicryptophyte (scand): 13.51, Nano-Phanerophyte: 8.11, Phanerophyte: 37.84, Phanerophyte (caesp): 21.62, Phanerophyte (scap): 13.51, Therophyte: 5.41, Chorotypes: Endemic: 0, Stenomediterranean: 10.81, Eurimediterranean: 24.32, Mediterranean-montane: 2.7, Eurasian: 45.95, Paleotemperate: 5.41, Eurasian (in sen. str.): 2.7, Pontic: 16.22, Euro-Caucasian: 8.11, Centroeuropean: 5.41, South European Orophytes: 0, Boreal: 10.81, Adventitious: 0, Balkan: 2.7.

7: Longitude: 481205, Latitude: 4533837, Location: Galičica, Osoj, pH: 6.9, organic matter: 11.3, C: 6.5, C/N: 15.1, N: 0.43, sand: 14, clay: 41.1, coarse silt: 13, fine silt: 32, total silt: 45, texture class: MG, Ca: 39.14, Mg: 2.83, K: 1.46, Na: 0.07, total exchangeable acidity: 5.8, sum of base cations: 43.5, cation exchange capacity: 49.3, proportion of base cations (%): 88.2, Ca (%): 79.4, Mg (%): 5.7, K (%): 3, Na (%): 0.1, total exchangeable acidity (%): 11.8, Shannon--Wiener Index: 2.504, Simpson Index: 0.7735, Life form: Chamaephyte: 0, Geophyte: 5.41, Hemicryptophyte: 35.14, Hemicryptophyte (caesp): 8.11, Hemicryptophyte (ros): 10.81, Hemicryptophyte (scand): 13.51, Nano-Phanerophyte: 13.51, Phanerophyte: 37.84, Phanerophyte (caesp): 18.92, Phanerophyte (scap): 18.92, Therophyte: 8.11, Chorotypes: Endemic: 2.7, Stenomediterranean: 16.22, Eurimediterranean: 24.32, Mediterranean-montane: 2.7, Eurasian: 45.95, Paleotemperate: 8.11, Eurasian (in sen. str.): 0, Pontic: 18.92, Euro-Caucasian: 8.11, Centroeuropean: 2.7, South European Orophytes: 0, Boreal: 2.7, Adventitious: 2.7, Balkan: 0.

8: Longitude: 481770, Latitude: 4533769, Location: Osoj, Trpejca, pH: 7, organic matter: 35.1, C: 20.3, C/N: 17.1, N: 1.19, sand: 16.9, clay: 32.5, coarse silt: 18, fine silt: 33, total silt: 51, texture class: MGI, Ca: 57.06, Mg: 4.48, K: 1.13, Na: 0.14, total exchangeable acidity: 7.65, sum of base cations: 62.8, cation exchange capacity: 70.5, proportion of base cations (%): 89.1, Ca (%): 80.9, Mg (%): 6.4, K (%): 1.6, Na (%): 0.2, total exchangeable acidity (%): 10.9, Shannon-Wiener Index: 2.417, Simpson Index: 0.8125, Life form: Chamaephyte: 11.11, Geophyte: 0, Hemicryptophyte: 37.04, Hemicryptophyte (caesp): 11.11, Hemicryptophyte (ros): 7.41, Hemicryptophyte (scand): 11.11, Nano-Phanerophyte: 14.81, Phanerophyte: 33.33, Phanerophyte (caesp): 22.22, Phanerophyte (scap): 7.41, Therophyte: 3.7, Chorotypes: Endemic: 3.7, Stenomediterranean: 7.41, Eurimediterranean: 33.33, Mediterranean-montane: 3.7, Eurasian: 40.74, Paleotemperate: 3.7, Eurasian (in sen. str.): 3.7, Pontic: 11.11, Euro-Caucasian: 7.41, Centroeuropean: 7.41, South European Orophytes: 0, Boreal: 7.41, Adventitious: 3.7, Balkan: 0.

9: Longitude: 481143, Latitude: 4533718, Location: Osoj, Trpejca, pH: 7.3, organic matter: 17, C: 9.8, C/N: 13.1, N: 0.75, sand: 25.9, clay: 30.4, coarse silt: 16, fine silt: 27, total silt: 44, texture class: GI, Ca: 40.34, Mg: 2.59, K: 0.78, Na: 0.27, total exchangeable acidity: 3.4, sum of base cations: 44, cation exchange capacity: 47.4, proportion of base cations (%): 92.8, Ca (%): 85.1, Mg (%): 5.5, K (%): 1.6, Na (%): 0.6, total exchangeable acidity (%): 7.2, Shannon-Wiener Index: 3.118, Simpson Index: 0.9065, Life form: Chamaephyte: 15, Geophyte: 0, Hemicryptophyte: 32.5, Hemicryptophyte (caesp): 12.5, Hemicryptophyte (ros): 7.5, Hemicryptophyte (scand): 7.5, Nano-Phanerophyte: 15, Phanerophyte: 22.5, Phanerophyte (caesp): 17.5, Phanerophyte (scap): 5, Therophyte: 15, Chorotypes: Endemic: 0, Stenomediterranean: 17.5, Eurimediterranean: 32.5, Mediterranean-montane: 7.5, Eurasian: 35, Paleotemperate: 10, Eurasian (in sen. str.): 2.5, Pontic: 10, Euro-Caucasian: 5, Centroeuropean: 5, South European Orophytes: 2.5, Boreal: 5, Adventitious: 0, Balkan: 0.

10: Longitude: 481438, Latitude: 4529317, Location: above Ljubaništa (Vojtino), pH: 6.6, organic matter: 10.1, C: 5.8, C/N: 14.1, N: 0.41, sand: 32.2, clay: 37.7, coarse silt: 9, fine silt: 21, total silt: 30, texture class: GI, Ca: 29.61, Mg: 5.34, K: 1.01, Na: 0.06, total exchangeable acidity: 8.05, sum of base cations: 36, cation exchange capacity: 44.1, proportion of base cations (%): 81.6, Ca (%): 67.1, Mg (%): 12.1, K (%): 2.3, Na (%): 0.1, total exchangeable acidity (%): 18.3, Shannon-Wiener Index: 2.462, Simpson Index: 0.8013, Life form: Chamaephyte: 2.86, Geophyte: 14.29, Hemicryptophyte: 28.57, Hemicryptophyte (caesp): 11.43, Hemicryptophyte (ros): 5.71, Hemicryptophyte (scand): 8.57, Nano-Phanerophyte: 5.71, Phanerophyte: 40, Phanerophyte (caesp): 22.86, Phanerophyte (scap): 11.43, Therophyte: 8.57, Chorotypes: Endemic: 2.86, Stenomediterranean: 5.71, Eurimediterranean: 31.43, Mediterranean-montane: 0, Eurasian: 57.14, Paleotemperate: 8.57, Eurasian (in sen. str.): 5.71, Pontic: 20, Euro-Caucasian: 8.57, Centroeuropean: 0, South European Orophytes: 0, Boreal: 2.86, Adventitious: 0, Balkan: 0.

