FOLIA GEOBOTANICA & PHYTOTAXONOMICA

A JOURNAL OF PLANT ECOLOGY AND SYSTEMATICS

Founded in 1966 by S. Hejný and J. Moravec

Published by the Institute of Botany, Academy of Sciences of the Czech Republic, Průhonice near Praha

ISSN 0015-5551
Folia Geobotanica & Phytotaxonomica is published quarterly.
Subscription price: 1500 SEK. Special private subscription price: 600 SEK. Prices of the back volumes available at request.
Second class postage paid at Praha, Czech Republic.
Distributed by OPULUS PRESS, Box 25 137, 750 25 Uppsala, Sweden.
Postmaster: please send all address corrections to: Folia Geobotanica & Phytotaxonomica, OPULUS PRESS, Box 25 137, 750 25 Uppsala, Sweden.
Objednávky z České a Slovenské Republiky zasílejte na adresu redakce FG&P.
Printed by Čihák-Tisk.

Folia Geobot. Phytotax. 32: 221-258, 1997

THERMOPHILOUS OAK FORESTS IN THE CZECH REPUBLIC: SYNTAXONOMICAL REVISION OF THE *QUERCETALIA PUBESCENTI-PETRAEAE*

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Keywords: Phytosociology, Plant communities, *Quercus*, Vegetation survey

Abstract: Using the Braun-Blanquet approach, a syntaxonomical revision of the order of *Quercetalia pubescenti-petraeae*, based on the synthesis of 634 relevés, distinguished three alliances of the thermophilous oak forests in the Czech Republic: (1) *Quercion pubescenti-petraeae* (3 communities: *Pruno mahaleb--Quercetum pubescentis, Lathyro versicoloris-Quercetum pubescentis, Corno-Quercetum*), which includes peri-alpine and peri-Carpathian oak forests on calcareous bedrock, (2) *Aceri tatarici-Quercion* (2 communities: *Quercetum pubescenti-roboris, Carici fritschii-Quercetum roboris*), which comprises Pontic-Pannonian oak forests on loess or sand that occur in southern Moravia only, (3) *Quercion petraeae* (5 communities: *Potentillo albae-Quercetum, Brachypodium pinnatum-Quercus robur* community, *Sorbo torminalis-Quercetum, Genisto pilosae-Quercetum petraeae, Asplenio cuneifolii-Quercetum petraeae*), which includes Central European thermophilous oak forests distributed outside the range of *Quercus pubescens* and some other submediterranean species.

INTRODUCTION

The origin of the thermophilous oak forests in the Czech Republic dates back to the Early Holocene (Boreal) when the low-lying areas were covered with open pine-oak woodlands with hazel, which replaced the Late Glacial cold forest-steppe and Early Holocene open birch-pine woodland (RYBNÍČEK & RYBNÍČKOVÁ 1994, RYBNÍČKOVÁ 1985). In the Holocene climatic optimum (Atlantic) these woodlands became more closed forests and *Pinus sylvestris* gradually disappeared. Most of the forests at altitudes of approximately (250-) 300-500 m, except those in extremely dry habitats, became rich in mesophilous species, changed into mixed oak forests with lime, elm, maple and ash, and in the Late Holocene developed into oak-hornbeam forests (*Carpinion*). Thermophilous oak forests remained as zonal vegetation in the lowlands and mountain fringes below 250-300 m, but these altitudes were subject to deforestation as early as in the Neolithic Age (RYBNÍČKOVÁ 1985). Most stands preserved up to now rather belong to azonal vegetation, being confined to restricted areas in dry habitats such as south-facing slopes at the altitudes of approximately 350-450 m, i.e. the *Carpinion* altitudinal range. Thus, the thermophilous oak forests may be considered as relict vegetation that survived only where oaks could avoid competition with mesophilous trees due to extreme soil and microclimatic conditions.

Contemporary thermophilous oak forests (*Quercetalia pubescenti-petraeae*) are usually dominated by *Quercus pubescens* or *Q. petraea*, in places by *Q. robur*, and, outside the

territory of the Czech Republic, also by *Q. cerris*, *Q. frainetto*, *Ostrya carpinifolia*, *Carpinus orientalis* and other species (JAKUCS 1960, HORVAT et al. 1974, POLDINI 1988). Shrub and field layers are usually rich in species, with a predominance of submediterranean and subcontinental species. These forests form a supramediteranean altitudinal belt in the Mediterranean mountains and zonal vegetation in submediterranean Europe and East European forest-steppes. Their range extends from the eastern part of the Iberian Peninsula through southern France and the fringes of the Alps to Central Europe, the Great Hungarian Plain, the fringes of the Carpathians and the Balkans. In eastern Europe they are widespread in southern Ukraine and Crimea, reaching their limits on the western foothills of the Caucasus (JAKUCS 1960).

Czech botanists have always devoted special attention to this vegetation type, especially due to its richness in rare plants. The thermophilous oak forests were among the first subjects of phytosociological research in this country (DOMIN 1928, KLIKA 1928a,b). A number of studies by KLIKA (1932, 1933, 1942, 1952, 1957, 1959) contributed significantly to our knowledge of the oak forest vegetation. A further period of extensive investigations in the late 1950s and the 1960s was connected with geobotanical mapping and forest site type research for applications in forestry. The researchers involved in the mapping project (MIKYŠKA et al. 1968) published a number of regional phytosociological studies on forest vegetation, including the thermophilous oak forests (e.g. MIKYŠKA 1963, 1968, NEUHÄUSL & NEUHÄUSLOVÁ-NOVOTNÁ 1968, 1969). The foresters also published several phytosociological papers on thermophilous oak forests from the territory of central and eastern Bohemia (e.g. MRÁZ 1958a,b, 1963, SAMEK 1962, 1964). Other prominent papers from central Bohemia were published by BLAŽKOVÁ (1962, 1997) and MORAVEC et al. (1991). Until the 1960s, extensive research on the thermophilous oak forests covered almost exclusively Bohemia, i.e. the western part of the Czech Republic. In Moravia, the eastern part, only research into forest site types prevailed (HORÁK 1969, 1979, 1980, 1981, 1983). A phytosociological scheme of the Moravian thermophilous oak forests was elaborated only recently in connection with the project of the European Vegetation Survey (CHYTRÝ 1991, CHYTRÝ & VICHEREK 1995, CHYTRÝ & HORÁK 1997). The present paper synthesizes all the earlier data from regional studies.

MATERIAL AND METHODS

All the available published vegetation relevés from the territory of the Czech Republic were used for synthesis, provided they used the 6- or 7-grade BRAUN-BLANQUET scale (BRAUN-BLANQUET 1928, 1951), or a scale which may be transformed into this scale. As in some older papers (e.g. KLIKA 1932, 1933, 1942) the relevé tables of thermophilous oak forests include also the relevés of successional stages after forest clearing, relevés with tree layer cover < 25 % were excluded. Those relevés in which the tree and shrub layers were not distinguished, and relevés of stands with a canopy dominated by planted coniferous trees were also excluded. The only exceptions are the *Pinus sylvestris* plantations on marbles in the Šumava foothills and on serpentines in SW Moravia, where stands with a natural canopy composition are rare or absent. In addition to the published relevés, 16 unpublished relevés by the author were used from the thermophilous oak forests on marbles in the Šumava foothills,

as these are poorly represented by data in the literature. A total of 634 relevés were analysed (see Appendix). No synthetical relevés (constancy tables) were used for the synthesis.

The data set was analysed by the program TWINSPAN (HILL 1979) to assess floristic variation and to detect natural groups of relevés. As data on the ground layer were absent in almost half of the relevés, only data on woody plants and the field layer were used for numerical analysis. To obtain better insight into the variation within the data set, subsets of relevés from similar habitats and particular geographical areas were also analysed besides the whole data set. The final classification of the relevés into community types was made subjectively, being mainly based on the TWINSPAN results. In the synoptic table, the communities are defined by blocks of diagnostic (i.e. character and differential) species, in the text by the combination of groups of diagnostic species. Symbols E_3, E_2, E_1 and E_0 are used for tree, shrub, field and ground layer, respectively. Names of syntaxa were checked for correctness in the terms of the Code (BARKMAN et al. 1986).

To visualise the variation among communities, already detected by TWINSPAN, correspondence analysis with default options from the package CANOCO 3.1 (TER BRAAK 1987, 1990) was applied. It was performed for the association level, based on the $\log_2$-transformed percentage constancy data matrix (synoptic table).

The nomenclature of vascular plants follows EHRENDORFER (1973), of bryophytes FRAHM & FREY (1992), and of lichens POELT (1969). In a synthesis based on data by different authors, problems arose from the different taxonomical concepts in some species or species groups. In the genus *Quercus*, the concept of broad species was used without distinguishing *Q. virgiliana, Q. dalechampii* and *Q. polycarpa* which are supposed to occur in Moravia (KOBLÍŽEK 1990). The taxon referred here as *Festuca ovina* includes both diploid (*F. ovina* L. s.str.) and (mainly) tetraploid cytotypes (*F. "firmula"* = *F. guestfalica* auct., *F. lemanii* auct.). For the other taxonomically problematic cases, aggregates as defined in EHRENDORFER (1973) are used.

RESULTS

The synthesis of the data is summarized in Tab. 1 (see Appendix). There are several general remarks to be mentioned prior to the description of particular community types:

(1) Geographical distribution of the thermophilous oak forests in the Czech Republic is mainly dependent on climate (Fig. 1). Generally, these forests occur in areas with the mean annual temperature higher than 7 °C and the rainfall lower than 650 mm/yr. However, hardly any localities are found in areas with temperatures > 9 °C and rainfall < 500 mm/yr because these areas have been largely deforested. Whereas climate is responsible for the distribution of the thermophilous oak forests as a whole, floristic variation patterns, which are suitable for classification at the alliance and association level, are mainly controlled by the interaction of climate and bedrock type.

(2) In terms of floristic composition and habitat, thermophilous oak forests are an apparently heterogeneous vegetation type in the Czech Republic. The main discontinuity in the data, detected by TWINSPAN, divided the relevés into two groups: (1) basiphilous communities of the driest and warmest areas with comparatively high proportions of submediterranean (and subcontinental) species; (2) communities with reduced numbers of submediterranean species and a higher proportion of Central European species, which occur on acid bedrocks

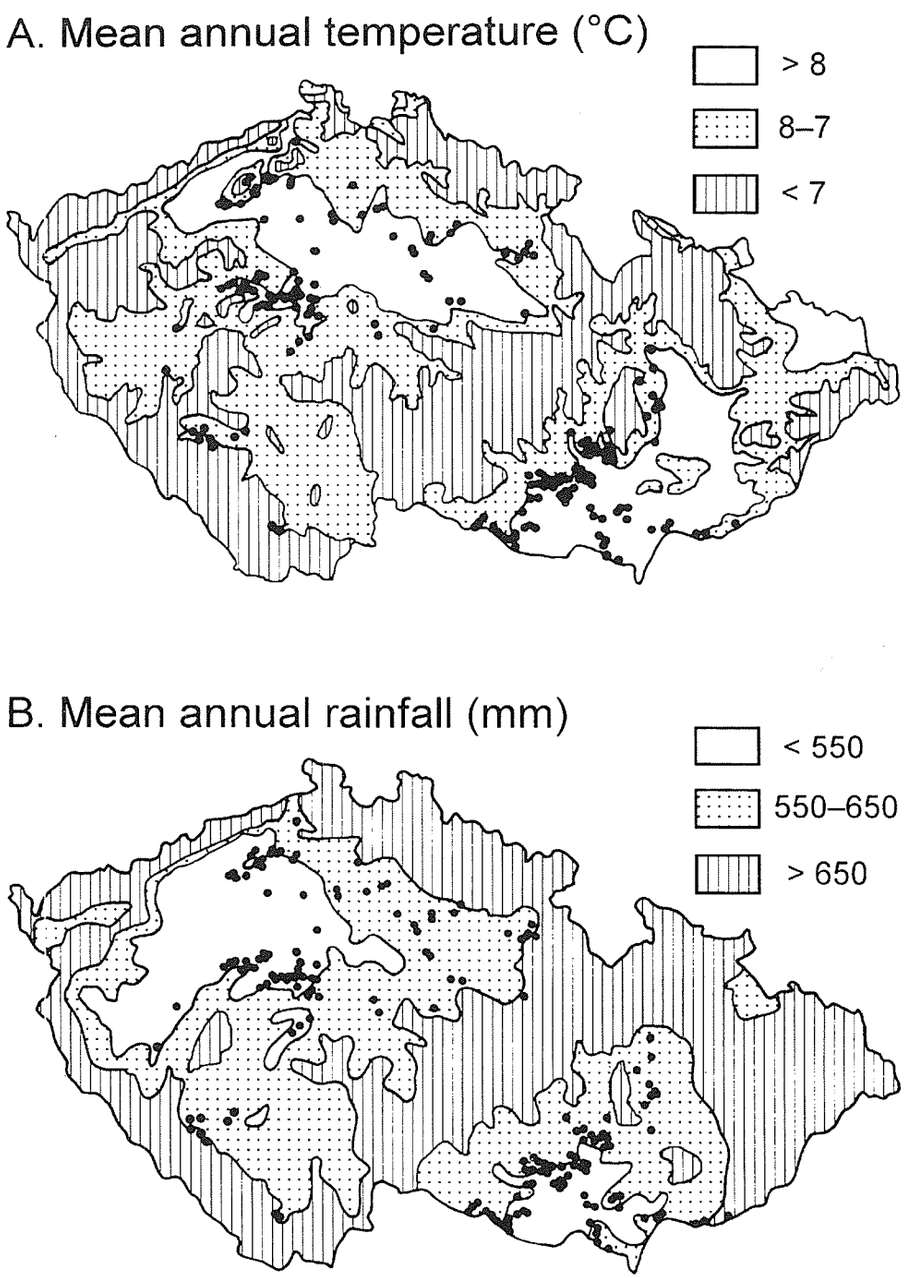

Fig. 1. Localities of all the *Quercetalia pubescenti-petraeae* relevés from the Czech Republic plotted over climatic maps (climatic data from VESECKÝ et al. 1958).

in the driest areas, being more confined to basic parent materials in wetter parts of the country. Group (1) was largely identified with the *Quercion pubescenti-petraeae* alliance, whereas group (2) was assigned to the *Quercion petraeae*. There was also one well-separated vegetation type with an outlying position relative to both groups (*Carici fritschii-Quercetum roboris*). It was assigned, on the basis of a comparison with the relevé material from Hungary (SOÓ 1937), to the continental alliance *Aceri tatarici-Quercion*. As a result of the comparison with Hungarian and Slovakian data (ZÓLYOMI 1957, 1967, MICHALKO & DŽATKO 1965), another marginal subgroup of relevés from group (1), comprising the oak forests on chernozems over loess (*Quercetum pubescenti-roboris*), was assigned to the *Aceri tatarici-Quercion*.

