

Syntaxonomy of the oak forests in the Pleven district (Danube plane in Bulgaria)

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Abstract

In the papers are analyzed the relevés of phytocoenoses of *Quercus robur* and *Quercus cerris* from the Middle Danubian plane. Two new associations are differentiated: mesophytic, *Scutellario altissimae-Quercetum roboris*, on lowland platforms with aluvial soils and xerothermic, *Cotyno coggygriae-Quercetum cerris*, on dry hills over chernozem soils. Hereby are considered their relationships with high syntaxa and their analogy with similar associations described in Serbia and in Romania.

Key words: new associations, oak forests, relevés.

Résumé

Dans le présent travail on a analysé les relevés des phytocoenoses à *Quercus robur* et à *Quercus cerris* de la partie moyenne de la Plaine Danubienne. On a fondé deux associations nouvelles: mésophyle, *Scutellario altissimae-Quercetum roboris*, à côté des rivières sur des sols alluviaux et xérotherme, *Cotyno coggygriae-Quercetum cerris*, des collines sèches aux sols tchernozems. On a examiné les relations avec les syntaxons supérieurs et les associations analogiques décrites dans la Serbie et dans la Roumanie.

Mots clés: associations nouvelles, forêts de chênes, relevés.

Introduction

The contemporary natural vegetation in the Danubian hilly plane possesses very restricted part from the territory and presents strongly modified and poor variant of the primary forest steppes vegetation (Stoyanov, 1941, 1950; Stefanov, 1943 and others). The present examination includes the natural phytocoenoses of *Quercus robur* L. and *Quercus cerris* L. The settlement of syntaxa on the basics of the rest small area fragments with noticeably modified structure with respect to the original in the former big forest complexes is a difficult task.

Phytoceenotic studying of the forest vegetation in the researched region is not performed. The only information is found in the article of Kochev & Tzolova (1987) in which is given brief phytoceenotic characteristics of the protected countryside "Lugut-Drumcata" near to the Pleven town with natural finding of *Paeonia peregrina* L. Highly generalized information on that theme is found in the works of Stoyanov (1941, 1950), Bondev (1991), Palamarev *et al.* (1982). Summarized information about cultigennic plants and cultigennic vegetation in Bulgaria is published by Stefanov & Kitanov (1962).

Object and methods of exploration

The exploration encompasses the territory between the Vit, Danube and the main morphotectonic line of Balcan foothill region in the central part of the plane within the boundaries of Bulgaria, which presents about 310000 ha.

Terrain explorations are performed in the period 1998-2001. The classification of the collected material is performed according to the method of Zurich-Montpellier schooling (Braun-Blanquet, 1964). In order to standardize the digital data and to take more precise syntaxonomic decisions, the range for cover-abundance was extended up to 9 values in correspondence with the recommendations of Barkman *et al.* (1964). The data is elaborated according to the method of unmeasure pairs. Florisric dissimilarity is calculated according to the formula $d=1-S$, where S is the similarity on Horn determining presence/absence and dominants. Kinds included in three or more descriptions are also considered.

The nomenclature of the cited in the papers taxa is done according to Flora of Bulgaria (volumes. I - X, 1964-1999) and Flora Europaea (v. 1-5, 1964-1980).

Material and discussion

SCUTELLARIO ALTISSIMAE-QUERCETUM ROBORIS ass. nova (rel. typus n. 8; Tab.1)

The big areal of *Quercus robur* in Europe excluding the northeast and the southwest territories, the diversification in the lowlands in wide climatic, edaphic and morphologic range, formation of pure or mixed with another tree, lots of frutex and grass types of phytocoenoses, determine the big number of the syntaxa of this oak in the European literature. The information about the phytocoenoses of *Quercus robur* in Bulgaria is run out with a publication of Velchev (1971) about the vegetation covering in Vrachanska mountain, where are described several highly influenced by human impact phytocoenoses with limited areas. The *Quercus robur* is not indicated by Bondev (1991) in his book about the vegetation of Bulgaria. Besides, comparatively the same is the level of examination of the phytocoenoses of *Quercus pedunculiflora* C. Koch (Ganchev, 1965) distributed in similar to these of *Quercus robur* sites.

From the publications on the above mention theme in the neighboring to the Bulgaria countries is obvious that two groups of phytocoenoses with ediphyctor *Quercus robur* are clearly distinguished: associations over sandy soil on the riverbank platforms with close to the surface of soil waters are grouped in azonal higrophytic alliance *Alno-Quercion roboris* Horvat (1937) 1938, and the Eastern-European associations of *Quercus robur* over chernozem soils in flat sections of watersheds under xerothermic conditions of the continental climate are related to the alliance *Aceri tatarico-Quercion* Zol. - Jakucs 1957.