11: Longitude: 481222, Latitude: 4529470, Location: above Ljubaništa (Vojtino), pH: 6.5, organic matter: 9.7, C: 5.6, C/N: 14, N: 0.4, sand: 45.1, clay: 27.5, coarse silt: 10, fine silt: 18, total silt: 27, texture class: GI-I, Ca: 20.95, Mg: 1.76, K: 0.65, Na: 0.06, total exchangeable acidity: 6.55, sum of base cations: 23.4, cation exchange capacity: 30, proportion of base cations (%): 78, Ca (%): 69.8, Mg (%): 5.9, K (%): 2.2, Na (%): 0.2, total exchangeable acidity (%): 21.8, Shannon-Wiener Index: 2.366, Simpson Index: 0.7615, Life form: Chamaephyte: 6.9, Geophyte: 0, Hemicryptophyte: 44.83, Hemicryptophyte (caesp): 24.14, Hemicryptophyte (ros): 6.9, Hemicryptophyte (scand): 6.9, Nano-Phanerophyte: 10.34, Phanerophyte: 27.59, Phanerophyte (caesp): 20.69, Phanerophyte (scap): 6.9, Therophyte: 10.34, Chorotypes: Endemic: 0, Stenomediterranean: 3.45, Eurimediterranean: 34.48, Mediterranean-montane: 0, Eurasian: 55.17, Paleotemperate: 17.24, Eurasian (in sen. str.): 3.45, Pontic: 13.79, Euro-Caucasian: 13.79, Centroeuropean: 3.45, South European Orophytes: 3.45, Boreal: 3.45, Adventitious: 0, Balkan: 0.

12: Longitude: 481018, Latitude: 4539418, Location: above Ljubaništa, pH: 6.7, organic matter: 6.1, C: 3.5, C/N: 10.6, N: 0.33, sand: 38.4, clay: 27.2, coarse silt: 14, fine silt: 21, total silt: 34, texture class: GI-I, Ca: 35.35, Mg: 7.4, K: 0.82, Na: 0.06, total exchangeable acidity: 10.3, sum of base cations: 43.6, cation exchange capacity: 53.9, proportion of base cations (%): 80.9, Ca (%): 65.6, Mg (%): 13.7, K (%): 1.5, Na (%): 0.1, total exchangeable acidity (%): 19.1, Shannon-Wiener Index: 2.767, Simpson Index: 0.8417, Life form: Chamaephyte: 7.69, Geophyte: 2.56, Hemicryptophyte: 28.21, Hemicryptophyte (caesp): 17.95, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 7.69, Nano-Phanerophyte: 17.95, Phanerophyte: 28.21, Phanerophyte (caesp): 17.95, Phanerophyte (scap): 10.26, Therophyte: 15.38, Chorotypes: Endemic:

7.69, Stenomediterranean: 5.13, Eurimediterranean: 30.77, Mediterranean-montane: 0, Eurasian: 46.15, Paleotemperate: 12.82, Eurasian (in sen. str.): 7.69, Pontic: 10.26, Euro-Caucasian: 7.69, Centroeuropean: 5.13, South European Orophytes: 2.56, Boreal: 5.13, Adventitious: 0, Balkan: 0.

13: Longitude: 480973, Latitude: 4529553, Location: above Ljubaništa, pH: 6.8, organic matter: 9.2, C: 5.3, C/N: 12.6, N: 0.42, sand: 38.5, clay: 25, coarse silt: 12, fine silt: 24, total silt: 37, texture class: I, Ca: 30.68, Mg: 1.97, K: 0.9, Na: 0.05, total exchangeable acidity: 4.95, sum of base cations: 33.6, cation exchange capacity: 38.6, proportion of base cations (%): 87, Ca (%): 79.5, Mg (%): 5.1, K (%): 2.3, Na (%): 0.1, total exchangeable acidity (%): 12.8, Shannon-Wiener Index: 2.378, Simpson Index: 0.7925, Life form: Chamaephyte: 7.14, Geophyte: 10.71, Hemicryptophyte: 28.57, Hemicryptophyte (caesp): 10.71, Hemicryptophyte (ros): 7.14, Hemicryptophyte (scand): 10.71, Nano-Phanerophyte: 14.29, Phanerophyte: 32.14, Phanerophyte (caesp): 25, Phanerophyte (scap): 7.14, Therophyte: 7.14, Chorotypes: Endemic: 3.57, Stenomediterranean: 0, Eurimediterranean: 32.14, Mediterranean-montane: 0, Eurasian: 50, Paleotemperate: 10.71, Eurasian (in sen. str.): 3.57, Pontic: 14.29, Euro-Caucasian: 7.14, Centroeuropean: 7.14, South European Orophytes: 0, Boreal: 14.29, Adventitious: 0, Balkan: 0.

14: Longitude: 479983, Latitude: 4528406, Location: Ljubaništa, at the river Čerava, pH: 7.1, organic matter: 2.2, C: 1.3, C/N: 11.8, N: 0.11, sand: 52, clay: 8.9, coarse silt: 23, fine silt: 16, total silt: 39, texture class: PI-I, Ca: 22.13, Mg: 1.11, K: 0.32, Na: 0.04, total exchangeable acidity: 1.65, sum of base cations: 23.6, cation exchange capacity: 25.3, proportion of base cations (%): 93.3, Ca (%): 87.5, Mg (%): 4.4, K (%): 1.3, Na (%): 0.2, total exchangeable acidity (%): 6.5, Shannon-Wiener Index: 2.208, Simpson Index: 0.7677, Life form: Chamaephyte: 8.33, Geophyte: 16.67, Hemicryptophyte: 8.33, Hemicryptophyte (caesp): 4.17, Hemicryptophyte (ros): 4.17, Hemicryptophyte (scand): 0, Nano-Phanerophyte: 8.33, Phanerophyte: 37.5, Phanerophyte (caesp): 12.5, Phanerophyte (scap): 12.5, Therophyte: 20.83, Chorotypes: Endemic: 0, Stenomediterranean: 4.17, Eurimediterranean: 16.67, Mediterranean-montane: 0, Eurasian: 54.17, Paleotemperate: 0, Eurasian (in sen. str.): 8.33, Pontic: 12.5, Euro-Caucasian: 29.17, Centroeuropean: 4.17, South European Orophytes: 4.17, Boreal: 12.5, Adventitious: 8.33, Balkan: 0.

15: Longitude: 480918, Latitude: 4529075, Location: above Ljubaništa, pH: 6.1, organic matter: 15, C: 8.7, C/N: 13.2, N: 0.66, sand: 21.8, clay: 27.4, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MI, Ca: 22.9, Mg: 18.5, K: 0.92, Na: 0.11, total exchangeable acidity: 11.9, sum of base cations: 42.4, cation exchange capacity: 54.3, proportion of base cations (%): 78.1, Ca (%): 42.2, Mg (%): 34.1, K (%): 1.7, Na (%): 0.2, total exchangeable acidity (%): 21.9, Shannon-Wiener Index: 2.596, Simpson Index: 0.8651, Life form: Chamaephyte: 8.82, Geophyte: 11.76, Hemicryptophyte: 29.41, Hemicryptophyte (caesp): 5.88, Hemicryptophyte (ros): 5.88, Hemicryptophyte (scand): 14.71, Nano-Phanerophyte: 8.82, Phanerophyte: 35.29, Phanerophyte (caesp): 17.65, Phanerophyte (scap): 14.71, Therophyte: 5.88, Chorotypes: Endemic: 0, Stenomediterranean: 11.76, Eurimediterranean: 32.35, Mediterranean-montane: 0, Eurasian: 47.06, Paleotemperate: 2.94, Eurasian (in sen. str.): 5.88, Pontic: 11.76, Euro-Caucasian: 8.82, Centroeuropean: 2.94, South European Orophytes: 0, Boreal: 5.88, Adventitious: 0, Balkan: 0.