(3) There are two areas of distribution of the thermophilous oak forests in the Czech Republic, isolated from one another: (1) central and southern Moravia (SE part of the Republic), which is a promontory of the continuous distribution of these forests in the Pannonian regions of Austria, Slovakia and Hungary; (2) Bohemia, mainly northern, central and eastern (NW part of the Republic), which is an isolated part of the thermophilous oak forest range, bounded by mountain ranges with *Fagion* and *Piceion excelsae* forests. Due to geographical isolation, some species with a more easterly distribution, typical of the Pannonian area, are absent in the Bohemian thermophilous oak forests. In Bohemia, only 5 communities were distinguished compared to 8 communities in Moravia (including 3 communities common to both areas). One alliance (*Aceri tatarici-Quercion*) occurs only in southern Moravia.

Syntaxonomical synopsis

Quercetalia pubescenti-petraeae KLIKA 1933
- *Quercion pubescenti-petraeae* BRAUN-BLANQUET 1932
  - *Pruno mahaleb-Quercetum pubescentis* JAKUCS et FEKETE 1957
  - *Lathyro versicoloris-Quercetum pubescentis* KLIKA (1928) 1932
    - *typicum* BLAŽKOVÁ 1997
    - *poëtosum nemoralis* CHYTRÝ 1997
  - *Corno-Quercetum* MÁTHÉ et KOVÁCS 1962
    - *euonymetosum verrucosae* CHYTRÝ 1997
    - *euonymetosum europaeae* CHYTRÝ 1997
- *Aceri tatarici-Quercion* ZÓLYOMI 1957
  - *Quercetum pubescenti-roboris* (ZÓLYOMI 1957) MICHALKO et DŽATKO 1965
  - *Carici fritschii-Quercetum roboris* CHYTRÝ et HORÁK 1997
- *Quercion petraeae* ZÓLYOMI et JAKUCS ex JAKUCS 1960
  - *Potentillo albae-Quercetum* LIBBERT 1933
  - *Brachypodium pinnatum-Quercus robur* community
  - *Sorbo torminalis-Quercetum* SVOBODA ex BLAŽKOVÁ 1962
    - *typicum* (NEUHÄUSL et NEUHÄUSLOVÁ-NOVOTNÁ 1977) CHYTRÝ et HORÁK 1997
    - *caricetosum humilis* (NEUHÄUSL et NEUHÄUSLOVÁ-NOVOTNÁ 1977) CHYTRÝ in CHYTRÝ et VICHEREK 1995
    - *poëtosum nemoralis* BLAŽKOVÁ 1962
  - *Genisto pilosae-Quercetum petraeae* ZÓLYOMI et al. ex SOÓ 1963
  - *Asplenio cuneifolii-Quercetum petraeae* CHYTRÝ et HORÁK 1997

Descriptions of syntaxa

Quercion pubescenti-petraeae

The *Quercion pubescenti-petraeae* includes thermophilous oak forests usually dominated by *Quercus pubescens*. *Q. petraea* prevails only in cooler habitats and outside the limits of *Q. pubescens*. Shrub and field layers are luxuriant and species-rich. In extremely dry habitats these communities may have an appearance of an open shrubby woodland in which tree and shrub layers grade continuously one into the other, so that it is hard to distinguish between the two (Germ.: Buschwald – see JAKUCS 1961a). This vegetation is confined to the warmest and driest areas where it typically inhabits slopes of sunny aspects, usually on rendzinas over calcareous rocks. Less frequently it occurs on calcaric luvisols (Pararendzina) over calcareous sediments and on rankers over base-rich siliceous rocks. In the Czech Republic this alliance is widespread in southern and central Moravia and in northern and central Bohemia. Outside the Czech Republic it ranges from the western Pyrenees through the submediterranean part of France, the western fringes of the Alps, the Jura, the Rhine Valley and Central Germany to the fringes of the Eastern Alps and Western Carpathians, upland fringes north of the Pannonian Basin and the Carpathian foothills in Romania (JAKUCS 1960, MÜLLER 1992).

Pruno mahaleb-Quercetum pubescentis

Constant dominants and co-dominants: E_3: *Quercus pubescens*, E_2: *Cornus mas*, *Ligustrum vulgare*, *Viburnum lantana*, E_1: *Carex humilis*, *Brachypodium pinnatum*, *Dictamnus albus*.

Diagnostic species groups: species of thermophilous oak forests and forest edges (*Bupleurum falcatum*, *Inula hirta*, *Teucrium chamaedrys*, *Vincetoxicum hirundinaria*, etc.), species of dry grasslands (*Adonis vernalis*, *Aster amellus*, *Salvia pratensis*, *Stachys recta*, etc.), species with an easterly distribution which do not occur in Bohemia (*Euonymus verrucosa*, *Euphorbia polychroma*, *Inula ensifolia*, *Iris pumila*, *I. variegata*, *Prunus mahaleb*, etc.).

These low and open forests with a luxuriant shrub layer are confined to south-facing slopes with an inclination usually ranging between 10-30°. The soils are shallow rendzinas over limestones or calcaric luvisols over calcareous sandstones. The stands usually form patches in the driest and warmest habitats, being bounded by more mesophilous forest communities. In the Czech Republic this association only occurs in southern Moravia: SE part of the Ždánický les Hills, Pálava Hills, Milovický les Forest and the Dyje Valley near Čížov (Fig. 2) (CHYTRÝ & HORÁK 1997). Reaching its NW distribution limits in Moravia, this community is widespread in the Hungarian Central Range (JAKUCS & FEKETE 1957, JAKUCS 1961a), the southern fringes of the Western Carpathians (JAKUCS 1961a,b, CHYTRÝ 1994) and NE Austria (WALLNÖFER et al. 1993).

Lathyro versicoloris-Quercetum pubescentis

Constant dominants and co-dominants: E_3: *Quercus pubescens*, *Quercus petraea*, E_2: *Cornus mas*, *Ligustrum vulgare*, E_1: *Carex humilis*, *Brachypodium pinnatum*, *Tanacetum corymbosum*.

Diagnostic species groups: species of thermophilous oak forests and forest edges (*Bupleurum falcatum*, *Dictamnus albus*, *Lathyrus pannonicus* subsp. *collinus*, *Primula veris*, *Silene nemorosa*, *Trifolium alpestre*, etc.), species of dry grasslands (*Galium glaucum*, *Verbascum lychnitis*, etc.), species of mesophilous oak-hornbeam forests (*Hepatica nobilis*, *Lathyrus vernus*, *Stellaria holostea*, etc.).

This association includes low and open forests with a well-developed shrub layer on south-facing slopes with a typical inclination of 10-30°. As with its Pannonian counterpart, the *Pruno mahaleb-Quercetum pubescentis*, this association is confined to extreme habitats, and its stands are surrounded by more mesophilous forests. *Lathyro versicoloris-Quercetum pubescentis* is an endemic association of central and northern Bohemia (Fig. 2). As there are some differences in ecology and species composition of this community between the two areas of its distribution, viz Bohemian Karst and the České středohoří Mts., two subassociations are distinguished:

L. v.-Q. p. typicum occurs on rendzinas over limestones in the Bohemian Karst and SW surroundings of Prague. The stands are dominated by *Quercus pubescens*. Differential species: E_2: *Cornus mas*, E_1: *Anthericum ramosum*, *Arabis pauciflora*, *Asperula tinctoria*, *Aster amellus*, *Carex humilis*, *Clematis recta*, *Inula hirta*, *Lotus corniculatus*, *Polygonatum odoratum*, *Salvia pratensis*, *Sesleria varia*, *Teucrium chamaedrys*, *Thlaspi montanum*, *Viola hirta*.

L. v.-Q. p. poëtosum nemoralis is encountered in the central and SW part of the České středohoří Mts. It occurs on rankers over base-rich Tertiary eruptive rocks (usually basalts). In some places *Quercus pubescens* is replaced by *Q. petraea* as a dominant tree. Differential species: E_2: *Viburnum lantana*, E_1: *Dactylis polygama*, *Festuca ovina*, *Luzula luzuloides*, *Mercurialis perennis*, *Poa nemoralis*.

Corno-Quercetum

Constant dominants and co-dominants: E_3: *Quercus petraea*, *Quercus pubescens*, E_2: *Cornus mas*, E_1: *Buglossoides purpurocaerulea*, *Tanacetum corymbosum*.

Diagnostic species groups: species of thermophilous oak forests and forest edges (*Polygonatum odoratum*, *Teucrium chamaedrys*, *Vincetoxicum hirundinaria*, etc.), species of mesophilous oak-hornbeam forests (*Campanula rapunculoides*, *C. trachelium*, *Corydalis cava*, *Dactylis polygama*, *Poa nemoralis*, *Viola mirabilis*, etc.), nitrophilous forest species (*Alliaria petiolata*, *Fallopia dumetorum*, *Geum urbanum*, etc.), invasive alien species (*Impatiens parviflora*, *Viola odorata*, etc.).

This association includes forests with a taller and more closed canopy than in the previous two associations. The shrub layer is well-developed. The soils are derived from base-rich bedrocks, usually limestones, base-rich Tertiary eruptives, diabases and calcareous sediments such as sandstones or conglomerates. The soils are rendzinas, rankers or calcaric luvisols, being usually deeper and richer in nutrients than is the case in the *Pruno mahaleb-Quercetum pubescentis* or *Lathyro versicoloris-Quercetum pubescentis*. Within the range of these two communities, the stands of *Corno-Quercetum* are often confined to south-facing foot- or mid-slopes with an accumulation of recently re-distributed material, such as small stones which have slumped down the slope. Beyond the limits of the above two communities, for example in central and SW Moravia, the *Corno-Quercetum* is a community of the driest south-facing slopes, typically with an inclination of 20-30°. In the Czech Republic it is distributed in southern and central Moravia and central and northern Bohemia (Fig. 3). Outside the Czech Republic the range of this community includes the Hungarian Central Range

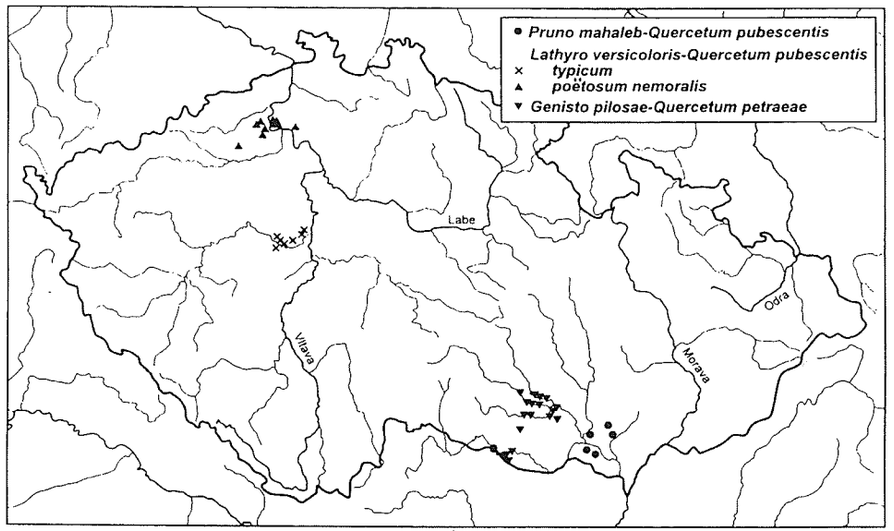

Fig. 2. Distribution of the *Pruno mahaleb-Quercetum pubescentis*, *Lathyro versicoloris-Quercetum pubescentis* and *Genisto pilosae-Quercetum petraeae* in the Czech Republic.