In the literature for neighboring of Bulgaria regions from Serbia and Romania, the alliance *Alno-Quercion roboris* has considerable number of associations in which ediphyctor and dominant is *Quercus robur*, independent or with other species. Phytocoenotic analysis shows, that no one of them does not present the composition and the structure of the phytocoenoses of that oak on the explored here region. From the species in the distributed in Serbia monodominant association - *Genista elatae-Quercetum roboris* (Ht. 1938) Vuk. E. (1959) 1989 s.l., in the examined region are not determined: *Genista elata* (*Genista tinctoria* var. *virgata*, *G. virgata*), *Cornus sanguinea*, *Frangula alnus*, *Viburnum opulus*, *Rumex sanguineus*, *Carex remota*, *Ranunculus repens*, *Galium palustre*, *Lycopus europaeus*, *Cardamine pratensis* and other, bigger part of which are basic in the Serbian association. Similar

are the conclusions for the rest associations of *Quercus robur*, described in Serbia. So, in the phytocoenoses of Pleven there is a lack of differential and constant for association *Violo-Quercetum roboris* B. Jov. - Z. Tom. 1980 species: *Viola sylvestris*, *Viola hirta* and *Ajuga reptans*. Constant species *Fraxinus excelsior*, *Pyrus pyraster*, *Prunus spinosa*, *Euonymus europaea*, *Ulmus effusa*, *Cornus sanguinea*, *Rumex sanguineus*, *Viola sylvestris*, *Ranunculus auricomus*, *Asarum europaeum*, *Fritillaria eleagnus*, *Polygonatum officinalis* ect., from the association *Fraxino-Quercetum roboris* Rud. (1940) 1949. are not in the list of the species distributed in the 19 phytocoenoses from the region of Pleven. This conclusion is related also to all associations by *Aceri tatarico-Quercion* published in the Serbian literature: *Tilieto-Quercetum crassiusculae* Slav. 1952; *Carpino-Quercetum roboris-cerris* Jov. 1983; *Tilio-Capino betuli-Quercetum roboris* B. Jov. et Tomic 1983 and other, *Carpino orientalis-Quercetum* B. Jov. 1960 etc. (Sarich, 1997). In the Pleven's phytocoenoses there is absence or they play extremely insignificant role for the species of Serbian associations: *Tilia tomentosa*, *Carpinus orientalis*, *Carpinus betulus*.

The forests of *Quercus robur* in neighboring Romania are grouped into associations: *Convallario-Quercetum roboris* Soó 1957; *Ornithogalo-Tilio-Quercetum* A. Dihoru 1976; *Carici brizoidis-Quercetum roboris* Ratiu et al. 1977; *Melampyro bihariensi-Carpinetum* (Borza, 1941) Soó 1964 em. Coldea 1975; *Quercetum roboris dacicum* Borza 1959; *Aceri tatarico-Quercetum petraeae-roboris* Soó 1951 em. Zoly 1957 (Ivan et al., 1993). The names of the cited associations, excluding the first one, show that they have not site in the Pleven surroundings, either because basic species such as *Carex brizoides* are not met in the Bulgarian flora, since *Melampyrum bihariense*, *Carpinus betulus-Quercus petraeae*, which are basic in the Romanian associations, are not included in the list of the species the observed here phytocoenoses.

According to the Romanian authors, forest steppe associations of *Quercus robur* are clearly differentiated into two groups: south panonian psamphytic and north - ucraino-moldavian (Ivan et al., 1993). *Convallario-Quercetum roboris* is a representative of the south panonian group (south forest steppe of *Festuca vaginata* and forests of *Quercus robur* with *Convallaria majalis*) which is in alliance *Alno-Quercion roboris*, and *Aceri tatarico-Quercetum petraeae-roboris* from the northern ucraino-moldavian (grass communities of *Stipa tirsia*, *Stipa pennata*, *Carex humilis* and forests of *Quercus robur* and *Acer tataricum*) is by *Aceri tatarici-Quercion*.