Table 16:

1: Longitude: 483564, Latitude: 4533007, Location: Bitolski pat, pH: 7, organic matter: 9.8, C: 5.7, C/N: 15.8, N: 0.36, sand: 6.7, clay: 48.3, coarse silt: 13, fine silt: 32, total silt: 45, texture

class: MG, Ca: 50.67, Mg: 1.48, K: 0.98, Na: 0.06, total exchangeable acidity: 6.7, sum of base cations: 53.2, cation exchange capacity: 59.9, proportion of base cations (%): 88.8, Ca (%): 84.6, Mg (%): 2.5, K (%): 1.6, Na (%): 0.1, total exchangeable acidity (%): 11.2, Shannon--Wiener Index: 3.142, Simpson Index: 0.9144, Life form: Chamaephyte: 19.51, Geophyte: 0, Hemicryptophyte: 48.78, Hemicryptophyte (caesp): 12.2, Hemicryptophyte (ros): 4.88, Hemicryptophyte (scand): 21.95, Nano-Phanerophyte: 7.32, Phanerophyte: 21.95, Phanerophyte (caesp): 17.07, Phanerophyte (scap): 4.88, Therophyte: 2.44, Chorotypes: Endemic: 14.63, Stenomediterranean: 0, Eurimediterranean: 14.63, Mediterranean-montane: 9.76, Eurasian: 46.34, Paleotemperate: 4.88, Eurasian (in sen. str.): 2.44, Pontic: 9.76, Euro-Caucasian: 4.88, Centroeuropean: 7.32, South European Orophytes: 2.44, Boreal: 4.88, Adventitious: 2.44, Balkan: 2.44.

2: Longitude: 483888, Latitude: 4533260, Location: above Zli Dol, pH: 6.9, organic matter: 24.4, C: 14.1, C/N: 13.6, N: 1.04, sand: 14, clay: 35, coarse silt: 14, fine silt: 37, total silt: 51, texture class: MGI, Ca: 56.91, Mg: 2.96, K: 1.53, Na: 0.1, total exchangeable acidity: 9.4, sum of base cations: 61.5, cation exchange capacity: 70.9, proportion of base cations (%): 86.7, Ca (%): 80.3, Mg (%): 4.2, K (%): 2.2, Na (%): 0.1, total exchangeable acidity (%): 13.3, Shannon-Wiener Index: 3.181, Simpson Index: 0.8782, Life form: Chamaephyte: 20.37, Geophyte: 9.26, Hemicryptophyte: 46.3, Hemicryptophyte (caesp): 11.11, Hemicryptophyte (ros): 5.56, Hemicryptophyte (scand): 27.78, Nano-Phanerophyte: 0, Phanerophyte: 22.22, Phanerophyte (caesp): 11.11, Phanerophyte (scap): 9.26, Therophyte: 1.85, Chorotypes: Endemic: 14.81, Stenomediterranean: 1.85, Eurimediterranean: 12.96, Mediterranean-montane: 14.81, Eurasian: 42.59, Paleotemperate: 5.56, Eurasian (in sen. str.): 7.41, Pontic: 11.11, Euro-Caucasian: 5.56, Centroeuropean: 0, South European Orophytes: 3.7, Boreal: 7.41, Adventitious: 0, Balkan: 1.85.

3: Longitude: 483510, Latitude: 4532867, Location: Krvov Kamen, pH: 6.4, organic matter: 60, C: 34.7, C/N: 16.5, N: 2.1, sand: 29, clay: 15.4, coarse silt: 26, fine silt: 29, total silt: 56, texture class: MI, Ca: 86.15, Mg: 4.19, K: 1.3, Na: 0.1, total exchangeable acidity: 17.35, sum of base cations: 91.7, cation exchange capacity: 109.1, proportion of base cations (%): 84.1, Ca (%): 79, Mg (%): 3.8, K (%): 1.2, Na (%): 0.1, total exchangeable acidity (%): 15.9, Shannon-Wiener Index: 3.108, Simpson Index: 0.9161, Life form: Chamaephyte: 15, Geophyte: 15, Hemicryptophyte: 45, Hemicryptophyte (caesp): 10, Hemicryptophyte (ros): 7.5, Hemicryptophyte (scand): 25, Nano-Phanerophyte: 0, Phanerophyte: 22.5, Phanerophyte (caesp): 15, Phanerophyte (scap): 7.5, Therophyte: 2.5, Chorotypes: Endemic: 10, Stenomediterranean: 0, Eurimediterranean: 17.5, Mediterranean-montane: 10, Eurasian: 47.5, Paleotemperate: 2.5, Eurasian (in sen. str.): 15, Pontic: 10, Euro-Caucasian: 2.5, Centroeuropean: 0, South European Orophytes: 2.5, Boreal: 10, Adventitious: 2.5, Balkan: 0.

4: Longitude: 483596, Latitude: 4532979, Location: Krvov Kamen, pH: 6.4, organic matter: 44.8, C: 25.9, C/N: 14.6, N: 1.77, sand: 23.6, clay: 21.2, coarse silt: 26, fine silt: 29, total silt: 55, texture class: MI, Ca: 25.12, Mg: 4.81, K: 1.25, Na: 0.1, total exchangeable acidity: 16.4, sum of base cations: 31.3, cation exchange capacity: 47.7, proportion of base cations (%): 65.6, Ca (%): 52.7, Mg (%): 10.1, K (%): 2.6, Na (%): 0.2, total exchangeable acidity (%): 34.4, Shannon-Wiener Index: 2.974, Simpson Index: 0.8972, Life form: Chamaephyte: 21.95, Geophyte: 4.88, Hemicryptophyte: 29.27, Hemicryptophyte (caesp): 9.76, Hemicryptophyte (ros): 4.88, Hemicryptophyte (scand): 9.76, Nano-Phanerophyte: 4.88, Phanerophyte: 36.59, Phanerophyte (caesp): 24.39, Phanerophyte (scap): 9.76, Therophyte: 2.44, Chorotypes: Endemic: 9.76, Stenomediterranean: 0, Eurimediterranean: 12.2, Mediterranean-montane: 14.63, Eurasian: 39.02, Paleotemperate: 7.32, Eurasian (in sen. str.): 4.88, Pontic: 9.76, Euro-Cau-

casian: 4.88, Centroeuropean: 2.44, South European Orophytes: 2.44, Boreal: 12.2, Adventitious: 2.44, Balkan: 4.88.