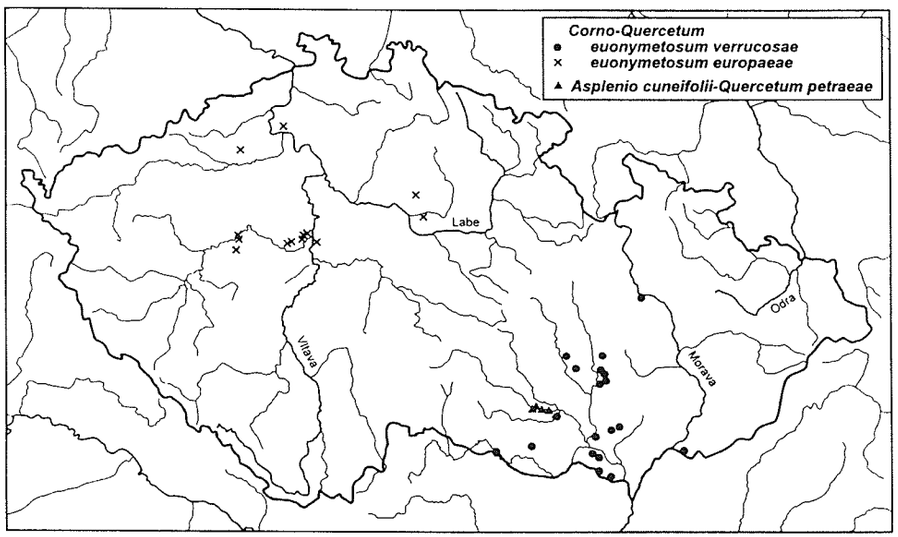

Fig. 3. Distribution of the *Corno-Quercetum* and *Asplenio cuneifolii-Quercetum petraeae* in the Czech Republic.

(MÁTHÉ & KOVÁCS 1962, SOÓ 1963, ZÓLYOMI 1967, FEKETE & JAKUCS 1968, KOVÁCS 1969), the southern fringes of the Western Carpathians (JAKUCS 1961b, CHYTRÝ 1994) and NE Austria (WALLNÖFER et al. 1993). There are some floristic differences between Bohemian and Moravian stands that make it possible to distinguish two subassociations:

C.-Q. euonymetosum verrucosae is distributed in Moravia only, in the hilly lands in the extreme south, the Pálava Hills and Moravian Karst. Scattered localities were recorded in SW Moravia, and near Tišnov, Mladeč and Radějov (CHYTRÝ & HORÁK 1997). Differential species: E_2: *Euonymus verrucosa*, E_1: *Carex michelii*, *Corydalis pumila*, *Euphorbia polychroma*, *Festuca rupicola*, *Galium album*, *Glechoma hirsuta*, *Melica uniflora*, *Melittis melissophyllum*, *Verbascum austriacum*.

C.-Q. euonymetosum europaeae occurs in the warm areas of Bohemia, particularly in the České středohoří Mts., Bohemian Karst and the Berounka Valley. *Quercus pubescens* plays a much less important role than in the previous subassociation. Isolated stands with a species composition transitional to the *Potentillo albae-Quercetum* were recorded in the Poděbrady area. Differential species: E_2: *Euonymus europaea*, E_1: *Barbarea vulgaris*, *Chaerophyllum temulum*, *Galium aparine*, *Stellaria holostea*, *Torilis japonica*.

Aceri tatarici-Quercion

This alliance includes thermophilous oak forests of subcontinental distribution in which *Quercus robur* usually dominates, sometimes accompanied by *Q. pubescens*. Only in the western part of the range of the alliance, which includes also the Czech localities, may *Q. petraea* co-dominate. Shrub and field layers are well-developed and rich in species. These forests are confined to flatlands or gentle slopes on loess or sand. On loess, the soil type is usually chernozem, in the western parts of the range being often degraded into luvisols. On sand, base-rich cambisols are developed. In the Czech Republic the *Aceri tatarici-Quercion* communities only occur in the extreme south of Moravia, where the alliance reaches the NW limits of its continuous distribution in eastern Austria (WENDELBERGER 1955, WALLNÖFER et al. 1993), southern Slovakia (MICHALKO & DŽATKO 1965, MICHALKO et al. 1987) and Hungary (ZÓLYOMI 1957, FEKETE 1965). The range of the alliance extends from the Pannonian Basin through southern Romania to southern Ukraine and SW Russia (ZÓLYOMI 1957, HORVAT et al. 1974).

Quercetum pubescenti-roboris

Constant dominants and co-dominants: E_3: *Quercus petraea*, *Q. pubescens*, *Q. robur*, E_2: *Acer campestre*, *Ligustrum vulgare*, *Cornus sanguinea*, E_1: *Poa nemoralis*, *Convallaria majalis*, *Carex montana*, *Brachypodium pinnatum*, *Melica uniflora*.

Diagnostic species groups: species of thermophilous oak forests and forest edges (*Buglossoides purpurocaerulea*, *Carex michelii*, *Dictamnus albus*, *Iris variegata*, *Melica picta*, *Tanacetum corymbosum*, *Viola hirta*, etc.), species of mesophilous oak-hornbeam forests (*Brachypodium sylvaticum*, *Dactylis polygama*, *Galium odoratum*, *Poa nemoralis*, *Pulmonaria officinalis* agg., *Viola mirabilis*, etc.), species of deep, loamy soils (*Betonica officinalis*, *Carex montana*, *Convallaria majalis*, etc.).

These forests are characterized by an open canopy due to coppicing in the past. In undisturbed sites the shrub layer is well-developed. It occurs on flatlands and gentle slopes

with an inclination less than 15°. The parent material is loess, which overlies calcareous Tertiary sandstones and claystones, or gravelly river terraces. The soils are deep, haplic or luvic chernozems, in some places degraded into luvisols. The *Quercetum pubescenti-roboris* was reported from southernmost Moravia only: Milovický les Forest, SW part of the Ždánický les Hills, Horní Kapánsko Forest near Starý Poddvorov, and the terraces of the Jihlava and Svratka Rivers (Fig. 4) (Chytrý & Horák 1997). In the pre-cultural landscape, this community used to be probably widespread in the lowlands of northern Hungary and southern Slovakia (Zólyomi 1957, Fekete 1965, Michalko & Džatko 1965, Zólyomi 1967, Michalko et al. 1987). In eastern and NE Austria and southern Moravia, it reaches the western and NW limits of its distribution (Wendelberger 1955, Wallnöfer et al. 1993, Chytrý & Horák 1997). As the whole area of its original distribution has been largely deforested, this community is only rarely preserved in residual forest tracts.

Carici fritschii-Quercetum roboris

Constant dominants and co-dominants: E_3: *Quercus robur*, E_1: *Molinia caerulea* agg., *Carex fritschii*, *Convallaria majalis*.

Diagnostic species groups: species of thermophilous oak forests and forest edges (*Geranium sanguineum*, *Iris variegata*, *Trifolium alpestre*, *Vincetoxicum hirundinaria*, etc.), species of intermittently wet soils (*Galium boreale*, *Laserpitium prutenicum*, *Molinia caerulea* agg., *Potentilla alba*, *Serratula tinctoria*, *Succisa pratensis*, etc.), species of mesophilous grasslands (*Ajuga reptans*, *Arrhenatherum elatius*, *Potentilla erecta*, *Vicia sepium*, etc.), acidophilous species of mesic and xeric habitats (*Anthoxanthum odoratum*, *Festuca ovina*, *Melampyrum pratense*, etc.), pleurocarpous mosses (*Hypnum cupressiforme*, etc.).

The canopy is tall, usually open. The shrub layer is sparsely developed and the field layer is usually extremely species-rich. The parent material at the sites of the typically developed and well-preserved stands in Dúbrava Forest near Hodonín is siliceous sand overlying calcareous Tertiary clays. The soils, influenced by base-rich ground water, largely belong to the cambisol type (Šmarda 1961). Degraded types, which are not included in the synoptic table (Tab. 1), are found in Boří les Forest near Valtice where they are confined to sandy-gravelly Neogene river terraces (Chytrý & Horák 1997). The *Carici fritschii-Quercetum roboris* is probably an endemic association of the two above mentioned sand areas in southernmost Moravia (Fig. 4). Fragmentarily developed stands have been also recorded on sandy plains in the adjacent areas of the Záhorská nížina Lowland in Slovakia (Michalko & Plesník 1982). Similar communities occur in the Great Hungarian Plain (Soó 1937, Hargitai 1940, Fekete 1965, Papp & Szodrift 1967).

Quercion petraeae

This alliance includes thermophilous oak forests with a Central European distribution which occur outside the geographical or ecological range of *Quercus pubescens*. The stands are dominated by *Quercus petraea* or (in the Czech Republic less commonly) *Q. robur*. Shrub and field layers are well-developed and comparatively rich in species; however, some thermophilous species of submediterranean or subcontinental distribution are rare or lacking. The *Quercion petraeae* forests occur in different habitat types. They are often encountered on sunny, south-facing slopes of various types of siliceous rocks (granitoids, gneiss, schist,

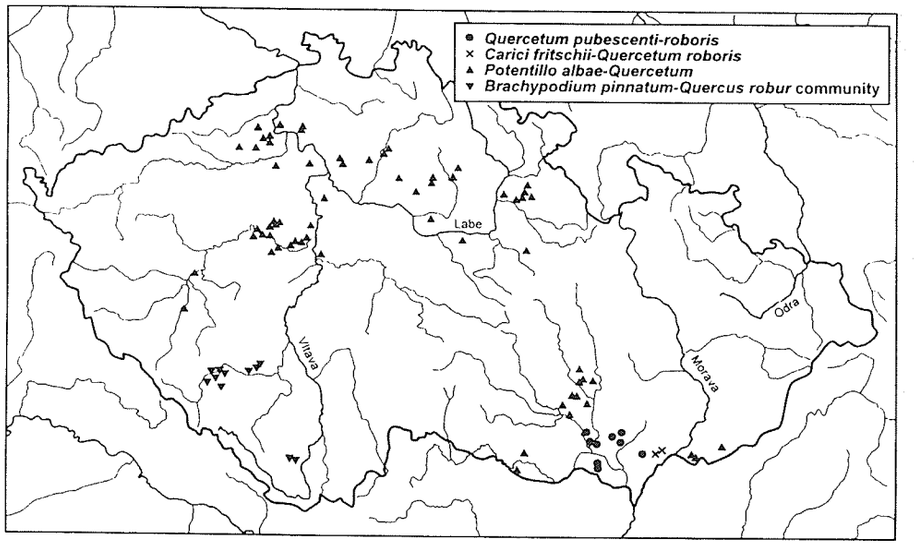

Fig. 4. Distribution of the *Quercetum pubescenti-roboris*, *Carici fritschii-Quercetum roboris*, *Potentillo albae-Quercetum* and *Brachypodium pinnatum-Quercus robur* community in the Czech Republic.

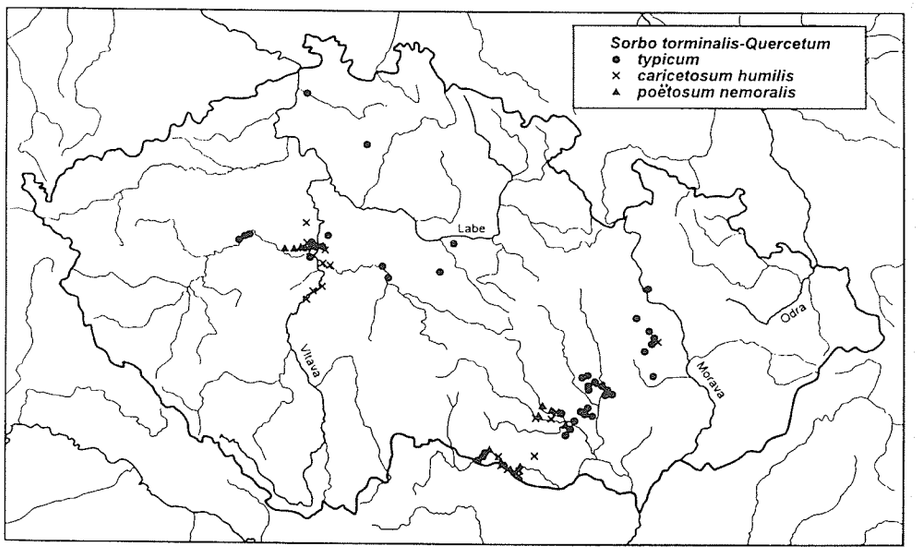

Fig. 5. Distribution of the *Sorbo torminalis-Quercetum* in the Czech Republic.

basalt, serpentine, shale), with shallow soils of a ranker or cambisol type. Some localities are also situated on flatlands or gentle south-facing slopes with heavy, poorly drained soils over loess loams or various sediments, characterized by seasonal surface-water gleying, and drying out in summer. In cooler and wetter areas, they are also found rarely on rendzinas over marbles. In the Czech Republic the range of this alliance is larger than that of the *Quercion pubescenti-petraeae* or *Aceri tatarici-Quercion*, as it also extends to comparatively cooler and wetter areas. In Moravia, the localities are mostly concentrated on the Bohemian Massif fringes. In Bohemia, these forests are encountered throughout the range of the thermophilous oak forests. Outside the Czech Republic, the distribution centre is in the moderately warm areas of Germany and Poland, extending to Belarus and Ukraine in the east (MRÁZ 1958b, JAKUCS 1960). In the south the *Quercion petraeae* communities are encountered in northern Austria (WALLNÖFER et al. 1993) and on the southern fringes of the Western Carpathians (ZÓLYOMI & JAKUCS 1957, SOÓ 1963).

Potentillo albae-Quercetum

Constant dominants and co-dominants: E_3: *Quercus petraea*, E_1: *Poa nemoralis*, *Carex montana*, *Brachypodium pinnatum*, *Convallaria majalis*.