Tab. 1 - *Scutellario altissimae* - *Quercetum roboris* ass. nova

| Number of relevés | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8* | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | Const. | |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|--|
| Altitude | 60 | 60 | 60 | 60 | 60 | 63 | 63 | 64 | 64 | 64 | 64 | 62 | 62 | 42 | 42 | 42 | 48 | 48 | 45 | | |
| Cover (%) | 90 | 100 | 90 | 90 | 90 | 100 | 100 | 90 | 90 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 90 | 90 | 80 | |
| Area of relevés (m ²) | 500 | 500 | 500 | 500 | 500 | 400 | 500 | 400 | 400 | 500 | 400 | 400 | 400 | 300 | 300 | 300 | 300 | 300 | 300 | | |
| Diagnostic species of the association | | | | | | | | | | | | | | | | | | | | | |
| <i>Quercus robur</i> | 9 | 7 | 7 | 6 | 8 | 6 | 8 | 8 | 7 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 9 | 8 | 8 | V | |
| <i>Scutellaria altissima</i> | 5 | 4 | 4 | 2 | 6 | 5 | 7 | 6 | 2 | 6 | 4 | 4 | . | 2 | 4 | 4 | 2 | . | . | V | |
| <i>Alno-Quercion roboris</i> | | | | | | | | | | | | | | | | | | | | | |
| <i>Rubus caesius</i> | 8 | 4 | 5 | 7 | 5 | 6 | 6 | 5 | 5 | 6 | 6 | . | 5 | . | . | 4 | . | 4 | . | IV | |
| <i>Fraxinus oxycarpa</i> | 2 | . | 6 | 2 | 4 | 2 | 6 | 6 | 6 | . | . | 2 | . | . | . | . | . | . | . | III | |
| <i>Physalis alkekengi</i> | 2 | . | . | . | . | . | 4 | 2 | . | 7 | . | . | 5 | . | 2 | 4 | . | 2 | 2 | III | |
| <i>Pyrus pyraeaster</i> | . | . | . | . | . | 2 | . | 2 | 2 | . | . | 2 | 4 | . | . | . | . | . | . | II | |
| <i>Sambucus nigra</i> | . | . | . | . | . | . | . | . | . | . | . | . | . | 2 | 4 | . | . | . | . | I | |
| <i>Solanum dulcamara</i> | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 2 | 2 | . | . | . | I | |
| <i>Quercetalia pubescentis - petraeae</i> | | | | | | | | | | | | | | | | | | | | | |
| <i>Corydalis bulbosa</i> | 5 | 4 | 4 | 4 | 4 | 2 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 5 | 2 | 2 | . | . | V | |
| <i>Buglossoides purpureocoerulea</i> | 5 | 4 | 4 | . | 6 | 5 | . | 7 | 7 | 4 | . | 5 | . | 2 | 2 | 2 | . | . | . | IV | |
| <i>Viola odorata</i> | . | . | . | 6 | . | 7 | 6 | 5 | 2 | . | . | 5 | . | 2 | 5 | 5 | 7 | 6 | 2 | IV | |
| <i>Acer tataricum</i> | 7 | 5 | 4 | 5 | 5 | . | . | 2 | 6 | 7 | 5 | . | 4 | 4 | . | 4 | 6 | 2 | 5 | IV | |
| <i>Rosa canina</i> | . | . | . | . | . | 4 | . | . | . | . | . | . | . | . | . | . | 2 | . | 2 | I | |
| <i>Tilia tomentosa</i> | . | . | . | . | . | 2 | . | . | . | 5 | 5 | . | . | . | . | . | . | . | . | I | |
| <i>Viburnum lantana</i> | . | . | . | . | . | . | . | . | . | 5 | . | 4 | . | . | . | . | . | . | . | I | |
| <i>Carpinion betuli and Fagetalia</i> | | | | | | | | | | | | | | | | | | | | | |
| <i>Scilla bifolia</i> | 1 | 2 | 7 | 5 | 5 | 7 | 7 | 7 | 6 | 6 | 2 | 2 | 2 | 5 | 3 | 3 | 2 | 2 | . | V | |
| <i>Polygonatum latifolium</i> | 4 | 5 | 5 | 5 | 7 | 2 | 5 | 5 | 6 | 5 | 7 | . | 6 | . | 2 | 2 | . | . | 2 | IV | |
| <i>Anemone ranunculoides</i> | 2 | . | 2 | 2 | 4 | 4 | 5 | 5 | 5 | 5 | 2 | 2 | 2 | 2 | 2 | . | 2 | . | . | IV | |
| <i>Isopyrum thalictroides</i> | 2 | . | 2 | 2 | 4 | 4 | 7 | 7 | 7 | 6 | 2 | 2 | 2 | 2 | . | . | 2 | . | . | IV | |
| <i>Ulmus minor</i> | 2 | . | 4 | . | . | 2 | 5 | 5 | 5 | . | . | . | . | 6 | 7 | 7 | 7 | 5 | 5 | IV | |
| <i>Cornus mas</i> | . | 5 | 6 | 5 | 6 | 2 | 6 | 7 | 7 | . | 6 | . | 5 | . | 2 | 4 | . | . | . | IV | |
| <i>Pulmonaria officinalis</i> | 2 | 6 | 6 | 5 | 4 | 5 | 7 | 5 | 2 | 2 | . | . | 2 | . | . | . | . | . | . | III | |
| <i>Arum maculatum</i> | . | . | . | . | 4 | 2 | 4 | 2 | 4 | 2 | . | 2 | 4 | 2 | . | . | . | . | . | III | |
| <i>Carex sylvatica</i> | 4 | . | . | 2 | . | . | . | 2 | 4 | 4 | . | . | . | . | . | . | . | . | . | II | |
| <i>Euphorbia amygdaloides</i> | . | . | . | . | . | 2 | 2 | 2 | 2 | 2 | . | 2 | . | . | . | . | . | . | . | II | |
| <i>Staphylea pinnata</i> | 4 | . | . | 2 | . | . | . | . | 5 | 2 | . | . | . | . | . | . | . | . | . | II | |
| <i>Convallaria majalis</i> | . | . | . | . | 4 | . | 4 | 2 | 4 | 2 | 4 | . | . | . | . | . | . | . | . | II | |
| <i>Viola reichenbachiana</i> | . | . | . | . | . | 2 | . | . | . | . | . | . | 2 | . | . | 2 | . | . | . | I | |