5: Longitude: 483476, Latitude: 4532798, Location: Krvov Kamen, pH: 6.4, organic matter: 62.7, C: 36.3, C/N: 21.9, N: 1.66, sand: 28.9, clay: 16.5, coarse silt: 24, fine silt: 31, total silt: 55, texture class: MI, Ca: 85.72, Mg: 4.48, K: 1.4, Na: 0.14, total exchangeable acidity: 16.6, sum of base cations: 91.7, cation exchange capacity: 108.3, proportion of base cations (%): 84.7, Ca (%): 79.2, Mg (%): 4.1, K (%): 1.3, Na (%): 0.1, total exchangeable acidity (%): 15.3, Shannon-Wiener Index: 3.093, Simpson Index: 0.9158, Life form: Chamaephyte: 15.38, Geophyte: 10.26, Hemicryptophyte: 28.21, Hemicryptophyte (caesp): 7.69, Hemicryptophyte (ros): 5.13, Hemicryptophyte (scand): 10.26, Nano-Phanerophyte: 5.13, Phanerophyte: 38.46, Phanerophyte (caesp): 20.51, Phanerophyte (scap): 15.38, Therophyte: 2.56, Chorotypes: Endemic: 2.56, Stenomediterranean: 2.56, Eurimediterranean: 12.82, Mediterranean-montane: 7.69, Eurasian: 48.72, Paleotemperate: 5.13, Eurasian (in sen. str.): 7.69, Pontic: 10.26, Euro-Caucasian: 5.13, Centroeuropean: 5.13, South European Orophytes: 0, Boreal: 10.26, Adventitious: 2.56, Balkan: 7.69.

6: Longitude: 494734, Latitude: 4531444, Location: above St. Tanas, pH: 6.6, organic matter: 18.3, C: 10.6, C/N: 12.9, N: 0.82, sand: 18.1, clay: 26.1, coarse silt: 0, fine silt: 0, total silt: 0, texture class: I-MI, Ca: 7.75, Mg: 6.41, K: 0.78, Na: 0.18, total exchangeable acidity: 13.55, sum of base cations: 35.1, cation exchange capacity: 48.7, proportion of base cations (%): 72.1, Ca (%): 57, Mg (%): 13.2, K (%): 1.6, Na (%): 0.4, total exchangeable acidity (%): 27.8, Shannon-Wiener Index: 3.528, Simpson Index: 0.9427, Life form: Chamaephyte: 7.14, Geophyte: 10.71, Hemicryptophyte: 44.64, Hemicryptophyte (caesp): 14.29, Hemicryptophyte (ros): 5.36, Hemicryptophyte (scand): 21.43, Nano-Phanerophyte: 5.36, Phanerophyte: 21.43, Phanerophyte (caesp): 14.29, Phanerophyte (scap): 7.14, Therophyte: 10.71, Chorotypes: Endemic: 3.57, Stenomediterranean: 1.79, Eurimediterranean: 19.64, Mediterranean-montane: 3.57, Eurasian: 46.43, Paleotemperate: 8.93, Eurasian (in sen. str.): 5.36, Pontic: 14.29, Euro-Caucasian: 3.57, Centroeuropean: 3.57, South European Orophytes: 1.79, Boreal: 12.5, Adventitious: 5.36, Balkan: 0.

Table 17:

1: Longitude: 483741, Latitude: 4533063, Location: Bitolski Pat, shallow soil, very stony, pH: 6.8, organic matter: 42.2, C: 24.4, C/N: 13.9, N: 1.75, sand: 36.4, clay: 15.8, coarse silt: 0, fine silt: 0, total silt: 0, texture class: I-MI, Ca: 68.41, Mg: 0.23, K: 0.99, Na: 0.09, total exchangeable acidity: 11.35, sum of base cations: 69.7, cation exchange capacity: 81.1, proportion of base cations (%): 85.9, Ca (%): 84.4, Mg (%): 0.3, K (%): 1.2, Na (%): 0.1, total exchangeable acidity (%): 14, Shannon-Wiener Index: 3.062, Simpson Index: 0.8836, Life form: Chamaephyte: 18.87, Geophyte: 13.21, Hemicryptophyte: 50.94, Hemicryptophyte (caesp): 11.32, Hemicryptophyte (ros): 9.43, Hemicryptophyte (scand): 26.42, Nano-Phanerophyte: 0, Phanerophyte: 15.09, Phanerophyte (caesp): 7.55, Phanerophyte (scap): 5.66, Therophyte: 1.89, Chorotypes: Endemic: 15.09, Stenomediterranean: 0, Eurimediterranean: 9.43, Mediterranean-montane: 7.55, Eurasian: 39.62, Paleotemperate: 7.55, Eurasian (in sen. str.): 7.55, Pontic: 11.32, Euro-Caucasian: 5.66, Centroeuropean: 1.89, South European Orophytes: 5.66, Boreal: 13.21, Adventitious: 1.89, Balkan: 1.89.

2: Longitude: 483225, Latitude: 4532062, Location: Drzgine, pH: 6.6, organic matter: 34.5, C: 20, C/N: 10.3, N: 1.95, sand: 0, clay: 0, coarse silt: 0, fine silt: 0, total silt: 0, texture class: Ca: 86.92, Mg: 6.16, K: 0.92, Na: 0.09, total exchangeable acidity: 16.9, sum of base cations: 94.1,

cation exchange capacity: 111, proportion of base cations (%): 84.8, Ca (%): 78.3, Mg (%): 5.5, K (%): 0.8, Na (%): 0.1, total exchangeable acidity (%): 15.2, Shannon-Wiener Index: 2.514, Simpson Index: 0.8336, Life form: Chamaephyte: 5.41, Geophyte: 18.92, Hemicryptophyte: 29.73, Hemicryptophyte (caesp): 10.81, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 13.51, Nano-Phanerophyte: 2.7, Phanerophyte: 43.24, Phanerophyte (caesp): 18.92, Phanerophyte (scap): 24.32, Therophyte: 0, Chorotypes: Endemic: 2.7, Stenomediterranean: 2.7, Eurimediterranean: 5.41, Mediterranean-montane: 5.41, Eurasian: 56.76, Paleotemperate: 5.41, Eurasian (in sen. str.): 5.41, Pontic: 10.81, Euro-Caucasian: 8.11, Centroeuropean: 5.41, South European Orophytes: 2.7, Boreal: 18.92, Adventitious: 0, Balkan: 0.

3: Longitude: 483365, Latitude: 4532539, Location: Bitolski pat, pH: 7, organic matter: 23.5, C: 13.6, C/N: 13.1, N: 1.04, sand: 14.1, clay: 30.1, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MGI, Ca: 65.81, Mg: 2.13, K: 1.04, Na: 0.14, total exchangeable acidity: 10.6, sum of base cations: 69.1, cation exchange capacity: 79.7, proportion of base cations (%): 86.7, Ca (%): 82.6, Mg (%): 2.7, K (%): 1.3, Na (%): 0.2, total exchangeable acidity (%): 13.3, Shannon--Wiener Index: 3.401, Simpson Index: 0.9514, Life form: Chamaephyte: 19.51, Geophyte: 9.76, Hemicryptophyte: 43.9, Hemicryptophyte (caesp): 12.2, Hemicryptophyte (ros): 2.44, Hemicryptophyte (scand): 21.95, Nano-Phanerophyte: 2.44, Phanerophyte: 21.95, Phanerophyte (caesp): 12.2, Phanerophyte (scap): 9.76, Therophyte: 2.44, Chorotypes: Endemic: 4.88, Stenomediterranean: 2.44, Eurimediterranean: 17.07, Mediterranean-montane: 17.07, Eurasian: 36.59, Paleotemperate: 2.44, Eurasian (in sen. str.): 2.44, Pontic: 14.63, Euro-Caucasian: 2.44, Centroeuropean: 4.88, South European Orophytes: 2.44, Boreal: 9.76, Adventitious: 2.44, Balkan: 2.44.