Diagnostic species groups: species of thermophilous oak forests and forest edges (*Anthericum ramosum*, *Polygonatum odoratum*, *Tanacetum corymbosum*, *Trifolium alpestre*, etc.), species of intermittently wet soils (*Betonica officinalis*, *Dianthus superbus*, *Frangula alnus*, *Galium boreale*, *Potentilla alba*, *Serratula tinctoria*, etc.), species of mesophilous oak-hornbeam forests (*Anemone nemorosa*, *Campanula persicifolia*, *Carpinus betulus*, *Galium sylvaticum*, *Lathyrus vernus*, *Melica nutans*, etc.), species of acidophilous oak forests (*Hieracium lachenalii*, *H. sabaudum*, *H. sylvaticum*, *Luzula luzuloides*, *Melampyrum pratense*, *Vaccinium myrtillus*, etc.), juvenile individuals in the field and shrub layers of the dominant tree species (*Quercus petraea* juv.), mosses (*Hypnum cupressiforme*, *Plagiomnium affine*, *Polytrichum formosum*, etc.).

The *Potentillo albae-Quercetum* includes forests with a tall canopy which is more closed than in the other thermophilous oak forest communities. The shrub layer is usually developed, although its cover is low. It occurs on flatland, gentle sunny slopes or in shallow depressions. Being usually developed on marls, clays or loess loams, the soils have a clay-loam texture which impairs the drainage. As a result, seasonal surface-water gleying occurs, but in summer the soils become dry. Another feature of these soils is their superficially lowered base-status with base-rich conditions usually maintained below. In most cases, the *Potentillo albae-Quercetum* is an anthropo-zoogenic community which has developed due to long term exploitation, particularly grazing and litter removal in forests (MRÁZ 1958a,b, JAKUBOWSKA-GABARA 1993). In the last decades, after cessation of traditional management practices and increasing fertilization from air pollution, shifts towards *Carpinion* forests have been observed in Polish stands of this community (KWIATKOWSKA & WYSZOMIRSKI 1988, JAKUBOWSKA-GABARA 1993). Of the thermophilous oak forest communities in the Czech Republic, the range of the *Potentillo albae-Quercetum* is the largest. In Moravia, it occurs along the SE fringes of the Bohemian Massif from Kuřim to the SW, and in the SW part of the Bílé Karpaty Mts. (CHYTRÝ & HORÁK 1997). In Bohemia it is widespread in the České středohoří Mts., in the lowlands along the Labe, Ohře, Jizera and Cidlina Rivers, in the middle and lower reaches of the Berounka River and in the surroundings of Prague. Two isolated

localities have been reported from the Berounka and Úhlava River Valleys near Plzeň (Fig. 4). The distribution centre of the *Potentillo albae-Quercetum* is in Germany and Poland (MATUSZKIEWICZ & MATUSZKIEWICZ 1956, MRÁZ 1958b, MATUSZKIEWICZ 1981, POTT 1992, SCHUBERT et al. 1995), with southern distribution limits in northern Austria (CHYTRÝ & VICHEREK 1995, CHYTRÝ & HORÁK 1997) and on the southern fringes of the Western Carpathians (MICHALKO et al. 1987, CHYTRÝ 1994).

Brachypodium pinnatum-Quercus robur community

Constant dominants and co-dominants: E_3: *Pinus sylvestris* (mostly planted), *Brachypodium pinnatum*.

Diagnostic species groups: species of thermophilous oak forests and forest edges (*Euphorbia cyparissias*, *Tanacetum corymbosum*, *Trifolium alpestre*, etc.), species of submontane dry grasslands (*Brachypodium pinnatum*, *Carlina acaulis*, *Coronilla varia*, *Knautia arvensis*, *Koeleria pyramidata*, *Potentilla neumanniana*, *Sanguisorba minor*, *Scabiosa columbaria*, *Thymus pulegioides*, etc.), species of mesophilous forests (*Campanula persicifolia*, *C. rapunculoides*, *Corylus avellana*, *Hepatica nobilis*, *Quercus robur*, *Ranunculus nemorosus*, etc.), species of peri-alpine pine forests (*Carex ornithopoda*, *Epipactis atrorubens*, *Polygala chamaebuxus*, *Viola collina*, etc.), species of acidophilous oak forests (*Campanula rotundifolia*, *Festuca ovina*, *Hieracium sylvaticum*, *Luzula luzuloides*, *Veronica officinalis*, etc.), mosses (*Hypnum cupressiforme*, *Plagiomnium affine*, *Pleurozium schreberi*, etc.).

In the present vegetation, this community is almost exclusively formed by open *Pinus sylvestris* plantations with a poorly developed shrub layer. As the field layer used to be mown and grazed up to the mid 20th century (MORAVEC 1952), it is similar to a *Bromion* dry grassland in most stands. Natural stands would be probably formed of *Quercus robur* (the other oak species do not occur in this community's range) with an admixture of *Pinus sylvestris* in some habitats and *Corylus avellana* being the commonest shrub layer species. It is confined to south-facing slopes of marble hillocks scattered in the landscape of the Šumava foothills which are otherwise chiefly dominated by gneiss. The soil is rendzina of pH(H_2O) 6.4-7.0 (MORAVEC 1972). Despite the relatively high altitudes of about 450-650 m, the area is rather dry, due to its location in the lee of the Brdy and Šumava Mts. The community was recorded in the surroundings of the SW Bohemian towns of Strakonice, Horažďovice, Sušice and Český Krumlov (Fig. 4). These localities are geographically isolated from the other areas with thermophilous oak forests and thermophilous flora so that a number of thermophilous species are absent. On the other hand, they are markedly influenced by the peri-alpine pine forest flora and some places with marble outcrops might have even supported small patches of fragmentary *Erico-Pinion* forests in the past. Besides low precipitation, the main factor that presumably played a role in preserving the thermophilous oak forests in these submontane areas during the postglacial vegetation history was the location beyond, or on, the geographical limits of *Carpinus betulus*, which failed to spread to the south of Bohemia (MORAVEC 1964).

Sorbo torminalis-Quercetum

Constant dominants and co-dominants: E_3: *Quercus petraea*, E_1: *Festuca ovina*, *Poa nemoralis*, *Vincetoxicum hirundinaria*, *Quercus petraea* juv.

Diagnostic species groups: species of thermophilous oak forests and forest edges (*Anthericum ramosum*, *Euphorbia cyparissias*, *Polygonatum odoratum*, *Sedum maximum*,

Silene nutans, *Tanacetum corymbosum*, *Teucrium chamaedrys*, *Trifolium alpestre*, etc.), species of acidophilous oak forests (*Hieracium lachenalii*, *H. sabaudum*, *H. sylvaticum*, *Luzula luzuloides*, *Lychnis viscaria*, *Veronica officinalis*, etc.), species of mesophilous oak-hornbeam forests (*Dactylis polygama*, *Stellaria holostea*, etc.), mosses (*Ceratodon purpureus*, *Dicranum scoparium*, *Hypnum cupressiforme*, *Polytrichum juniperinum*, etc.).

The stands of this association are characterized by an open to almost closed canopy. The shrub layer is usually scarcely developed. In warm and dry areas, this community may occur on gentle, sunny slopes, whereas in somewhat cooler and wetter areas, it is confined exclusively to steeper south-facing slopes. The soils are well-drained rankers or cambisols derived from poor rocks (usually granitoids, gneiss, granulite and Proterozoic or Palaeozoic sediments, particularly shales). The *Sorbo torminalis-Quercetum* occurs in warm and moderately warm areas (Fig. 5), in particular on the eastern and SE fringes of the Bohemian Massif, i.e. central and SW Moravia (Chytrý & Horák 1997), and in central Bohemia (Neuhäusl & Neuhäuslová-Novotná 1977). Scattered localities have been recorded in northern and eastern Bohemia. From Moravia the association also extends to the Bohemian Massif fringes in northern Austria (Wallnöfer et al. 1993). Outside the Czech Republic and Austria the *Sorbo torminalis-Quercetum* has not been recorded. Three subassociations may be distinguished that reflect the differences in species composition between warm/dry and moderately warm/moderately humid areas, and within the warm/dry areas the differences between oligotrophic and slightly base-rich soils:

S. t.-Q. typicum is characterized by the absence of a number of thermophilous species. Over much of the association's range, it occurs on steep south-facing slopes in cooler and wetter areas, but it is also rarely encountered on plateaus or gentle slopes in warm and dry areas. In Moravia this association prevails from the Jihlava River to the NE. In Bohemia it includes all the localities of the association except the Vltava Valley and SW surroundings of Prague. Differential species: *Allium montanum*, *Carex digitata*, *Convallaria majalis*, *Galium pusillum* agg., *Genista germanica*.

S. t.-Q. caricetosum humilis includes the stands of extremely dry habitats over the warmer parts of the association's range. It is confined to steep south-facing slopes with acidic, shallow rankers. It occurs in SW Moravia, in the Vltava Valley, lower part of the Sázava Valley, and the surroundings of Prague. An isolated locality has been recorded in central Moravia (Velký Kosíř Hill). Differential species: *Avenella flexuosa*, *Calluna vulgaris*, *Carex humilis*, *Jasione montana*, *Rumex acetosella*, *Sedum reflexum*, *Thymus praecox*; in Moravia only: *Genista pilosa*.

S. t.-Q. poëtosum nemoralis is confined to the warmer parts of the association's range and to soils richer in calcium compared to the other subassociations. It is typical of habitats with intruded or interbedded basic rocks (e.g. marbles, limestones, amphibolites) occurring within predominantly acidic masses. In some sites with acidic rocks only, the occurrence of basiphilous plants may be due to the supply of propagules from contact communities on calcareous bedrock (vicinism). It occurs in the river valleys of SW Moravia and in the SW surroundings of Prague. Differential species: E_2: *Acer campestre*, *Cornus mas*, *Ligustrum vulgare*, E_1: *Brachypodium sylvaticum*, *Campanula rapunculoides*, *C. trachelium*, *Lapsana communis*, *Torilis japonica*.

Genisto pilosae-Quercetum petraeae

Constant dominants and co-dominants: E_3: *Quercus petraea*, E_1: *Festuca ovina*, *Carex humilis*, *Genista pilosa*, E_0: *Hypnum cupressiforme*, *Polytrichum piliferum*.

Diagnostic species groups: species of thermophilous oak forests and forest edges (*Euphorbia cyparissias*, *Polygonatum odoratum*, *Trifolium alpestre*, *Vincetoxicum hirundinaria*, etc.), xerophilous species of open habitats on shallow, oligotrophic soils (*Agrostis stricta*, *Hieracium pilosella*, *Jasione montana*, *Lychnis viscaria*, *Rumex acetosella*, *Scleranthus perennis*, etc.), species of acidophilous oak forests (*Avenella flexuosa*, *Hieracium lachenalii*, *H. sabaudum*, *H. sylvaticum*, *Luzula luzuloides*, *Veronica officinalis*, etc.), species of dry grasslands (*Festuca pallens*, *Hypericum perforatum*, *Sedum reflexum*, etc.), species with easterly distribution which do not occur in Bohemia (*Campanula moravica*, *Linaria genistifolia*, *Verbascum austriacum*), heliophilous woody plants (*Betula pendula*, *Juniperus communis*, *Pinus sylvestris*), juvenile individuals in the field and shrub layers of the dominant tree species (*Quercus petraea* juv.), vascular epiphytes (*Loranthus europaeus*), xerophilous mosses (*Ceratodon purpureus*, *Polytrichum juniperinum*, etc.), terrestrial fruticose and foliose lichens (*Cladonia coniocraea*, *C. foliacea*, *C. rangiferina*, *C. rangiformis*, etc.), epilithic foliose and crustaceous lichens (*Hypogymnia physodes*, *Parmelia conspersa*, *P. pulla*, *P. saxatilis*, *P. stenophylla*, etc.).

The tree layer is formed from an open canopy of stunted oaks. The shrub layer is absent or scarcely developed. In contrast to the other associations, the *Genisto pilosae-Quercetum petraeae* possesses a luxuriant ground layer. It is confined to steep (15-40°), rocky and sunny slopes. The soils are shallow, well-drained rankers over acidic siliceous rocks (granitoids, gneiss, granulite) that inhibit the development of an extensive woody cover by drought stress. In the Czech Republic this association occurs in SW Moravia only, from the lower course of the Oslava River to the SW (Fig. 1). The bulk of the localities are situated on the upper parts of south-facing slopes of the river valleys (Chytrý 1991, Chytrý & Horák 1997). The Moravian range of the association extends to the adjacent Austrian territory (Wallnöfer et al. 1993, Chytrý & Vicherek 1995) and the Hungarian Central Range (Magyar 1933, Fekete 1956, Horánszky 1964, Kovács 1975).

Asplenio cuneifolii-Quercetum petraeae

Constant dominants and co-dominants: E_3: *Quercus petraea*, *Pinus sylvestris*, E_2: *Prunus mahaleb*, *Berberis vulgaris*, E_1: *Carex humilis*, E_0: *Hypnum cupressiforme*.

Diagnostic species groups: species of thermophilous oak forests and forest edges (*Bupleurum falcatum*, *Vincetoxicum hirundinaria*, etc.), species of dry grasslands (*Alyssum montanum*, *Avenochloa pratensis*, *Carex humilis*, *Centaurea scabiosa*, *C. stoebe*, *Dorycnium germanicum*, *Euphorbia cyparissias*, *Festuca pallens*, *Koeleria macrantha*, *Potentilla arenaria*, *Scorzonera austriaca*, etc.), serpentinophilous ferns (*Asplenium cuneifolium*), epiphytes (*Viscum laxum*), mosses (*Dicranum polysetum*, *Rhytidium rugosum*, etc.).