| <i>Mycelis muralis</i> | 2 | . | . | . | 2 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | I | |
| <i>Lapsana communis</i> | 2 | . | . | . | . | . | . | . | . | . | . | . | 2 | . | . | . | 2 | . | . | I | |
| <i>Quercio-Fagetalia</i> | | | | | | | | | | | | | | | | | | | | | |
| <i>Geum urbanum</i> | . | 2 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | 4 | 6 | 4 | 4 | 4 | 4 | 4 | 4 | 6 | 4 | V | |
| <i>Acer campestre</i> | 7 | 2 | 5 | 6 | 6 | 6 | 7 | 7 | 7 | 6 | 6 | 7 | 7 | 6 | 7 | 7 | 4 | 7 | 2 | V | |
| <i>Crataegus monogyna</i> | 7 | 8 | 8 | 8 | 7 | . | 4 | 7 | 7 | 5 | 7 | 7 | 8 | 8 | 8 | 7 | . | . | 7 | V | |
| <i>Brachypodium sylvaticum</i> | 2 | . | . | . | . | 4 | 4 | 6 | 7 | 2 | 6 | 5 | 4 | 2 | 5 | 4 | 4 | 4 | 2 | IV | |
| <i>Ligustrum vulgare</i> | . | . | . | . | 2 | . | 5 | 5 | 7 | . | 5 | 4 | . | 2 | 2 | . | . | . | 2 | III | |
| <i>Clematis vitalba</i> | . | . | . | . | . | 5 | 5 | 4 | . | . | 4 | 4 | 5 | 4 | . | . | . | . | . | II | |
| <i>Populus alba</i> | . | . | . | . | . | . | . | . | . | . | . | 4 | . | 2 | . | . | . | 2 | 7 | II | |
| <i>Hedera helix</i> | 5 | . | . | . | . | . | . | . | 4 | . | . | . | . | . | . | . | . | . | . | I | |
| Other taxa | | | | | | | | | | | | | | | | | | | | | |
| <i>Gagea minima</i> | . | . | 2 | 2 | 2 | . | 6 | 7 | 7 | 7 | 5 | 3 | 3 | 2 | . | . | 2 | . | . | IV | |
| <i>Dactylis glomerata</i> | 4 | . | 4 | 2 | 4 | . | . | . | 5 | 4 | . | 4 | 5 | 2 | 4 | 5 | 2 | . | 4 | III | |
| <i>Galium aparinae</i> | 2 | . | . | . | . | 2 | 7 | . | 7 | . | 4 | 5 | 2 | 2 | 2 | . | . | 4 | . | III | |
| <i>Corylus avellana</i> | 5 | 5 | 5 | 6 | . | . | 2 | . | 4 | 4 | . | 5 | . | . | . | . | . | . | . | III | |
| <i>Aristolochia clematitis</i> | 2 | . | . | . | . | 2 | 4 | 4 | 2 | . | 4 | 6 | . | . | . | . | . | . | . | II | |
| <i>Lysimachia nummularia</i> | . | . | . | . | . | 6 | 5 | . | 2 | . | . | 5 | . | 4 | . | 2 | . | 2 | . | II | |
| <i>Galanthus elwesii</i> | 2 | . | 2 | . | . | 2 | 2 | 2 | 2 | . | . | . | . | . | . | . | . | . | . | II | |
| <i>Conium maculatum</i> | . | 2 | . | . | . | 2 | 2 | 2 | . | 2 | . | 2 | . | 2 | . | . | . | . | . | II | |
| <i>Calystegia sylvatica</i> | . | . | . | . | . | 5 | . | . | . | 4 | . | 6 | 2 | 4 | 2 | . | . | . | . | II | |
| <i>Mercurialis perennis</i> | . | 4 | . | . | 4 | . | . | . | 7 | . | . | 7 | 5 | 2 | . | . | . | . | . | II | |
| <i>Tamus communis</i> | 2 | . | 5 | 7 | . | . | . | . | 2 | . | 5 | . | . | . | . | . | . | . | . | II | |
| <i>Urtica dioica</i> | . | . | . | . | . | . | . | . | . | . | . | 6 | 2 | 2 | 5 | . | . | 2 | . | II | |
| <i>Heracleum sibiricum</i> | 2 | 2 | . | . | . | . | . | . | . | 2 | . | . | . | . | . | . | . | . | . | I | |
| <i>Carex muricata</i> | . | . | . | . | . | 4 | . | . | . | . | . | . | . | . | . | 2 | 2 | . | . | I | |
| <i>Cornus sanguinea</i> | . | . | . | . | . | . | . | . | . | . | . | . | 5 | . | 2 | . | . | 2 | . | I | |
| <i>Clematis recta</i> | . | . | 2 | . | . | 5 | . | . | . | . | . | . | . | . | . | . | . | . | . | I | |
| <i>Smyrnium perfoliatum</i> | . | . | . | . | . | . | . | . | 2 | . | 2 | . | . | . | . | . | . | . | . | I | |
| <i>Allium atropurpureum</i> | . | . | . | . | . | . | . | 4 | . | . | 2 | . | . | . | . | . | . | . | . | I | |
| <i>Lamium maculatum</i> | . | . | 2 | . | . | . | . | . | . | . | . | 5 | . | . | . | . | . | . | . | I | |
| <i>Ruscus aculeatus</i> | . | . | . | . | . | . | . | 2 | 1 | . | . | . | . | . | . | . | . | . | . | I | |
| <i>Ajuga genevensis</i> | . | 2 | . | . | . | . | . | 2 | . | . | . | . | . | . | . | . | . | . | . | I | |
| <i>Cynanchum acutum</i> | . | . | 2 | 2 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | I | |
| <i>Rumex pulcher</i> | . | . | . | . | . | . | . | . | . | . | . | 4 | . | . | . | . | . | . | . | I | |
| <i>Asparagus tenuifolium</i> | . | 2 | . | . | . | . | . | . | . | . | . | . | . | . | . | 2 | . | . | . | I | |
| <i>Ranunculus falax</i> | . | . | . | . | 2 | . | . | . | . | 2 | . | . | . | . | . | . | . | . | . | I | |
| <i>Morus alba</i> | . | . | . | . | . | . | . | . | . | . | . | . | 2 | . | . | . | . | 2 | . | I | |
| <i>Ballota nigra</i> | . | . | . | . | . | . | . | . | . | . | . | . | 2 | . | . | . | . | 2 | . | I | |