4: Longitude: 483596, Latitude: 4529095, Location: Galičica, above the spring of St. Naum (Kreka), pH: 6.5, organic matter: 12, C: 6.9, C/N: 9.1, N: 0.76, sand: 25.1, clay: 17.1, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MI, Ca: 3.72, Mg: 3.65, K: 1.49, Na: 0.09, total exchangeable acidity: 11.85, sum of base cations: 79, cation exchange capacity: 90.9, proportion of base cations (%): 86.9, Ca (%): 81.1, Mg (%): 4, K (%): 1.6, Na (%): 0.1, total exchangeable acidity (%): 13, Shannon-Wiener Index: 3.312, Simpson Index: 0.9212, Life form: Chamaephyte: 8.51, Geophyte: 10.64, Hemicryptophyte: 36.17, Hemicryptophyte (caesp): 14.89, Hemicryptophyte (ros): 4.26, Hemicryptophyte (scand): 12.77, Nano-Phanerophyte: 4.26, Phanerophyte: 29.79, Phanerophyte (caesp): 17.02, Phanerophyte (scap): 10.64, Therophyte: 10.64, Chorotypes: Endemic: 6.38, Stenomediterranean: 2.13, Eurimediterranean: 23.4, Mediterranean-montane: 6.38, Eurasian: 44.68, Paleotemperate: 8.51, Eurasian (in sen. str.): 6.38, Pontic: 8.51, Euro-Caucasian: 10.64, Centroeuropean: 2.13, South European Orophytes: 0, Boreal: 10.64, Adventitious: 4.26, Balkan: 0.

Table 18:
1: Longitude: 498998, Latitude: 4524327, Location: Golem Grad, at the coast, pH: 6.7, organic matter: 21.4, C: 12.4, C/N: 9.4, N: 1.32, sand: 10.2, clay: 25.4, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MI, Ca: 52.99, Mg: 2.91, K: 1.85, Na: 0.11, total exchangeable acidity: 9.2, sum of base cations: 57.9, cation exchange capacity: 67.1, proportion of base cations (%): 86.3, Ca (%): 79, Mg (%): 4.3, K (%): 2.8, Na (%): 0.2, total exchangeable acidity (%): 13.7, Shannon--Wiener Index: 2.888, Simpson Index: 0.8829, Life form: Chamaephyte: 0, Geophyte: 12.82, Hemicryptophyte: 10.26, Hemicryptophyte (caesp): 0, Hemicryptophyte (ros): 2.56, Hemicryptophyte (scand): 7.69, Nano-Phanerophyte: 10.26, Phanerophyte: 20.51, Phanerophyte (caesp): 7.69, Phanerophyte (scap): 5.13, Therophyte: 46.15, Chorotypes: Endemic: 0, Stenomediterranean: 12.82, Eurimediterranean: 38.46, Mediterranean-montane: 5.13, Eurasian: 28.21,

Paleotemperate: 10.26, Eurasian (in sen. str.): 5.13, Pontic: 5.13, Euro-Caucasian: 7.69, Centroeuropean: 0, South European Orophytes: 0, Boreal: 7.69, Adventitious: 5.13, Balkan: 2.56.

2: Longitude: 499073, Latitude: 4524190, Location: Golem Grad, pH: 7, organic matter: 31.2, C: 18.1, C/N: 12.7, N: 1.42, sand: 0, clay: 0, coarse silt: 0, fine silt: 0, total silt: 0, texture class: Ca: 6.58, Mg: 3.98, K: 1.86, Na: 0.14, total exchangeable acidity: 8.2, sum of base cations: 112.6, cation exchange capacity: 120.8, proportion of base cations (%): 93.2, Ca (%): 88.2, Mg (%): 3.3, K (%): 1.5, Na (%): 0.1, total exchangeable acidity (%): 6.8, Shannon-Wiener Index: 2.331, Simpson Index: 0.8605, Life form: Chamaephyte: 5.88, Geophyte: 0, Hemicryptophyte: 0, Hemicryptophyte (caesp): 0, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 0, Nano-Phanerophyte: 11.76, Phanerophyte: 52.94, Phanerophyte (caesp): 29.41, Phanerophyte (scap): 5.88, Therophyte: 29.41, Chorotypes: Endemic: 0, Stenomediterranean: 17.65, Eurimediterranean: 35.29, Mediterranean-montane: 0, Eurasian: 23.53, Paleotemperate: 0, Eurasian (in sen. str.): 0, Pontic: 23.53, Euro-Caucasian: 0, Centroeuropean: 0, South European Orophytes: 0, Boreal: 5.88, Adventitious: 5.88, Balkan: 5.88.

Table 19:
1: Longitude: 493536, Latitude: 4538853, Location: Margarina, under the Kaleto, pH: 5.5, organic matter: 10.1, C: 5.8, C/N: 14.9, N: 0.39, sand: 32.6, clay: 22.2, coarse silt: 10, fine silt: 36, total silt: 45, texture class: I, Ca: 12.37, Mg: 1.68, K: 0.62, Na: 0.07, total exchangeable acidity: 14, sum of base cations: 14.7, cation exchange capacity: 28.7, proportion of base cations (%): 51.2, Ca (%): 43.1, Mg (%): 5.9, K (%): 2.2, Na (%): 0.2, total exchangeable acidity (%): 48.8, Shannon-Wiener Index: 2.984, Simpson Index: 0.8916, Life form: Chamaephyte: 9.52, Geophyte: 4.76, Hemicryptophyte: 30.95, Hemicryptophyte (caesp): 9.52, Hemicryptophyte (ros): 2.38, Hemicryptophyte (scand): 16.67, Nano-Phanerophyte: 2.38, Phanerophyte: 26.19, Phanerophyte (caesp): 7.14, Phanerophyte (scap): 11.9, Therophyte: 26.19, Chorotypes: Endemic: 4.76, Stenomediterranean: 9.52, Eurimediterranean: 28.57, Mediterranean-montane: 7.14, Eurasian: 30.95, Paleotemperate: 14.29, Eurasian (in sen. str.): 2.38, Pontic: 0, Euro-Caucasian: 2.38, Centroeuropean: 0, South European Orophytes: 2.38, Boreal: 14.29, Adventitious: 0, Balkan: 2.38.

2: Longitude: 494731, Latitude: 4539388, Location: Sirhan, Kaleto, pH: 6.9, organic matter: 8.6, C: 5, C/N: 11.9, N: 0.42, sand: 19.1, clay: 31.7, coarse silt: 0, fine silt: 0, total silt: 0, texture class: GI-MGI, Ca: 3.2, Mg: 6.41, K: 0.58, Na: 0.17, total exchangeable acidity: 9, sum of base cations: 30.4, cation exchange capacity: 39.4, proportion of base cations (%): 77.2, Ca (%): 58.9, Mg (%): 16.3, K (%): 1.5, Na (%): 0.4, total exchangeable acidity (%): 22.8, Shannon-Wiener Index: 3.089, Simpson Index: 0.8675, Life form: Chamaephyte: 7.84, Geophyte: 3.92, Hemicryptophyte: 43.14, Hemicryptophyte (caesp): 7.84, Hemicryptophyte (ros): 9.8, Hemicryptophyte (scand): 19.61, Nano-Phanerophyte: 3.92, Phanerophyte: 23.53, Phanerophyte (caesp): 9.8, Phanerophyte (scap): 7.84, Therophyte: 17.65, Chorotypes: Endemic: 7.84, Stenomediterranean: 9.8, Eurimediterranean: 19.61, Mediterranean-montane: 1.96, Eurasian: 39.22, Paleotemperate: 5.88, Eurasian (in sen. str.): 5.88, Pontic: 11.76, Euro-Caucasian: 9.8, Centroeuropean: 0, South European Orophytes: 3.92, Boreal: 7.84, Adventitious: 3.92, Balkan: 5.88.