This association includes open oak forests with a natural admixture of *Pinus sylvestris* and well-developed shrub and ground layers. Most of the stands have been converted into pine plantations. They are encountered on southern slopes with an inclination of 15-40° on serpentines in the middle Jihlava Valley (SW Moravia). The soils are shallow, well-drained, with a high base saturation, being rich in Mg^{2+}. In some places, rock outcrops and small cliffs are found. This association is endemic to the Jihlava Valley between the villages of Mohelno and Biskoupky (Fig. 2) (Chytrý & Horák 1997).

Ordination

Community ordination based on percentage constancy data matrix (Fig. 6) captured the outlying position of the *Carici fritschii-Quercetum roboris*. The *Quercion pubescenti-petraeae* communities are placed close together in the bottom part of the diagram. The *Quercetum pubescenti-roboris*, which is assigned to the *Aceri tatarici-Quercion* in the present classification, is situated close to the *Quercion pubescenti-petraeae* cluster, and is rather remote from the other *Aceri tatarici-Quercion* community, which is the outlying *Carici fritschii-Quercetum roboris*. The *Quercion petraeae* communities from siliceous bedrocks (*Sorbo torminalis-Quercetum*, *Genisto pilosae-Quercetum petraeae* and *Asplenio cuneifolii-Quercetum petraeae*) are well-separated in the right part of the diagram, whereas the *Potentillo albae-Quercetum* and the *Brachypodium pinnatum-Quercus robur* community have transitional positions to the communities of the other alliances. The *Potentillo albae-Quercetum* in particular shows certain similarities with the *Aceri tatarici-Quercion* communities.

DISCUSSION

The syntaxonomical scheme accepted in this paper is largely based on that of Hungarian phytosociologists (ZÓLYOMI 1957, ZÓLYOMI & JAKUCS 1957, JAKUCS 1960, 1961a), with some corrections reflecting the vegetation patterns detected in the Czech Republic and the nomenclature rules. An apparent heterogeneity of the *Quercetalia pubescenti-petraeae* was the reason for recognition of three alliances within this order, viz the *Quercion pubescenti-petraeae*, *Aceri tatarici-Quercion* and *Quercion petraeae*.

In the Czech Republic the *Quercion pubescenti-petraeae* is a rather homogeneous alliance comprising communities on limestones and, less typically, on other basic bedrocks. In Moravia the same associations as in Hungary, Austria and Slovakia (JAKUCS 1961a,b, MÁTHÉ & KOVÁCS 1962, FEKETE & JAKUCS 1968, KOVÁCS 1969, WALLNÖFER et al. 1993, CHYTRÝ 1994) were distinguished, corresponding to the extremely xerophilous and more mesophilous vegetation types (*Pruno mahaleb-Quercetum pubescentis* and *Corno-Quercetum euonymetosum verrucosae*, respectively). Bohemian *Quercion pubescenti-petraeae* communities differ to some extent from Moravian ones, particularly due to the absence of some species with a Pannonian distribution. As in Moravia, a divergence along the xericity gradient was detected in Bohemian communities. It is reflected in a recognition of the xerophilous *Lathyro versicoloris-Quercetum pubescentis* and the more mesophilous *Corno-Quercetum euonymetosum europaeae*. This pattern has already been recognized by earlier authors (MIKYŠKA et al. 1968, MORAVEC et al. 1995), although the *Corno-Quercetum* was usually identified with the *Lithospermo-Quercetum*. This is obviously not correct because the *Lithospermo-Quercetum* is a quite different association described from Switzerland (BRAUN-BLANQUET 1932).

The *Aceri tatarici-Quercion* was established by ZÓLYOMI (1957) to include continental communities of lowland areas in the Pannonian Basin, southern Romania and the areas north of the Black Sea. He originally assigned the thermophilous oak forests on chernozems over loess and sand-plain oak forests to this alliance. In further papers, Hungarian authors (JAKUCS & FEKETE 1957, ZÓLYOMI & JAKUCS 1957, JAKUCS 1960, JAKUCS 1961a) also placed *Quercus pubescens* dominated forests on limestone and dolomite slopes into this alliance. These forests,

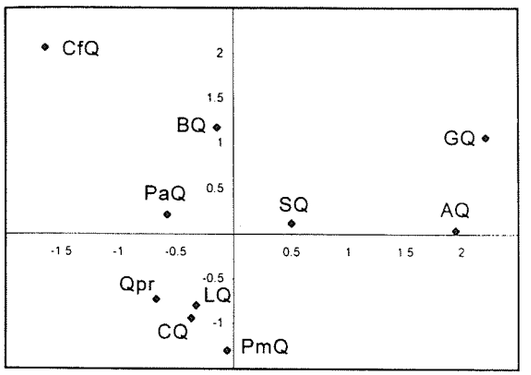

Fig. 6. Correspondence analysis ordination diagram of the $\log_2$-transformed percentage constancy data of the associations of the Czech thermophilous oak forests. PmQ: *Pruno mahaleb-Quercetum pubescentis*, LQ: *Lathyro versicoloris-Quercetum pubescentis*, CQ: *Corno-Quercetum*, Qpr: *Quercetum pubescenti-roboris*, CfQ: *Carici fritschii-Quercetum roboris*, PaQ: *Potentillo albae-Quercetum*, BQ: *Brachypodium pinnatum-Quercus robur* community, SQ: *Sorbo torminalis-Quercetum*, GQ: *Genisto pilosae-Quercetum petraeae*, AQ: *Asplenio cuneifolii-Quercetum petraeae*. Axis 1 – horizontal, axis 2 – vertical.

however, rather correspond to the *Quercion pubescenti-petraeae*, being different from the forests on lowland loess and sand deposits. For this reason, the original narrow concept of the alliance (ZÓLYOMI 1957) was accepted in later studies (MUCINA & MAGLOCKÝ 1985, MICHALKO et al. 1987, WALLNÖFER et al. 1993, CHYTRÝ & HORÁK 1997), as well as in the present paper. In southern Moravia, at the NW limits of its distribution, this is a heterogeneous alliance. It comprises two rather different communities: *Quercetum pubescenti-roboris* on loess and *Carici fritschii-Quercetum roboris* on sand. The reasons for their assignment to the same alliance are their close similarities with Hungarian communities on loess and sand, respectively (ZÓLYOMI 1957, SOÓ 1937), which are included in the *Aceri tatarici-Quercion* by ZÓLYOMI (1957). These similarities are closer than the similarity of these two communities to one another or to any other Czech oak forest community, although the *Quercetum pubescenti-roboris* appears to be closely related to the *Quercion pubescenti-petraeae* communities in the ordination results (Fig. 6). The heterogeneity of the *Aceri tatarici-Quercion* communities is a challenging problem and needs revision in the future. Nevertheless, it is not dealt with in this paper because a comparison of large data sets from Hungary, Romania and eastern Europe would be necessary for the analysis.

The alliance of *Quercion petraeae* was proposed by Hungarian phytosociologists (ZÓLYOMI & JAKUCS 1957, JAKUCS 1960) to include Central European communities of the thermophilous oak forests, impoverished in submediterranean and continental species. This approach was similar to that of KLIKA (1955, 1957) who proposed two suballiances (*Eu-Quercenion pubescentis* and *Querco-Carpinenion*) within the *Quercion pubescentis*. The need for a separate alliance of the Central European oak forests was also felt by later authors (e.g. PASSARGE & HOFMANN 1968, HORVÁT 1976, FÖRSTER 1979). However, the concept of the *Quercion petraeae* was not followed. WALLNÖFER et al. (1993), being aware of the distinction between the *Sorbo torminalis-Quercetum petraeae* and the *Genisto pilosae-Quercetum petraeae* on the one hand and the other Austrian *Quercetalia pubescenti-petraeae* communities on the other, have assigned the *Quercion petraeae* communities to the acidophilous oak forests of the *Genisto germanicae-Quercion*. Such an approach is not followed in the present paper because of the high presence in the communities in question of the thermophilous species that rarely occur

in the acidophilous oak forests. In the Czech Republic, the *Quercion petraeae* communities are clearly separated from the other thermophilous oak forest communities. They comprise vegetation of different habitat types such as deeper, loamy soils with impaired drainage (*Potentillo albae-Quercetum*), rendzinas over marbles (*Brachypodium pinnatum-Quercus robur* community), and shallow soils on siliceous rocks (*Sorbo torminalis-Quercetum*, *Genisto pilosae-Quercetum* and *Asplenio cuneifolii-Quercetum petraeae*). Despite the differences in habitats, all the above groups are floristically similar to one another and separated from the communities of the other alliances by the absence of a number of submediterranean and continental species and often by the occurrence of some acidophilous species.

There is a striking similarity between the *Carici fritschii-Quercetum roboris* and *Potentillo albae-Quercetum*, which are confined to habitats wet in spring and conspicuously dry for the larger part of the growing season. Despite the number of differential species between the two, their common feature is the occurrence of species tolerating the intermittently wet soils. To reflect this convergence, which includes still other kinds of thermophilous oak forests in Central Europe, a separate alliance, the *Potentillo albae-Quercion*, was proposed for the communities confined to habitats of that type (MICHALKO in MICHALKO et al. 1987). *Carici fritschii-Quercetum roboris*, however, has clear floristic affinities to the Hungarian *Aceri tatarici-Quercion* communities on sand, whereas the *Potentillo albae-Quercetum* has a lot of species in common with the *Quercion petraeae* communities (acidophytes and *Carpinion*-species). This kind of floristic divergence found in the Czech Republic resulted in assigning these communities into different alliances. An alternative solution would be to place the *Potentillo albae-Quercetum* within the continental group of communities (*Aceri tatarici-Quercion*), or maybe within a group of communities of intermittently wet soils. The final solution to this problem, however, will only be possible after an analysis of the Central European data, together with those of Ukraine.

Acknowledgements: I am indebted to Dr. Jaroslav Moravec, Prof. Dr. Ladislav Mucina and four anonymous reviewers for their comments on the earlier version of the paper, and to Bohumil Mandák and Leoš Lippl for their assistance during the field research in SW Bohemia. The English was kindly corrected by Luke Perkins. This study was financed from the grants nr. 206/93/1181 and 206/96/0592 of the Grant Agency of the Czech Republic for the project "European Vegetation Survey – Czech Republic" (project manager: J. Moravec).

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Encl. Appendix pp. 243-258

APPENDIX

Table 1

Synoptic table of the *Quercetalia pubescenti-petraeae* communities in the Czech Republic. PmQ - *Pruno mahaleb-Quercetum pubescentis*, LQt – *Lathyro versicoloris-Quercetum pubescentis typicum*, LQp – *Lathyro versicoloris-Quercetum pubescentis poëtosum nemoralis*, CQev – *Corno-Quercetum euonymetosum verrucosae*, CQee – Corno-*Quercetum euonymetosum europaeae*, Qpr – *Quercetum pubescenti-roboris*, CfQ – *Carici fritschii-Quercetum roboris*, PaQ – *Potentillo albae-Quercetum*, BQ – *Brachypodium pinnatum-Quercus robur* community, SQt – *Sorbo torminalis-Quercetum typicum*, SQc – *Sorbo torminalis-Quercetum caricetosum humilis*, SQp – *Sorbo torminalis-Quercetum poëtosum nemoralis*, GQ – *Genisto pilosae-Quercetum petraeae*, AQ – *Asplenio cuneifolii-Quercetum petraeae*. Percentage constancy value and cover range are given. Species in 1-4 columns only with constancy less than 15 % are omitted.