Single taxa: *Parietaria officinalis* - 12 (4), *Vitis sylvestris* - 10 (5), *Crocus flavus* - 10 (2), *Lamiastrum galeobdolon* - 10 (2), *Symphytum tuberosum* - 10 (1), *Hypericum hirsutum* - 10 (1), *Campanula trachelium* - 10 (2), *Euonymus verrucosa* - 1 (2), *Melitis melissophyllum* 6 (2), *Ranunculus ficaria* - 6 (5), *Acanthus balcanicus* - 2 (2), *Carpinus betulus* - 10 (5), *Cardamine bulbifera* 10 (2), *Robinia pseudoacacia* - 14 (2), *Torilis japonica* - 14 (2), *Cruciata laevipes* - 14 (2), *Ailanthus altissima* - 15 (2), *Alliaria petiolata* - 15 (2), *Chelidonium majus* - 16 (2), *Prunus cerasifera* - 16 (2), *Viola hirta* - 16 (2), *Clinopodium vulgare* - 16 (2), *Arctium minus* - 18 (2), *Torilis arvensis* - 18 (2), *Physospermum cornubiensis* - 16 (2), *Atriplex patula* - 16 (2)

Localities: 1,2,3,4,5,11,12,13 - Levski town; 6,7,8,9,10 - Gradishte village; 14,15,16 - Bozuritzka village ;17,18 - Batzova mahala village ;19 - Trunchovitzka village

Dates: 1-20.06.99; 2,3,4,5-19.05.00; 6,7,8,9,10,11,12,13-22.05.00; 14,15,16 - 2.10.01 ; 17,18,19-16.10.01; 1,2,3,4,5,6,7,8,9,10,11,12,13-19.03.01; 14,15,16-12.03.01, 17, 18, 19 - 26.03.99

Phytocoenotic analysis shows certain similarity with examined in that paper phytocoenoses and the cited by the both alliances in Romania, and also significant differences. From the association *Convallario-Quercetum roboris* (distributed in the north-eastern part of Romania, which is significantly territory remote from the considered in that paper Bulgarian phytocoenoses) in our country are missing 7 from 8 differential species, some of which are not distributed in this region of Bulgaria (*Colchicum bulbocodioides*, *Iris arenaria*). In *Aceri tatarico-Quercetum petraeae-roboris* differential species is *Acer tataricum*. It is introduced in the phytocoenoses from Tab. 1 in that paper, but the comparison among the species composition of the association of interest from Tab. 9/1 published in the work of Ivan *et al.* (1993) shows, that in the Bulgarian phytocoenoses are not met big part of the basic for that association species (with constancy between III and V class): *Quercus petraea*, *Carpinus betulus*, *Polygonatum odoratum*, *Melitis melissophyllum*, *Dactylis polygama*, *Stellaria holostea*, *Asarum europaeum*, *Hepatica nobilis*, *Viola mirabilis*, *V. reichenbachiana*, *Poa nemoralis*, *Symphytum tuberosum*, *Ajuga reptans*, *Melica nutans*.

The dendrogram (Fig. 1) of Tab. 1 shows significant similarity in the floristic compound and the structure of

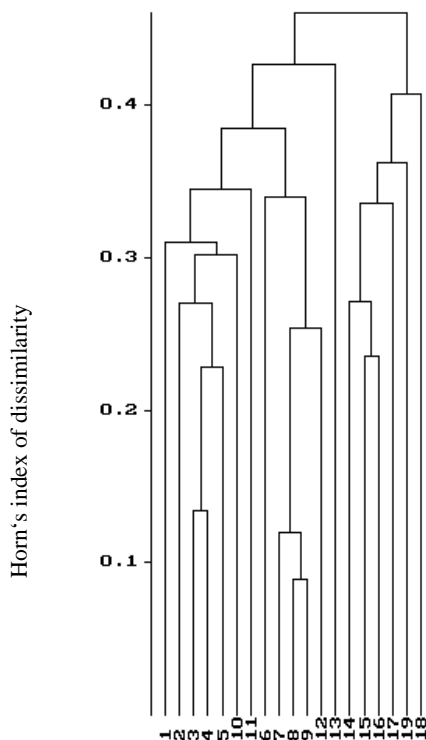


Fig. 1 - Classification dendrogram of the ass. *Scutellario-Quercetum roboris*

the particular phytocoenoses, distributed in the examined in Bulgaria region. At two groups of phytocoenoses from the listed 19 the semblance is above 60 %, and for the rest of them - it is about 55 %.

The descriptions are based on the exploration of several forest arrays. Their total area is about 600 ha. They are situated mainly in the lowlands of the big rivers in the region around the town of Pleven. Up to now they have been distributed in comparatively wider region everywhere in the Danubian lowland. For the native-born they are known under the names "Ormani" and "Elii". During the last 50 years they were mass killed and changed with workable lands. The examined several forest arrays are last preserved and they have very high nature value. They are situated near to the river of Osam in the region of town of Levski and the villages Gradishte, Tranchovitsa and Batzova mahala.