3: Longitude: 494160, Latitude: 4539432, Location: Sirhansko Kale, pH: 6.5, organic matter: 9, C: 5.2, C/N: 9.6, N: 0.54, sand: 16, clay: 34, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MGI, Ca: 2.29, Mg: 1.75, K: 0.86, Na: 0.06, total exchangeable acidity: 10.7, sum of base cations: 45, cation exchange capacity: 55.7, proportion of base cations (%): 80.8, Ca (%): 75.9, Mg (%): 3.1, K (%): 1.5, Na (%): 0.1, total exchangeable acidity (%): 19.2, Shannon-Wiener Index:

3.194, Simpson Index: 0.9081, Life form: Chamaephyte: 18.03, Geophyte: 3.28, Hemicryptophyte: 27.87, Hemicryptophyte (caesp): 11.48, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 11.48, Nano-Phanerophyte: 1.64, Phanerophyte: 11.48, Phanerophyte (caesp): 3.28, Phanerophyte (scap): 6.56, Therophyte: 37.7, Chorotypes: Endemic: 8.2, Stenomediterranean: 6.56, Eurimediterranean: 34.43, Mediterranean-montane: 6.56, Eurasian: 27.87, Paleotemperate: 11.48, Eurasian (in sen. str.): 1.64, Pontic: 8.2, Euro-Caucasian: 3.28, Centroeuropean: 1.64, South European Orophytes: 4.92, Boreal: 1.64, Adventitious: 1.64, Balkan: 6.56.

4: Longitude: 493937, Latitude: 4539234, Location: the village of Sirhan, Vasilij II, Sirhansko Kale, pH: 5.5, organic matter: 10.1, C: 5.8, C/N: 14.9, N: 0.39, sand: 32.6, clay: 22.2, coarse silt: 10, fine silt: 36, total silt: 45, texture class: I, Ca: 12.37, Mg: 1.68, K: 0.62, Na: 0.07, total exchangeable acidity: 14, sum of base cations: 14.7, cation exchange capacity: 28.7, proportion of base cations (%): 51.2, Ca (%): 43.1, Mg (%): 5.9, K (%): 2.2, Na (%): 0.2, total exchangeable acidity (%): 48.8, Shannon-Wiener Index: 3.212, Simpson Index: 0.8877, Life form: Chamaephyte: 14.55, Geophyte: 1.82, Hemicryptophyte: 34.55, Hemicryptophyte (caesp): 7.27, Hemicryptophyte (ros): 7.27, Hemicryptophyte (scand): 16.36, Nano-Phanerophyte: 0, Phanerophyte: 18.18, Phanerophyte (caesp): 3.64, Phanerophyte (scap): 12.73, Therophyte: 30.91, Chorotypes: Endemic: 5.45, Stenomediterranean: 5.45, Eurimediterranean: 27.27, Mediterranean-montane: 3.64, Eurasian: 45.45, Paleotemperate: 7.27, Eurasian (in sen. str.): 7.27, Pontic: 10.91, Euro-Caucasian: 7.27, Centroeuropean: 5.45, South European Orophytes: 5.45, Boreal: 0, Adventitious: 3.64, Balkan: 3.64.

Table 20:
1: Longitude: 479979, Latitude: 4528637, Location: Ljubaništa, at the river Čerava, pH: 7, organic matter: 2.2, C: 1.3, C/N: 13, N: 0.1, sand: 54.7, clay: 4.3, coarse silt: 0, fine silt: 0, total silt: 0, texture class: PI, Ca: 0.3, Mg: 0.89, K: 0.6, Na: 0.05, total exchangeable acidity: 1.95, sum of base cations: 31.8, cation exchange capacity: 33.8, proportion of base cations (%): 94.1, Ca (%): 89.6, Mg (%): 2.6, K (%): 1.8, Na (%): 0.1, total exchangeable acidity (%): 5.8, Shannon-Wiener Index: 2.478, Simpson Index: 0.8313, Life form: Chamaephyte: 0, Geophyte: 7.41, Hemicryptophyte: 25.93, Hemicryptophyte (caesp): 3.7, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 22.22, Nano-Phanerophyte: 14.81, Phanerophyte: 44.44, Phanerophyte (caesp): 18.52, Phanerophyte (scap): 11.11, Therophyte: 7.41, Chorotypes: Endemic: 0, Stenomediterranean: 3.7, Eurimediterranean: 7.41, Mediterranean-montane: 0, Eurasian: 66.67, Paleotemperate: 11.11, Eurasian (in sen. str.): 25.93, Pontic: 3.7, Euro-Caucasian: 22.22, Centroeuropean: 3.7, South European Orophytes: 0, Boreal: 14.81, Adventitious: 7.41, Balkan: 0.

2: Longitude: 479680, Latitude: 4529209, Location: Ljubaništa, pH: 7, organic matter: 1.8, C: 1, C/N: 12.5, N: 0.08, sand: 70.6, clay: 6.7, coarse silt: 14, fine silt: 9, total silt: 23, texture class: PI, Ca: 19.93, Mg: 1.02, K: 0.26, Na: 0.06, total exchangeable acidity: 1.35, sum of base cations: 21.3, cation exchange capacity: 22.7, proportion of base cations (%): 93.8, Ca (%): 87.8, Mg (%): 4.5, K (%): 1.1, Na (%): 0.3, total exchangeable acidity (%): 5.9, Shannon-Wiener Index: 3.183, Simpson Index: 0.9268, Life form: Chamaephyte: 0, Geophyte: 4.26, Hemicryptophyte: 44.68, Hemicryptophyte (caesp): 14.89, Hemicryptophyte (ros): 2.13, Hemicryptophyte (scand): 23.4, Nano-Phanerophyte: 4.26, Phanerophyte: 34.04, Phanerophyte (caesp): 14.89, Phanerophyte (scap): 10.64, Therophyte: 12.77, Chorotypes: Endemic: 0, Stenomediterranean: 2.13, Eurimediterranean: 6.38, Mediterranean-montane: 0, Eurasian: 57.45, Paleotemperate: 21.28, Eurasian (in sen. str.): 14.89, Pontic: 2.13, Euro-Caucasian: 17.02, Centroeuropean: 2.13, South European Orophytes: 0, Boreal: 17.02, Adventitious: 17.02, Balkan: 0.