Community	PmQ	LQt	LQp	CQev	CQee	Qpr	CfQ	PaQ	BQ	SQt	SQc	SQp	GQ	AQ
Nr. of relevés	20	52	18	73	41	49	11	138	22	71	58	33	39	9
Nr. of relevés with identified cryptogams	9	1	1	39	31	47	5	72	22	53	41	21	39	9
E_3 – tree layer														
Carici fritschii-Quercetum roboris														
Quercus robur	25^{24}	8^{13}	.	3^{12}	10^{+1}	22^{14}	100^{25}	16^{+5}	5^{4}	4^{12}	7^{23}	.	.	11^{3}
Brachypodium pinnatum-Quercus robur* community and *Asplenio cuneifolii-Quercetum petraeae														
Pinus sylvestris	5^{1}	4^{+3}	.	1^{+}	5^{+2}	.	.	15^{+2}	95^{35}	23^{r4}	14^{+2}	.	33^{+2}	89^{14}
Quercion pubescenti-petraeae* and *Quercetum pubescenti-roboris														
Quercus pubescens	75^{15}	94^{+5}	61^{14}	75^{+5}	17^{24}	39^{+4}	.	.	.	.	.	3^{+}	3^{3}	.
Fraxinus excelsior	25^{+2}	17^{+2}	6^{2}	26^{+3}	39^{+3}	31^{r4}	.	3^{+2}	.	.	.	3^{1}	.	.
Sorbus torminalis	15^{+2}	37^{+2}	33^{+1}	18^{+2}	17^{+2}	4^{r1}	.	7^{r2}	.	1^{+}	5^{+3}	9^{r+}	.	.
Cornus mas	.	29^{+4}	11^{+}	.	10^{14}	.	.	.	.	.	.	.	.	.
Other species (incl. *Quercetalia pubescenti-petraeae*)														
Quercus petraea	40^{+2}	37^{+5}	72^{+5}	56^{+5}	88^{15}	84^{+5}	.	93^{15}	.	99^{15}	95^{25}	100^{25}	100^{14}	56^{14}
Carpinus betulus	5^{1}	12^{r2}	11^{+1}	30^{+5}	34^{r3}	14^{+3}	.	43^{r3}	.	42^{r5}	22^{+2}	45^{+2}	8^{12}	.
Tilia cordata	15^{2}	6^{+2}	.	15^{+2}	2^{+}	4^{23}	.	15^{r3}	5^{1}	13^{+3}	3^{1}	12^{+2}	.	.
Acer campestre	5^{1}	6^{+}	6^{2}	26^{+2}	49^{+4}	18^{+2}	.	4^{+}	.	.	.	6^{+1}	.	.
Betula pendula	.	.	.	.	.	.	9^{+}	15^{r3}	14^{+1}	1^{r}	3^{+}	.	21^{+1}	.
Ulmus minor	5^{+}	.	.	3^{+}	7^{r1}	4^{1}	.	1^{+}	.	.	.	.	.	.
Acer platanoides	.	.	6^{2}	.	10^{+2}	.	.	5^{+2}	.	1^{1}	2^{2}	.	.	.
E_3 – epiphytes														
Viscum laxum	.	.	.	.	.	.	.	.	18^{+}	.	.	.	.	33^{+}
Loranthus europaeus	.	.	.	.	.	.	.	.	.	1^{+}	.	.	18^{+}	.
E_2 – shrub layer														
Corno-Quercetum euonymetosum europaeae														
Euonymus europaea	5^{+}	2^{2}	.	7^{+1}	46^{+2}	10^{r+}	.	3^{+1}	.	.	.	3^{+}	.	.
***Brachypodium pinnatum-Quercus robur* community**														
Picea abies	.	.	.	.	.	.	.	.	32^{+2}	.	.	.	.	.
Asplenio cuneifolii-Quercetum petraeae														
Juniperus communis	10^{+1}	2^{+}	.	.	.	.	.	2^{+1}	9^{+1}	3^{r+}	2^{+}	3^{+}	13^{+1}	44^{+2}
Prunus mahaleb	15^{+}	.	.	11^{+1}	.	.	.	.	.	1^{+}	.	3^{+}	.	56^{12}
Berberis vulgaris	15^{+}	21^{r+}	.	12^{r1}	.	.	.	.	23^{+2}	1^{+}	.	.	.	56^{+2}
Quercion pubescenti-petraeae* and *Quercetum pubescenti-roboris														
Quercus pubescens	70^{+2}	48^{+3}	17^{+1}	44^{+2}	5^{+}	22^{+3}	.	.	.	.	.	.	.	.
Cornus mas	60^{+3}	65^{+3}	6^{+}	68^{r4}	61^{+5}	20^{+4}	.	3^{r1}	.	3^{2}	.	42^{+3}	.	.
Viburnum lantana	65^{+2}	.	28^{+1}	16^{r2}	.	16^{+1}	.	1^{+}	.	.	.	.	.	.

Community	PmQ	LQt	LQp	CQev	CQee	Qpr	CfQ	PaQ	BQ	SQt	SQc	SQp	GQ	AQ
Quercetalia pubescenti-petraeae														
Ligustrum vulgare	85^{+2}	69^{r4}	44^{+2}	49^{r2}	63^{+3}	67^{r3}	27^{+2}	21^{r2}	5^{+}	11^{+2}	17^{+2}	52^{+2}	5^{+}	11^{1}
Rosa canina agg.	15^{+}	13^{+1}	17^{+1}	30^{+2}	15^{+1}	16^{r+}	.	6^{r1}	9^{1}	11^{r1}	17^{+1}	18^{+2}	5^{+}	33^{+1}
Crataegus monogyna	45^{+3}	31^{+2}	6^{1}	53^{+3}	44^{+3}	41^{r2}	.	15^{r3}	9^{1}	11^{r2}	12^{+2}	6^{+1}	.	.
Acer campestre	20^{+1}	35^{r2}	6^{+}	52^{+2}	63^{+3}	57^{r2}	.	17^{+1}	.	3^{r1}	2^{1}	36^{+2}	.	.
Sorbus torminalis	25^{+}	33^{r2}	22^{r+}	32^{r2}	7^{+1}	31^{r1}	.	15^{r3}	.	10^{+1}	2^{+}	3^{+}	.	.
Pyrus pyraster	5+	8^{+}	17^{+1}	10^{r+}	9^{r1}	6^{r+}	.	7^{r1}	9^{r}	1^{r}	2^{1}	18^{+1}	.	.
Prunus spinosa	15^{+}	6^{+}	.	10^{+1}	37^{+2}	8^{r1}	.	19^{r2}	9^{+1}	1^{+}	.	6^{+1}	.	.
Sorbus aria agg.	25^{+1}	50^{r2}	22^{+}	1^{+}	2^{+}	.	.	4^{+}	.	1^{+}	3^{+1}	.	10^{+1}	.
Other species														
Rhamnus catharticus	5^{+}	23^{r2}	6^{+}	23^{r1}	34^{+}	2^{r}	9^{+}	9^{+2}	9^{+}	1^{+}	2^{+}	15^{r1}	.	.
Quercus petraea	15^{+}	17^{r2}	22^{+2}	26^{r2}	29^{+1}	65^{+2}	.	40^{+3}	.	49^{r3}	40^{+2}	27^{+2}	33^{+2}	56^{+1}
Carpinus betulus	5^{2}	21^{r2}	11^{+}	15^{+2}	20^{+3}	14^{+2}	.	22^{r3}	.	32^{r2}	10^{+2}	36^{r2}	5^{+}	11^{r}
Rosa sp.	5^{+}	25^{+}	11^{+}	19^{r1}	51^{r2}	12^{r+}	.	20^{+2}	36^{r1}	6^{+1}	5^{+1}	21^{+1}	.	.
Corylus avellana	30^{+2}	13^{+2}	39^{+4}	25^{r4}	10^{+2}	27^{+3}	.	37^{r3}	50^{+3}	15^{+3}	7^{+1}	.	5^{2}	.
Tilia cordata	5^{1}	8^{+1}	.	11^{r+}	.	8^{r+}	36^{+1}	12^{+2}	5^{+}	14^{r3}	3^{12}	9^{+2}	5^{12}	.
Cornus sanguinea	35^{+2}	42^{r3}	11^{+3}	11^{+2}	32^{+3}	37^{+4}	.	25^{r2}	18^{+3}	6^{+2}	.	.	.	.
Fraxinus excelsior	35^{+1}	15^{r+}	17^{+1}	29^{+2}	37^{r2}	43^{r2}	.	6^{+1}	.	1^{r}	.	6^{+}	.	.
Crataegus sp.	.	21^{+2}	17^{+2}	1^{+}	34^{+3}	.	18^{1}	20^{+3}	14^{+2}	3^{r1}	5^{+}	21^{+1}	.	.
Crataegus laevigata	.	.	11^{r+}	11^{+2}	10^{12}	6^{r1}	27^{r1}	20^{r3}	5^{2}	1^{1}	2^{+}	.	.	.
Cotoneaster integerrimus	5^{r}	50^{r2}	17^{+1}	7^{+}	10^{r+}	.	.	.	.	.	7^{+2}	.	3^{+}	11^{+}
Lonicera xylosteum	.	10^{+1}	11^{+}	11^{r1}	2^{+}	6^{r+}	.	8^{+}	14^{+1}	1^{+}	2^{+}	.	.	.
Prunus avium	.	.	.	5^{+1}	7^{+1}	4^{+}	.	5^{+1}	14^{+1}	1^{1}	2^{+}	3^{+}	.	.
Robinia pseudacacia	5^{+}	.	.	3^{+}	2^{r}	12^{r+}	.	1^{r}	5^{1}	1^{+}	.	3^{r}	.	.
Euonymus verrucosa	45^{r1}	.	.	49^{+3}	.	29^{r2}	.	1^{+1}	.	7^{+2}	2^{1}	6^{+1}	.	.
Betula pendula	.	.	.	.	5^{r+}	2^{r}	27^{+1}	1^{1}	5^{+}	.	3^{+1}	.	10^{+2}	.
Frangula alnus	.	.	.	.	.	.	45^{+1}	28^{r2}	9^{+}	1^{+}	2^{+}	.	5^{+}	44^{+3}
Ulmus minor	.	2^{r}	.	7^{+1}	7^{+1}	6^{+1}	.	3^{+1}	.	.	.	.	3^{1}	.
Pinus sylvestris	.	2^{+}	.	.	.	.	.	1^{2}	5^{1}	3^{+}	.	.	21^{+2}	22^{+}
Quercus robur	.	.	.	.	5^{r+}	12^{+1}	36^{+}	11^{+3}	32^{r3}	.	5^{1}	.	.	.
Sorbus aucuparia	.	.	.	.	.	.	.	7^{+2}	18^{+1}	3^{+}	2^{2}	.	10^{+1}	.
E_1 – field layer														
Pruno mahaleb-Quercetum pubescentis														
Inula ensifolia	80^{r3}	.	.	4^{+1}	.	.	.	.	.	.	.	.	.	.
Stachys recta	80^{r1}	25^{+1}	17^{r+}	18^{+1}	10^{+}	2^{r}	.	1^{+}	9^{+}	.	2^{+}	3^{+}	.	.
Adonis vernalis	40^{r3}	.	6^{r}	4^{+2}	.	2^{+}	.	.	.	.	.	.	.	.
Agropyron repens	35^{+3}	.	.	1^{+}	.	4^{+2}	.	.	.	.	.	.	.	11^{+}
Iris pumila	25^{+1}	.	.	.	.	.	.	.	.	.	.	.	.	.
Inula ensifolia × *salicina*	25^{r2}	.	.	.	.	.	.	.	.	.	.	.	.	.
Seseli libanotis	20^{+2}	.	.	1^{1}	.	.	.	.	.	.	.	.	.	.
Astragalus onobrychis	20^{+}	.	.	.	.	.	.	.	.	.	.	.	.	.
Chamaecytisus austriacus	20^{r2}	.	.	.	.	2^{2}	.	.	.	.	.	.	.	.
Potentilla patula	15^{+2}	.	.	.	.	.	.	.	.	.	.	.	.	.
Scorzonera hispanica	15^{+2}	.	.	.	.	2^{r}	.	.	.	.	.	.	.	.
Buphthalmum salicifolium	15^{+}	.	.	1^{r}	.	.	.	.	.	.	.	.	.	.
Bromus inermis	15^{+}	.	.	1^{1}	.	2^{1}	.	.	.	.	.	.	.	.
Polygala major	15^{r1}	.	.	1^{+}	.	.	.	.	.	.	.	.	.	.
Lathyro versicoloris-Quercetum pubescentis														
Lathyrus pannonicus subsp. *collinus*	15^{+}	54^{+3}	28^{+1}	.	2^{+}	2^{+}	.	1+	.	.	.	.	.	.
Silene nemorosa	.	27^{+2}	33^{+2}	.	2^{+}	.	.	1^{+}	.	.	.	.	.	.
Lathyro versicoloris-Quercetum pubescentis typicum														
Sesleria varia	5^{+}	33^{+4}	.	1^{2}	.	.	.	.	.	.	.	2^{+}	.	.	11^{2}
Thlaspi montanum	.	29^{+2}	.	.	.	.	.	1^{+}	.	.	.	.	.	.	11^{+}