The altitude varies between 40 and 63 m. The terrain is even. Soils are of type Fluvisols, Fl, FAO (1988), well-provided-for with moisture, with gravelly or sandy base, shallow, but with comparatively well developed humus horizon. In the past, before dikes of the rivers to be done, these territories have been poured on during the spring high waters in April and May. The break off the rivers caused drying of the trees, illumination and entering of new for the phytocoenoses species plants, mainly ruderal elements.

Tree layers set up *Quercus robur* V⁷⁻⁹, *Acer campestre* V²⁻⁷, *Acer tataricum* IV²⁻⁷, *Ulmus minor* IV²⁻⁷, *Fraxinus oxycarpa* III²⁻⁷, *Pyrus communis* II²⁻⁴.

Bush layer is well defined, composed mainly of *Crataegus monogyna* V⁴⁻⁸, *Cornus mas* IV²⁻⁷, *Corylus avellana* III²⁻⁶, *Ligustrum vulgare* III²⁻⁷. There is also wide distribution of *Rubus caesius* IV⁴⁻⁸.

At ground layers there are 65 species. Among them constant, but with changing size are *Scutellaria altissima* V²⁻⁷, *Scilla bifolia* V²⁻⁷, *Corydalis cava* V²⁻⁵, *Geum urbanum* V²⁻⁶, *Polygonatum latifolium* IV²⁻⁷, *Isopyrum thalictroides* IV²⁻⁷, *Anemone ranunculoides* IV²⁻⁵, *Gagea minima* IV²⁻⁷, *Buglossoides purpureocoerulea* IV²⁻⁷, *Brachypodium sylvaticum* IV²⁻⁷, *Viola odorata* IV²⁻⁷. Some species are with constancy factor of III: *Physalis alkekengi*, *Dactylis glomerata*, *Galium aparine*.

Floristic composition of the phytocoenoses might be divided into two groups:

1. Connected with shadowy and damper sites - *Crataegus monogyna*, *Isopyrum thalictroides*, *Anemone ranunculoides*, *Brachypodium sylvaticum*, *Ulmus minor*, *Geum urbanum*, *Corylus avellana*, *Scilla bifolia*, *Clematis vitalba*, *Ligustrum vulgare* ect. from class *Quercus-Faetea* or order *Fagetalia sylvatica*.

2. Preferring dryer lots, with highly illuminated - *Quercus robur*, *Polygonatum latifolium*, *Buglossoides purpureocoerulea*, *Cornus mas*, *Scutellaria altissima*, *Corydalis bulbosa*, *Viburnum lantana*, *Tilia tomentosa*, *Viola odorata* etc., from class (or order) *Quercetea pubescentis-petraeae*. Dependent role, but indicator with human influence has the group of species with distribution on green fences, close to the roads, boundaries - *Physalis alkekengi*, *Heracleum sibiricum*, *Aristolochia clematitis*, *Calystegia sylvatica*, *Smyrniium perfoliatum*, *Urtica dioica*.

We might conclude from the performed analysis, that the listed phytocoenoses of the explored region couldn't be referred to the well-known associations of *Quercus robur*. A new association of *Scutellario altissimae-Quercetum roboris* with diagnostic species of *Quercus robur* and *Scutellaria altissima* has been developed.

Analysis of the structure of the phytocoenoses in the region of Pleven shows, that the number of the mesophytic species is significant and the relationships with *Quercus-Fagetalia* Br.-Bl. et Vlieger 1937 and *Fagetalia sylvaticae* Pawl. 1928 are with comparatively the same number as those of *Quercetea pubescenti-petraeae* and *Quercetalia petraeae-pubescentis*. We might emphasize, that similar situation regarding the high syntaxa is observed also with *Aceri tatarico-Quercetum petraeae-roboris* in Romania, but both associations have very bad connection with *Alno-Quercion roboris*. But contrary to the Romanian association the Plevens one is not connected with the alliance *Carpinion betuli*. In it, there is prevalence of species which are peculiar to the alliance *Alno-Quercion roboris*: *Sambucus nigra*, *Fraxinus oxycarpa*, *Solanum dulcamara*, *Rubus caesius*, *Physalis alkekengi*, *Pyrus pyraster* etc. from the classe *Quercetea pubescentis-petraeae*. Only two diagnostic species are presented from the alliance *Quercion frainetto* Ht. 1954 of Pleven phytocoenoses: *Tilia tomentosa* (with very scarce abundance and distribution) and *Tamus communis*.