3: Longitude: 479970, Latitude: 4528554, Location: left bank of the river Čerava, pH: 7, organic matter: 2, C: 1.2, C/N: 12, N: 0.1, sand: 61, clay: 9.8, coarse silt: 13, fine silt: 16, total silt: 29, texture class: PI, Ca: 19.83, Mg: 1.31, K: 0.63, Na: 0.06, total exchangeable acidity: 1.45, sum of base cations: 21.8, cation exchange capacity: 23.3, proportion of base cations (%): 93.6, Ca (%): 85.1, Mg (%): 5.6, K (%): 2.7, Na (%): 0.3, total exchangeable acidity (%): 6.2, Shannon-Wiener Index: 2.759, Simpson Index: 0.8921, Life form: Chamaephyte: 0, Geophyte: 3.13, Hemicryptophyte: 34.38, Hemicryptophyte (caesp): 9.38, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 21.88, Nano-Phanerophyte: 6.25, Phanerophyte: 46.88, Phanerophyte (caesp): 15.63, Phanerophyte (scap): 12.5, Therophyte: 9.38, Chorotypes: Endemic: 0, Stenomediterranean: 3.13, Eurimediterranean: 3.13, Mediterranean-montane: 0, Eurasian: 65.63, Paleotemperate: 21.88, Eurasian (in sen. str.): 15.63, Pontic: 0, Euro-Caucasian: 28.13, Centroeuropean: 0, South European Orophytes: 0, Boreal: 12.5, Adventitious: 15.63, Balkan: 0.

4: Longitude: 480032, Latitude: 4528468, Location: Ljubaništa, pH: 7.1, organic matter: 2.2, C: 1.3, C/N: 11.8, N: 0.11, sand: 52, clay: 8.9, coarse silt: 23, fine silt: 16, total silt: 39, texture class: PI-I, Ca: 22.13, Mg: 1.11, K: 0.32, Na: 0.04, total exchangeable acidity: 1.65, sum of base cations: 23.6, cation exchange capacity: 25.3, proportion of base cations (%): 93.3, Ca (%): 87.5, Mg (%): 4.4, K (%): 1.3, Na (%): 0.2, total exchangeable acidity (%): 6.5, Shannon-Wiener Index: 2.340, Simpson Index: 0.8177, Life form: Chamaephyte: 0, Geophyte: 8.82, Hemicryptophyte: 47.06, Hemicryptophyte (caesp): 8.82, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 35.29, Nano-Phanerophyte: 8.82, Phanerophyte: 29.41, Phanerophyte (caesp): 5.88, Phanerophyte (scap): 14.71, Therophyte: 5.88, Chorotypes: Endemic: 0, Stenomediterranean: 2.94, Eurimediterranean: 8.82, Mediterranean-montane: 0, Eurasian: 55.88, Paleotemperate: 20.59, Eurasian (in sen. str.): 14.71, Pontic: 2.94, Euro-Caucasian: 17.65, Centroeuropean: 0, South European Orophytes: 0, Boreal: 14.71, Adventitious: 17.65, Balkan: 0.

5: Longitude: 480084, Latitude: 4528359, Location: Ljubaništa, pH: 6.8, organic matter: 28.8, C: 16.7, C/N: 16.1, N: 1.04, sand: 15.6, clay: 31.7, coarse silt: 19, fine silt: 34, total silt: 53, texture class: MGI, Ca: 66.44, Mg: 4.11, K: 1.67, Na: 0.15, total exchangeable acidity: 9.6, sum of base cations: 72.4, cation exchange capacity: 82, proportion of base cations (%): 88.3, Ca (%): 81, Mg (%): 5, K (%): 2, Na (%): 0.2, total exchangeable acidity (%): 11.7, Shannon-Wiener Index: 2.056, Simpson Index: 0.7847, Life form: Chamaephyte: 0, Geophyte: 7.69, Hemicryptophyte: 42.31, Hemicryptophyte (caesp): 7.69, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 30.77, Nano-Phanerophyte: 7.69, Phanerophyte: 34.62, Phanerophyte (caesp): 0, Phanerophyte (scap): 19.23, Therophyte: 7.69, Chorotypes: Endemic: 0, Stenomediterranean: 0, Eurimediterranean: 3.85, Mediterranean-montane: 3.85, Eurasian: 65.38, Paleotemperate: 26.92, Eurasian (in sen. str.): 7.69, Pontic: 3.85, Euro-Caucasian: 26.92, Centroeuropean: 0, South European Orophytes: 0, Boreal: 15.38, Adventitious: 11.54, Balkan: 0.

6: Longitude: 479979, Latitude: 4528503, Location: left bank of the river Čerava, pH: 7.1, organic matter: 2.1, C: 1.2, C/N: 10.9, N: 0.11, sand: 44.5, clay: 8.7, coarse silt: 30, fine silt: 17, total silt: 47, texture class: I, Ca: 22.1, Mg: 1.39, K: 0.99, Na: 0.05, total exchangeable acidity: 1.25, sum of base cations: 24.5, cation exchange capacity: 25.8, proportion of base cations (%): 95, Ca (%): 85.7, Mg (%): 5.4, K (%): 3.8, Na (%): 0.2, total exchangeable acidity (%): 4.8, Shannon-Wiener Index: 2.079, Simpson Index: 0.764, Life form: Chamaephyte: 0, Geophyte: 3.7, Hemicryptophyte: 37.04, Hemicryptophyte (caesp): 11.11, Hemicryptophyte (ros): 0, Hemicryptophyte (scand): 22.22, Nano-Phanerophyte: 7.41, Phanerophyte: 25.93, Phanerophyte (caesp): 3.7, Phanerophyte (scap): 7.41, Therophyte: 25.93, Chorotypes: Endemic: 0, Stenomediterranean: 0, Eurimediterranean: 14.81, Mediterranean-montane: 0, Eurasian:

70.37, Paleotemperate: 22.22, Eurasian (in sen. str.): 18.52, Pontic: 0, Euro-Caucasian: 29.63, Centroeuropean: 0, South European Orophytes: 0, Boreal: 11.11, Adventitious: 3.7, Balkan: 0.

Table 21:

1: Longitude: 486100, Latitude: 4543471, Location: Galičica, Veleluga, pH: 6.5, organic matter: 12.6, C: 7.3, C/N: 9.5, N: 0.77, sand: 18.4, clay: 21, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MI, Ca: 0.87, Mg: 2.05, K: 1.5, Na: 0.12, total exchangeable acidity: 13, sum of base cations: 64.5, cation exchange capacity: 77.5, proportion of base cations (%): 83.2, Ca (%): 78.5, Mg (%): 2.6, K (%): 1.9, Na (%): 0.2, total exchangeable acidity (%): 16.8, Shannon-Wiener Index: 2.792, Simpson Index: 0.7951, Life form: Chamaephyte: 22, Geophyte: 2, Hemicryptophyte: 54, Hemicryptophyte (caesp): 16, Hemicryptophyte (ros): 2, Hemicryptophyte (scand): 26, Nano-Phanerophyte: 0, Phanerophyte: 14, Phanerophyte (caesp): 8, Phanerophyte (scap): 4, Therophyte: 8, Chorotypes: Endemic: 8, Stenomediterranean: 2, Eurimediterranean: 20, Mediterranean-montane: 6, Eurasian: 40, Paleotemperate: 6, Eurasian (in sen. str.): 10, Pontic: 10, Euro-Caucasian: 6, Centroeuropean: 4, South European Orophytes: 6, Boreal: 4, Adventitious: 4, Balkan: 4.