Community	PmQ	LQt	LQp	CQev	CQee	Qpr	CfQ	PaQ	BQ	SQt	SQc	SQp	GQ	AQ
Corno-Quercetum														
Viola odorata	10^{+1}	.	.	40^{r3}	17^{+1}	2^{+}	.	2^{+}	.	.	.	.	.	.
Alliaria petiolata	5^{r}	6^{+}	6^{+}	38^{r2}	80^{r2}	10^{r2}	.	1^{r1}	.	18^{r2}	9^{+1}	27^{+1}	3^{+}	11^{+}
Impatiens parviflora	.	4^{r}	.	10^{+2}	63^{+4}	.	.	2^{r2}	.	14^{r2}	3^{+}	6^{+}	.	.
Fallopia dumetorum	.	.	.	18^{r1}	59^{+2}	10^{r1}	.	1^{1}	.	14^{r1}	9^{r1}	9^{+1}	.	.
Corydalis cava	.	.	.	8^{+2}	27^{r2}	2^{1}	.	.	.	.	.	.	.	.
Corno-Quercetum euonymetosum verrucosae														
Corydalis pumila	.	.	.	23^{r2}	.	4^{+2}	.	.	.	.	.	6^{1}	.	.
Corno-Quercetum euonymetosum europaeae														
Galium aparine	5^{+}	4^{r+}	11^{+}	15^{+1}	68^{+2}	10^{r1}	.	5^{r1}	32^{r+}	8^{r1}	10^{+}	15^{r+}	5^{r}	.
Chaerophyllum temulum	.	.	.	5^{+}	29^{+2}	.	.	1^{+}	.	7^{r+}	.	6^{r+}	.	.
Quercetum pubescenti-roboris														
Melica picta	.	6^{+}	11^{+1}	4^{+2}	10^{+2}	24^{r2}	.	7^{r2}	.	1^{+}	.	.	.	.
Galium odoratum	.	4^{+1}	6^{+}	3^{+}	.	22^{+3}	.	10^{+2}	.	7^{+}	.	.	.	.
Carici fritschii-Quercetum roboris														
Carex fritschii	.	.	.	.	.	.	91^{+3}	.	.	1^{4}	.	.	.	.
Ajuga reptans	.	.	.	1^{r}	.	2^{+}	73^{+1}	20^{r1}	.	7^{r1}	3^{+1}	.	.	.
Molinia caerulea agg.	.	.	.	1^{1}	.	2^{2}	73^{23}	14^{r4}	.	.	.	.	.	.
Galium boreale	.	.	17^{+}	1^{+}	.	.	73^{+1}	25^{r1}	.	.	.	.	.	.
Vicia sepium	.	4^{r}	6^{+}	.	2^{+}	2^{r}	73^{+1}	15^{r1}	5^{+}	1^{r}	.	.	.	.
Iris variegata	25^{+2}	.	.	8^{r2}	.	27^{+2}	73^{r1}	.	.	.	.	3^{+}	.	.
Anthoxanthum odoratum	.	.	11^{+}	.	.	2^{+}	64^{+1}	17^{r1}	.	4^{+1}	7^{+1}	.	18^{+2}	.
Laserpitium pruthenicum	.	.	.	.	.	.	64^{+1}	1^{+}	.	.	.	.	.	.
Succisa pratensis	.	.	.	.	.	.	64^{+}	4^{+}	.	.	.	.	.	.
Viola reichenbachiana	.	.	11^{+}	4^{+}	5^{+}	.	64^{+}	25^{r1}	14^{+2}	4^{+}	.	.	.	.
Valeriana wallrothii	.	2^{+}	.	12^{+}	.	10^{+1}	63^{r1}	.	.	.	.	.	.	.
Festuca amethystina	.	19^{+2}	.	.	.	.	55^{12}	1^{+}	.	.	.	.	.	.
Lysimachia vulgaris	.	.	.	.	.	.	55^{+1}	3^{r1}	.	.	.	.	.	.
Scrophularia nodosa	.	.	.	.	.	12^{r+}	55^{+}	20^{r1}	5^{+}	7^{r+}	3^{+}	.	.	.
Pulmonaria angustifolia	.	.	.	.	2^{+}	.	45^{+2}	8^{r2}	.	.	.	.	.	.
Peucedanum oreoselinum	.	6^{+}	.	.	2^{+}	.	45^{+1}	2^{r+}	.	.	.	.	.	.
Selinum carvifolia	.	.	.	.	.	.	45^{+}	7^{r2}	.	.	.	.	.	.
Filipendula vulgaris	10^{+1}	.	6^{2}	1^{r}	.	6^{r+}	45^{r+}	4^{r+}	.	.	2^{+}	.	.	.
Potentilla erecta	.	.	.	.	.	.	36^{+1}	14^{r1}	.	.	.	.	.	.
Vicia cassubica	.	.	.	.	7^{+1}	.	36^{+1}	1^{+}	.	1^{r}	2^{1}	12^{12}	.	.
Rumex acetosa	.	.	.	.	.	.	36^{+}	.	.	.	2^{+}	.	.	.
Sanguisorba officinalis	.	.	.	.	.	.	36^{r+}	1^{+}	.	.	.	.	.	.
Polygonum bistorta	.	.	.	.	.	.	27^{+1}	.	.	.	.	.	.	.
Carex pallescens	.	.	.	.	.	2^{1}	27^{+}	7^{r1}	.	.	.	.	.	.
Euphorbia villosa	.	.	.	.	2^{+}	.	27^{+}	1^{1}	.	.	.	.	.	.
Ornithogalum kochii	.	.	.	1^{+}	.	4^{+1}	27^{+}	.	.	.	.	.	.	.
Iris sibirica	.	.	.	.	.	.	18^{+1}	.	.	.	.	.	.	.
Avenochloa pubescens	5^{+}	.	17^{+2}	4^{r1}	.	.	18^{+}	1^{1}	.	.	.	.	.	.
Briza media	.	.	6^{+}	.	.	2^{1}	18^{+}	1^{+}	9^{+}	.	.	.	.	.
Carex brizoides	.	.	.	.	.	.	18^{+}	.	.	.	.	.	.	.
Cerastium arvense	.	.	11^{1}	.	.	.	18^{+}	.	9^{r+}	.	.	.	.	.
Galium palustre	.	.	.	.	.	.	18^{+}	.	.	.	.	.	.	.
Hypericum hirsutum	.	.	.	1^{r}	5^{r+}	4^{+}	18^{+}	4^{r+}	.	4^{r1}	.	.	.	.
Lathyrus pratensis	.	.	.	.	.	2^{+}	18^{+}	1^{+}	.	1^{r}	.	.	.	.
Linaria vulgaris	10^{r+}	.	6^{+}	.	.	.	18^{+}	.	9^{+}	1^{+}	2^{r}	3^{+}	3^{+}	.
Platanthera chlorantha	5^{r}	.	.	.	.	.	18^{+}	1^{r}	.	.	.	.	.	.
Ranunculus acris	.	.	.	.	.	.	18^{+}	.	.	.	.	.	.	.
Stachys sylvatica	.	.	6^{+}	7^{+1}	2^{+}	.	18^{+}	1^{r}	.	.	.	.	.	.
Stellaria graminea	.	.	.	.	.	2^{+}	18^{+}	.	.	.	.	.	.	.

Community	PmQ	LQt	LQp	CQev	CQee	Qpr	CfQ	PaQ	BQ	SQt	SQc	SQp	GQ	AQ
Potentillo albae-Quercetum														
Anemone nemorosa	.	2^{+}	.	1^{+}	5^{+1}	.	.	45^{+3}	5^{+}	.	.	.	.	.
Vaccinium myrtillus	.	.	.	.	.	.	.	20^{+4}	9^{+1}	.	.	.	3^{+}	.
***Brachypodium pinnatum-Quercus robur* community**														
Viola collina	10^{r+}	.	.	5^{+}	2^{1}	4^{+}	.	.	77^{r2}	3^{+1}	.	.	.	33^{r+}
Sorbus aucuparia juv.	.	.	6^{+}	.	.	.	.	9^{r1}	64^{r1}	4^{r+}	3^{+}	6^{+}	5^{+}	11^{r}
Knautia arvensis agg.	.	.	.	.	.	.	9^{+}	1^{+1}	64^{r1}	1^{r}	.	.	.	.
Koeleria pyramidata	.	.	17^{+1}	.	.	.	.	1^{12}	59^{+2}	1^{+}	2^{r}	.	.	.
Polygala chamaebuxus	.	.	.	.	.	.	.	.	45^{+2}	.	.	.	.	.
Epipactis atrorubens	.	.	.	.	.	.	.	.	45^{r1}	.	.	.	.	.
Potentilla neumanniana	.	4^{+}	.	.	.	.	.	1^{+}	45^{r1}	3^{r+}	2^{+}	.	.	.
Ranunculus nemorosus	.	.	.	.	.	.	.	.	41^{+1}	.	.	.	.	.
Rhamnus catharticus juv.	5^{+}	17^{+}	.	18^{r1}	37^{r+}	2^{+}	.	4^{r+}	41^{r1}	3^{+}	5^{+}	6^{r+}	.	.
Trifolium medium	.	2^{+}	.	.	.	.	.	12^{+1}	41^{r1}	1^{+}	2^{+}	.	.	.
Medicago lupulina	.	4^{+}	.	.	2^{+}	.	.	.	41^{r+}	.	.	.	.	.
Sanicula europaea	.	.	.	.	.	.	.	7^{r1}	36^{+3}	1^{r}	.	.	.	.
Sanguisorba minor	5^{+}	4^{+}	6^{+}	7^{r1}	.	.	.	1^{+}	36^{+1}	3^{r+}	5^{+}	.	.	.
Thymus pulegioides	5^{r}	15^{+}	.	4^{+}	.	4^{r+}	.	4^{+3}	36^{+}	6^{r+}	14^{r1}	21^{+1}	8^{+}	11^{2}
Carlina acaulis	.	.	.	.	.	.	.	.	32^{+1}	1^{+}	2^{+}	.	.	.
Goodyera repens	.	.	.	.	.	.	.	.	27^{12}	.	.	.	.	.
Corylus avellana juv.	.	6^{+}	6^{+}	4^{+}	2^{+}	4^{+}	9^{+}	9^{r1}	27^{+1}	1^{+}	2^{+}	.	3^{+}	.
Orthilia secunda	.	.	.	.	.	.	.	.	23^{12}	.	.	.	.	.
Rubus idaeus juv.	.	.	.	.	.	.	.	2^{+1}	23^{r1}	1^{+}	2^{r}	.	.	.
Prunus avium juv.	.	2^{+}	.	.	2^{+}	.	.	7^{r+}	23^{r+}	1^{1}	7^{+}	6^{+}	.	.
Carex flacca	.	.	.	.	.	.	.	.	18^{+1}	.	.	.	.	.
Scabiosa columbaria	.	.	.	.	.	.	.	.	18^{+}	.	.	.	.	.
Carex ornithopoda	.	.	.	.	.	.	.	.	18^{+}	.	.	.	.	.
Carex pallens	.	.	.	.	.	.	.	.	18^{r+}	.	.	.	.	.
Galium rotundifolium	.	.	.	.	.	.	.	.	18^{r1}	.	.	.	.	.
Genisto pilosae-Quercetum petraeae														
Jasione montana	.	.	.	.	.	.	.	.	.	8^{r+}	34^{r+}	3^{+}	74^{r2}	.
Rumex acetosella	.	.	.	.	.	.	.	.	5^{+}	6^{+}	31^{r2}	.	74^{r2}	11^{1}
Linaria genistifolia	.	.	.	1^{+}	.	.	.	.	.	3^{r+}	19^{r+}	12^{+}	59^{+1}	11^{1}
Scleranthus perennis	.	.	.	.	.	.	.	.	.	.	5^{r+}	.	31^{r1}	.
Asplenio cuneifolii-Quercetum petraeae														
Potentilla arenaria	15^{+}	6^{+}	11^{r1}	3^{+2}	.	.	.	.	.	.	7^{+}	3^{+}	5^{+1}	89^{+2}
Dorycnium pentaphyllum agg.	35^{+2}	.	.	1^{+}	.	.	.	.	.	.	.	.	.	78^{r3}
Koeleria macrantha	5^{+}	4^{r+}	22^{+1}	3^{+}	.	2^{+}	.	1^{+}	.	.	5^{r2}	.	23^{+2}	56^{r1}
Alyssum montanum	.	.	.	1^{r}	.	.	.	.	.	4^{+1}	.	.	3^{1}	44^{r1}
Centaurea stoebe	15^{r+}	4^{+}	11^{r+}	.	.	.	.	.	.	1^{+}	5^{+}	6^{+1}	5^{+}	44^{+}
Scorzonera austriaca	.	.	.	.	.	.	.	.	.	.	.	.	.	44^{r+}
Avenochloa pratensis	.	2^{+}	6^{1}	1^{+}	.	.	.	.	.	.	.	.	.	33^{+2}
Centaurea scabiosa	10^{+}	6^{+}	.	1^{+}	.	.	.	1^{+}	9^{+}	.	.	.	.	33^{+1}
Prunus mahaleb juv.	.	.	.	.	.	.	.	.	.	.	.	.	.	33^{+1}
Asplenium cuneifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	33^{r1}
Stipa joannis	10^{r1}	.	6^{1}	1^{+}	.	.	.	.	.	.	.	.	.	22^{12}
Euphorbia seguierana	.	.	.	.	.	.	.	.	.	.	.	.	.	22^{1}
Berberis vulgaris juv.	.	4^{+}	.	4^{r+}	2^{+}	2^{+}	.	2^{+}	9^{+}	.	.	.	3^{+}	22^{+1}
Biscutella laevigata	.	.	.	.	.	.	.	.	.	.	.	.	.	22^{+1}
Bothriochloa ischaemum	5^{2}	.	.	.	.	.	.	.	.	.	.	.	.	22^{+1}
Melica transsilvanica	.	.	.	.	5^{+}	.	.	.	.	.	.	.	.	22^{+1}
Lepidium campestre	.	2^{r}	.	.	.	2^{1}	.	1^{+}	.	.	.	.	.	22^{+}
Seseli hippomarathrum	.	2^{+}	11^{r+}	.	.	.	.	.	.	.	.	.	.	22^{+}
Carlina vulgaris agg.	.	.	.	.	.	.	.	.	.	.	.	5^{+}	3^{+}	8^{r1}	22^{r+}