COTINO COGGYGRIAE-QUERCETUM CERRIS ass. nova (rel. typus n. 16; Tab. 2)

The phytocoenoses of *Quercus cerris* have wide distribution in Europe, including in Bulgaria. They present fragments of former large forests. In the explored region the biggest are with area of about 300 ha. Their distribution on north reaches conventional line, which passes at about 30-40 km parallel to the river of Danube. On the south, within the borders with Stara planina (Balcan) mountain region, *Quercus frainetto* has

increased significantly its quantitative participation in the mixed with *Quercus cerris* phytocoenoses, there are also monodominant phytocoenoses of these oak species. Probably this is somehow connected with the soils, which became poor and the climate became warmer in the Balcan foothill region. In Pleven, phytocoenoses of *Quercus cerris* has been developed over rich soils or ordinary Chernozems and Luvisols. They are from sandy to sandy-clayey, with well developed humus and comparatively developed aluvial horizon. Altitude varies from 100 up to 350 m. They are mainly on the southern, western and high parts of the hills. Rarely they are met on slopes with eastern and northern expositions. On the calcareous terrain they changed over to phytocoenoses of *Carpinus orientalis* and *Fraxinus ornus*. Contrary to the phytocoenoses of *Quercus robur*, these of *Quercus cerris* are presented in Bulgarian phytocoenotic literature with over 30 associations described according to the dominant method. Comparatively the same is the number of *Quercus frainetto*. From the point of view of the school of Zurich-Montpellier however syntaxonomy of these most widely distributed oak phytocoenoses in Bulgaria is not performed. In that paper is done analysis of 40 relevés from 13 significantly remote one from another region in the Middle Danubian plane.

Significant part of the phytocoenoses of *Quercus cerris* (independently or together with *Quercus frainetto*) in Serbia (and on the territory of the former Yugoslavia) and Romania are included in the association of *Quercetum frainetto-cerris* Rud. (1940) 1949 s. 1. In the content of this widely distributed and big in size association, equitably accepted as "coenoaggregate" of typical and mutually coenoecologically and floristic close "small" associations (Sarich, 1997) take part big number of tree, bush and grass species. Typical phytocoenoses of the association are included in *Quercetum frainetto-cerris physospermetosum* Rud. 1940 (typicum Horvat, 1946). Character species are *Quercus frainetto* V, *Physospermum cornubiensis* V, *Iris graminea* IV, *Lathyrus pannonicus* IV, *Genista tinctoria* IV, *Cytisus supinus* IV, *Silene viridiflora* IV. All these species are part of the Bulgarian flora, but in the group of the interested phytocoenoses they are either not present or they have extremely limited distribution, for that reason they have no special diagnostic importance. Besides, there are quite a lot common species between the examined sub-association and the group of phytocoenoses from Pleven, the rest of them have different floristic structure. Dominating species are

Quercus cerris, and *Quercus frainetto* is with constant factor of III and limited abundance as a rule. *Physospermum cornubiensis* settled as accidental species in only one phytocoenoses out of 40. It is not mentioned among the most frequently met species in the forests of *Quercus cerris* and *Quercus frainetto* in Bulgaria cited by Bondev (1991). There is also differentiation in some constant species in the both groups of phytocoenoses - the one of Pleven and these from Serbia and Romania. In the Pleven group of phytocoenoses with constance V and IV are: *Quercus cerris*, *Crataegus monogyna*, *Cotinus coggygia*, *Brachypodium sylvaticum*, *Buglossoides purpureocoerulea*, *Geum urbanum*, *Lathyrus niger* and with constance III are *Festuca heterophylla*, *Helleborus odorus*, *Prunus spinosa*, *Rosa gallica*, *Quercus frainetto*, *Tanacetum corymbosum*, *Viburnum lantana*, *Acer tataricum*. In *Quercetum frainetto-cerris physospermetosum* constant beside *Quercus frainetto*, *Crataegus monogyna*, *Buglossoides purpureocoerulea*, *Lathyrus niger*, *Helleborus odorus*, *Prunus spinosa*, *Acer tataricum*, *Viburnum lantana*, *Geum urbanum*, some of which are well presented in the phytocoenoses in Pleven, often met are *Sorbus domestica*, *Peucedanum cervaria*, *Pyrus pyraster*, *Pyrus malus*, *Rosa arvensis*, *Euphorbia cyparissias*, *Corylus avellana*, *Calamintha clynopodium*, *Achillea millefolium*, *Fragaria vesca*, *Viola hirta*, *Polygonatum latifolium* etc. Most of them are very poor presented, and some of them are not met in the Pleven group of phytocoenoses.

We might say, that the high percent of participation of *Cotinus coggygia* is secondary phenomenon. In the frutex layer of the primary phytocoenoses there has prevailed *Crataegus monogyna*, but as result of the artificial diminishing of the slope and increasing of the illumination, as an aftermath of the farm activity, *Cotinus coggygia*, which is developed faster than *Crataegus monogyna*, has taken its place. From this we might conclude, the better developed the layer of *Cotinus coggygia* is, the higher human influence of the given phytocoenoses.

Results from the performed analysis give us reason to admit, that the Pleven group of phytocoenoses should be distinguished as association *Cotino-Quercetum cerris*, which is part of association *Quercetum frainetto-cerris* s.l. We might conclude this from the comparison of the floristic compound and structure of the examined group of phytocoenoses with these of associations *Rusco aculeati-Quercetum frainetto-cerris* (Rud. 1940) B. Jov. (1951) 1979, *Sedo maximi-Quercetum frainetto-cerris* B.

Jov. (1979) 1986, *Hieracio-Quercetum frainetto-cerris* B. Jov. (1967) 1979, *Carpineto orientalis-Quercetum frainetto-cerris* etc., distributed in Serbia and Romania, and take part in the above mentioned association.