2: Longitude: 487576, Latitude: 4544874, Location: Galičica, under Mažon, pH: 5.9, organic matter: 13.9, C: 8, C/N: 9.8, N: 0.82, sand: 7.3, clay: 43.4, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MG, Ca: 6.38, Mg: 2.05, K: 0.76, Na: 0.09, total exchangeable acidity: 17.9, sum of base cations: 49.3, cation exchange capacity: 67.2, proportion of base cations (%): 73.4, Ca (%): 69, Mg (%): 3.1, K (%): 1.1, Na (%): 0.1, total exchangeable acidity (%): 26.6, Shannon-Wiener Index: 2.447, Simpson Index: 0.7449, Life form: Chamaephyte: 23.68, Geophyte: 5.26, Hemicryptophyte: 50, Hemicryptophyte (caesp): 13.16, Hemicryptophyte (ros): 7.89, Hemicryptophyte (scand): 23.68, Nano-Phanerophyte: 5.26, Phanerophyte: 13.16, Phanerophyte (caesp): 10.53, Phanerophyte (scap): 0, Therophyte: 2.63, Chorotypes: Endemic: 13.16, Stenomediterranean: 0, Eurimediterranean: 10.53, Mediterranean-montane: 10.53, Eurasian: 44.74, Paleotemperate: 2.63, Eurasian (in sen. str.): 15.79, Pontic: 2.63, Euro-Caucasian: 10.53, Centroeuropean: 0, South European Orophytes: 7.89, Boreal: 7.89, Adventitious: 2.63, Balkan: 0.

3: Longitude: 488424, Latitude: 4540070, Location: Galičica, Dolni Merezi, under Đereka, pH: 6.1, organic matter: 10.8, C: 6.3, C/N: 9.8, N: 0.64, sand: 14.5, clay: 23.1, coarse silt: 0, fine silt: 0, total silt: 0, texture class: MI, Ca: 6.1, Mg: 1.56, K: 1.1, Na: 0.1, total exchangeable acidity: 16.3, sum of base cations: 38.9, cation exchange capacity: 55.2, proportion of base cations (%): 70.5, Ca (%): 65.4, Mg (%): 2.8, K (%): 2, Na (%): 0.2, total exchangeable acidity (%): 29.5, Shannon-Wiener Index: 3.077, Simpson Index: 0.8766, Life form: Chamaephyte: 19.64, Geophyte: 3.57, Hemicryptophyte: 64.29, Hemicryptophyte (caesp): 16.07, Hemicryptophyte (ros): 8.93, Hemicryptophyte (scand): 33.93, Nano-Phanerophyte: 1.79, Phanerophyte: 5.36, Phanerophyte (caesp): 5.36, Phanerophyte (scap): 0, Therophyte: 5.36, Chorotypes: Endemic: 12.5, Stenomediterranean: 3.57, Eurimediterranean: 12.5, Mediterranean-montane: 10.71, Eurasian: 35.71, Paleotemperate: 7.14, Eurasian (in sen. str.): 14.29, Pontic: 5.36, Euro-Caucasian: 3.57, Centroeuropean: 1.79, South European Orophytes: 8.93, Boreal: 10.71, Adventitious: 1.79, Balkan: 3.57.

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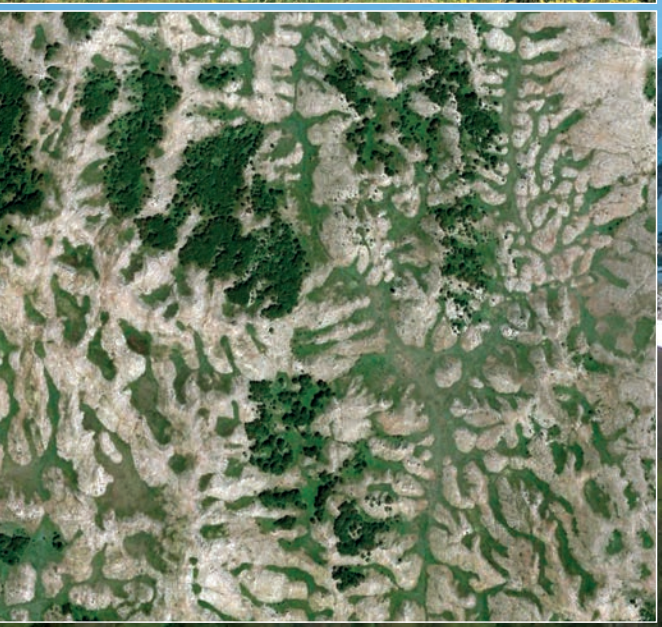

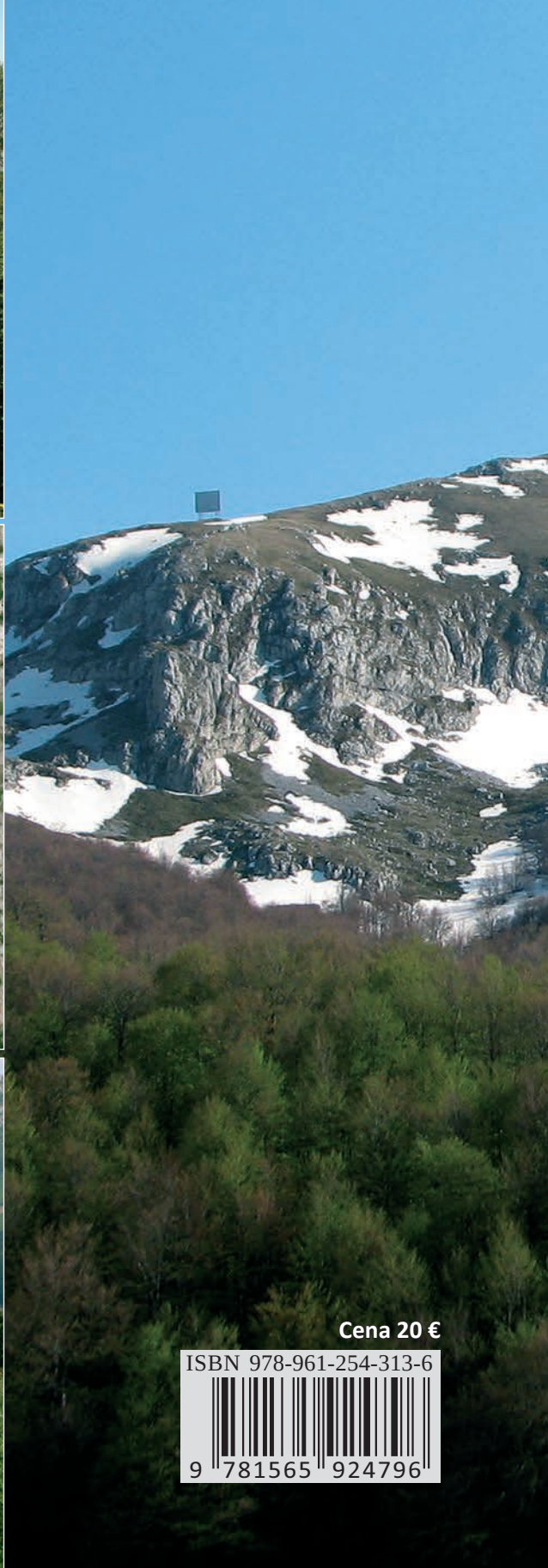

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ISBN 978-961-254-313-6