In Bulgarian phytocoenotic literature there are several associations of *Quercus cerris* which are very close to the considered phytocoenoses of these species from other regions of Bulgaria, but settled according to the dominant method. Ganchev (1965) has published the associations of *Quercus cerris* + *Quercus virgiliana* - *Cotinus coggygia*, *Quercus cerris* + *Quercus conferta* - *Cotinus coggygia* in the region of Stara Zagora. Detailed is also the species composition of the described by Stoyanov, Kitanov & Velchev (1955) phytocoenoses from Northeastern Bulgaria. There are such phytocoenoses also in the region of Russe and on another Bulgarian sites. This shows that the considered group of phytocoenoses is distributed in Bulgaria with its own specification, which is the reason for the settlement of a separate syntaxon. The dendrogram (Fig. 2) of Tab. 2 shows, that only two phytocoenoses out of the examined 40 have less than 40 % of identity with the rest, which is due to the poorer floral compound. Similarity among the rest phytocoenoses is about 50 %.

It is important to mention, that Serbian specialists refer to all unions and associations of the oak phytocoenoses

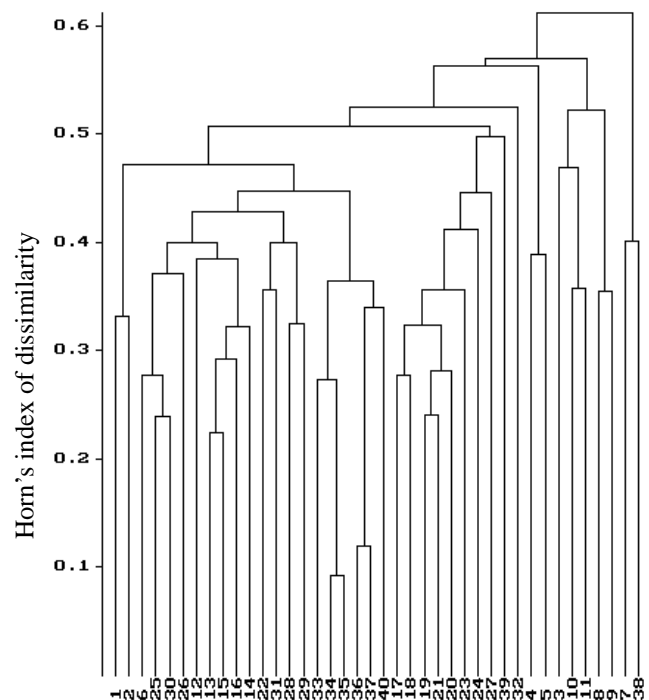


Fig. 2 - Classification dendrogram of the ass. *Cotino coggygiae-Quercetum cerris*

from the class of eurosiberian deciduous forests *Quercus-Fagetea* Br.-Bl. et Vlieg. 1937. In the Romanian basic phytocoenotic literature, syntaxa of xerophytic forests from the continental Europe and the xerophytic from south Europe, in which the oaks (*Quercus robur*, *Q. petraea*, *Q. cerris*, *Q. frainetto*, *Q. pubescens*, *Q. pedunculiflora*) play edipycator role in the associations “nearly all” belong to class *Quercetea pubescenti-petraeae* (Ivan *et al.*, 1993). In the considered above Romanian association *Aceri tatarico-Quercetum petraeae-roboris* is rather from union *Carpinion betuli* of class *Quercus-Fagetea*, than from union *Aceri tatarico-Quercion* of class *Quercetea pubescenti-petraeae*. Both associations from Pleven show different orientation regarding the high syntaxa. While in the compound of association *Scutellario altissimae-Quercetum roboris* there is a big number of species from the one and from the other of the above mentioned classes and it is obvious that it belongs to the alliance of *Alno-Quercion roboris* Horvat (1937) 1938, then association *Cotino-Quercetum cerris* is connected with the Balkan alliance *Quercion frainetto*.

Conclusions

Classification of oak phytocoenoses according to the sigmatic method in Bulgaria is not done. Floristic composition and structure of the phytocoenoses with edipycators *Quercus robur* and *Quercus cerris* in Central North Bulgaria show well distinguished specifics regarding to the phytocoenoses with these edipycators in the neighboring to Bulgaria countries - Serbia and Romania. The settled two new associations: *Scutellario altissimae-Quercetum roboris* and *Cotino-Quercetum cerris* show somewhat different orientation regarding the high syntaxa. In the association of *Scutellario altissimae-Quercetum roboris* from the alliance *Alno-Quercion roboris* Horvat (1937) 1938 there is a big number of species from the both classes of *Quercus-Fagetea* Br.-Bl. et Vlieger 1937 and *Quercetea pubescenti-petraeae* Jakucs 1960. Association *Cotino-Quercetum cerris* is connected with the Balkan alliance *Quercion frainetto* Horvat 1954. It might be considered as a part of association *Quercetum frainetto-cerris* (Georgescu, 1945) Rudski 1949 s. I.

Syntaxonomical schema

Quercus-Fagetea Br.-Bl. et Vlieger 1937

Quercetalia petraeae-pubescentis Jakucs 1960

Alno-Quercion roboris Horvat (1937) 1938

Scutellario altissimae-Quercetum roboris ass. nova

Quercion frainetto Horvat 1954

Cotino coggygriae-Quercetum cerris ass. nova

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