Community	PmQ	LQt	LQp	CQev	CQee	Qpr	CfQ	PaQ	BQ	SQt	SQc	SQp	GQ	AQ
Quercion pubescenti-petraeae **(and partly *Aceri tatarici-Quercion*)**														
Dictamnus albus	70^{+3}	58^{r2}	33^{+2}	44^{+2}	10^{+2}	69^{r2}	.	4^{r1}	.	4^{+}	2^{+}	15^{r1}	.	.
Buglossoides purpuro-caerulea	55^{+2}	50^{r4}	22^{13}	51^{r4}	73^{+5}	59^{r2}	.	2^{+1}	.	3^{+1}	.	6^{+1}	.	.
Quercus pubescens juv.	10^{+}	35^{+2}	6^{+}	12^{+1}	7^{+}	8^{+2}	.	.	.	.	.	3^{+}	.	.
Clematis recta	.	46^{+2}	6^{+}	7^{+}	12^{r1}	6^{+2}	.	4^{+1}	.	.	.	.	.	.
Melampyrum cristatum	35^{+2}	50^{+2}	22^{+2}	5^{r+}	5^{+2}	4^{r1}	27^{+}	2^{+1}	.	1^{+}	2^{r}	.	.	.
Veronica teucrium	35^{+1}	23^{+2}	11^{12}	10^{+1}	2^{r}	4^{+}	.	1^{+}	5^{+}	.	.	.	.	11^{+}
Galium glaucum	50^{r2}	69^{+2}	50^{r2}	11^{+2}	2^{+}	.	.	6^{+1}	5^{+}	1^{1}	21^{+1}	12^{+}	.	.
Pruno mahaleb-Quercetum pubescentis **and *Lathyro versicoloris-Quercetum pubescentis typicum***														
Aster amellus	70^{+2}	46^{+2}	.	5^{+1}	2^{+}	.	.	1^{+}	.	.	.	3^{+}	.	.
Inula hirta	45^{+1}	44^{+1}	6^{1}	4^{+1}	.	2^{+}	.	1^{+}	.	.	5^{+}	6^{+1}	3^{+}	.
Salvia pratensis	60^{+1}	38^{+3}	11^{1}	.	7^{+}	.	.	1^{+}	.	.	.	.	.	11^{+}
Lathyro versicoloris-Quercetum pubescentis typicum **and *Carici fritschii-Quercetum roboris***														
Asperula tinctoria	.	71^{+2}	11^{+1}	7^{+1}	2^{+}	.	73^{+1}	1^{+}	.	.	3^{+}	3^{+}	3^{+}	.
Carici fritschii-Quercetum roboris **and *Potentillo albae-Quercetum***														
Potentilla alba	.	8^{+2}	22^{+}	1^{+}	.	.	91^{r2}	49^{r2}	.	1^{1}	.	.	.	.
Serratula tinctoria	5^{+}	4^{+}	17^{+}	1^{1}	2^{+}	10^{+2}	82^{r1}	60^{r3}	.	.	.	.	.	.
Dianthus superbus	.	.	.	.	.	.	27^{+1}	14^{r1}	.	.	.	3^{+}	.	.
Carici fritschii-Quercetum roboris **and *Brachypodium pinnatum-Quercus robur* community**														
Quercus robur juv.	.	.	.	.	2^{+}	4^{+1}	55^{+1}	3^{+1}	50^{+}	.	3^{+1}	.	.	.
Aceri tatarici-Quercion **and *Quercion petraeae***														
Veronica officinalis	.	.	.	5^{+1}	.	33^{r2}	18^{+}	47^{r2}	32^{r1}	48^{r1}	36^{r1}	18^{+}	28^{r+}	11^{+}
Carici fritschii-Quercetum roboris **and *Quercion petraeae***														
Festuca ovina	10^{+}	13^{+3}	44^{+1}	7^{r1}	5^{r+}	.	100^{+3}	60^{+3}	68^{+2}	89^{r4}	84^{+4}	52^{+4}	95^{14}	67^{+2}
Campanula rotundifolia agg. (cf. *gentilis* et *moravica*)	.	.	.	.	2^{+}	.	27^{r+}	15^{r1}	59^{+1}	16^{r1}	23^{+1}	3^{+}	41^{+1}	11^{1}
Quercion petraeae														
Quercus petraea juv.	.	12^{+1}	6^{1}	8^{+1}	32^{+2}	10^{+1}	.	62^{r2}	.	73^{r3}	55^{+2}	82^{+2}	72^{+2}	56^{+1}
Luzula luzuloides	.	2^{+}	22^{+}	1^{+}	2^{+}	.	.	40^{r3}	27^{+1}	54^{+3}	40^{+1}	9^{+}	36^{+1}	.
Avenella flexuosa	.	4^{23}	.	3^{+}	.	.	.	22^{+3}	5^{+}	14^{+2}	53^{+3}	9^{+2}	26^{+3}	.
Lychnis viscaria	.	.	17^{+1}	5^{r+}	.	2^{+}	9^{+}	12^{r2}	.	59^{r2}	69^{+2}	48^{+1}	69^{+2}	11^{+}
Hieracium pilosella	5^{+}	2^{1}	.	4^{+2}	.	6^{+1}	.	6^{r2}	36^{+1}	38^{r2}	64^{+1}	21^{+}	90^{+2}	33^{+1}
Calamagrostis epigeios	.	.	.	.	.	.	.	6^{13}	5^{+}	3^{+1}	2^{+}	3^{2}	5^{+}	11^{+}
Pinus sylvestris juv.	5^{r}	.	.	.	.	.	.	1^{r+}	27^{r+}	6^{r+}	14^{r3}	.	21^{+}	.
Sorbo torminalis-Quercetum **and *Genisto pilosae-Quercetum petraeae*** **and *Asplenio cuneifolii-Quercetum petraeae***														
Dianthus carthusia-norum agg.	.	2^{+}	6^{r}	3^{+}	.	.	.	1^{+}	.	7^{r1}	21^{+}	9^{+}	21^{+1}	44^{+}
Festuca pallens	.	.	.	1^{+}	.	.	.	.	.	3^{r+}	12^{+1}	3^{1}	41^{+2}	44^{+3}
Sedum sexangulare	.	6^{+}	6^{r}	4^{+}	.	.	.	.	.	10^{r1}	22^{+1}	15^{+}	15^{r+}	11^{+}
Asplenium septentrionale	.	.	6^{r}	.	.	.	.	1^{+}	.	6^{r+}	14^{r1}	.	10^{r+}	11^{1}
Polypodium vulgare	.	.	.	.	.	.	.	.	.	3^{+}	9^{r+}	3^{+}	18^{r+}	.
Sedum reflexum	.	.	.	1^{+}	.	.	.	.	.	7^{r+}	40^{r1}	6^{+}	31^{r1}	.
Agrostis stricta	.	.	.	.	.	.	.	.	.	.	7^{+}	9^{r1}	28^{r2}	.
Thymus praecox	15^{+}	4^{+}	.	3^{1}	.	.	.	.	.	.	21^{r1}	.	33^{r1}	44^{+1}
Genisto pilosae-Quercetum petraeae **and *Asplenio cuneifolii-Quercetum petraeae***														
Genista pilosa	20^{r1}	.	.	.	.	.	.	.	.	1^{+}	34^{r1}	.	97^{+2}	67^{+2}
Quercetalia pubescenti-petraeae														
Euphorbia cyparissias	80^{r1}	54^{r1}	44^{r1}	45^{r2}	44^{+2}	18^{r1}	64^{+1}	19^{r1}	55^{+1}	62^{r3}	50^{r1}	58^{+1}	46^{r1}	67^{+1}
Vincetoxicum hirundinaria	75^{+2}	23^{+2}	6^{r}	81^{r4}	44^{r2}	27^{r2}	64^{+1}	19^{r3}	9^{+1}	85^{r3}	62^{+3}	70^{r3}	49^{r2}	56^{+2}
Teucrium chamaedrys	85^{+2}	81^{r2}	17^{12}	58^{r3}	20^{+3}	6^{r1}	36^{+}	7^{r1}	18^{+2}	14^{+1}	31^{r1}	58^{r2}	10^{+1}	22^{+}

Community	PmQ	LQt	LQp	CQev	CQee	Qpr	CfQ	PaQ	BQ	SQt	SQc	SQp	GQ	AQ
Hypericum perforatum	10^{+}	15^{r+}	11^{r+}	23^{+1}	32^{r+}	24^{r1}	64^{r+}	25^{r2}	41^{+}	46^{r1}	67^{r1}	48^{+}	49^{r+}	11^{+}
Poa pratensis agg. (cf. *angustifolia*)	30^{+1}	16^{+2}	33^{12}	38^{+2}	25^{+1}	16^{r2}	27^{+}	18^{r1}	64^{+2}	16^{r2}	17^{+2}	18^{+2}	23^{r1}	33^{r+}
Ajuga genevensis	30^{r1}	13^{r1}	33^{+2}	19^{r1}	12^{+1}	29^{r1}	9^{+}	11^{r1}	14^{r+}	20^{r1}	22^{+2}	27^{r+}	3^{+}	11^{+}
Polygonatum odoratum	40^{+1}	87^{r3}	17^{+2}	40^{+2}	51^{+3}	6^{r1}	73^{+}	36^{r3}	27^{+1}	58^{r3}	55^{r1}	52^{+1}	36^{r2}	.
Veronica chamaedrys agg. (cf. *vindobonensis*)	15^{+1}	35^{r2}	72^{+2}	41^{r2}	41^{r1}	43^{r1}	82^{+1}	59^{r2}	32^{+1}	77^{r1}	29^{+1}	52^{+2}	28^{r1}	.
Brachypodium pinnatum	80^{14}	54^{+2}	61^{+3}	52^{+4}	34^{+4}	47^{+4}	18^{+1}	30^{+4}	95^{15}	17^{r3}	12^{+4}	24^{24}	3^{+}	.
Coronilla varia	45^{+2}	75^{r2}	28^{r1}	30^{+2}	39^{+1}	14^{r1}	9^{+}	17^{r2}	73^{+1}	11^{r+}	5^{+1}	15^{r+}	3^{+}	.
Bupleurum falcatum	85^{r1}	69^{+2}	28^{r2}	37^{r2}	20^{r+}	18^{r1}	18^{+}	10^{+1}	14^{1}	23^{r2}	22^{r1}	58^{r2}	.	56^{+2}
Galium mollugo agg. (cf. *album*)	40^{+1}	4^{+1}	17^{r+}	42^{r3}	7^{+}	16^{r+}	55^{+}	14^{r2}	59^{r1}	28^{r2}	14^{r+}	24^{r1}	.	33^{r2}
Carex humilis	65^{+3}	75^{+5}	17^{23}	18^{r2}	5^{+}	12^{12}	9^{+}	1^{+1}	.	10^{+3}	64^{+4}	12^{+1}	59^{14}	100^{+3}
Tanacetum corymbosum	75^{r2}	100^{+3}	89^{+2}	58^{r2}	76^{r1}	47^{+1}	.	76^{r2}	36^{+2}	59^{r2}	28^{+2}	64^{r1}	8^{+}	22^{+1}
Trifolium alpestre	15^{+2}	69^{+2}	72^{r2}	8^{+1}	2^{+}	14^{r1}	82^{+1}	42^{r2}	9^{+1}	45^{r2}	34^{r1}	48^{+2}	26^{r2}	11^{+}
Genista tinctoria	40^{+1}	48^{+1}	11^{+2}	12^{r1}	.	6^{+}	55^{r1}	30^{r2}	18^{+1}	59^{r2}	40^{r2}	45^{+2}	31^{+2}	22^{r+}
Festuca rupicola	65^{+2}	4^{+}	22^{12}	30^{r2}	.	14^{r2}	9^{+}	1^{+}	5^{+}	4^{+2}	5^{r1}	3^{+}	3^{+}	11^{3}
Anthericum ramosum	55^{+2}	81^{+3}	.	34^{r2}	20^{+1}	6^{+}	18^{r+}	31^{r2}	14^{r+}	68^{r2}	40^{r2}	42^{r2}	33^{r2}	22^{12}
Fragaria vesca	20^{+}	19^{+1}	.	32^{r2}	32^{+1}	29^{+2}	55^{+1}	46^{r3}	73^{+2}	39^{r3}	19^{+1}	39^{+1}	3^{1}	11^{+}
Ligustrum vulgare juv.	.	2^{1}	6^{1}	12^{r1}	12^{+1}	8^{+1}	27^{+1}	16^{+2}	5^{+}	18^{r2}	7^{+1}	27^{+1}	5^{+}	11^{+}
Betonica officinalis	10^{+1}	35^{r2}	17^{1}	15^{r1}	12^{+}	16^{r1}	91^{+1}	56^{r3}	5^{1}	8^{r+}	3^{+}	9^{+2}	.	.
Fragaria moschata	25^{+}	4^{+2}	17^{+2}	34^{r2}	22^{+2}	37^{r2}	18^{+1}	39^{r3}	23^{+1}	15^{+1}	5^{r+}	21^{+1}	.	.
Geranium sanguineum	75^{+2}	21^{r3}	6^{+}	10^{+1}	2^{+}	4^{r+}	91^{+1}	4^{+1}	5^{+}	3^{r}	5^{+1}	12^{+}	.	.
Fragaria viridis	15^{r1}	37^{+2}	50^{+2}	14^{r2}	7^{+1}	12^{+1}	9^{+}	6^{+3}	5^{1}	3^{+1}	.	6^{+}	.	22^{+1}
Carex michelii	70^{+2}	4^{+1}	6^{+}	40^{r3}	7^{+}	47^{+2}	9^{1}	1^{r1}	.	15^{r2}	5^{r1}	9^{+}	.	11^{+}
Sedum maximum	25^{+}	25^{r1}	11^{r+}	41^{r1}	16^{+}	37^{r+}	.	10^{r2}	.	61^{r1}	53^{r1}	52^{+}	46^{+}	11^{+}
Campanula glomerata	5^{+}	6^{r+}	11^{+}	3^{+}	5^{+1}	.	9^{+}	11^{r1}	5^{+}	6^{+1}	3^{+}	3^{+}	.	22^{r+}
Origanum vulgare	55^{r2}	23^{+1}	6^{+}	37^{+2}	20^{+1}	8^{r2}	.	6^{+1}	9^{+}	14^{r1}	5^{+}	27^{r2}	.	.
Viola hirta	50^{r1}	63^{+2}	17^{+}	41^{+1}	71^{+3}	45^{r1}	.	23^{r2}	18^{1}	4^{+}	.	6^{+1}	.	22^{+1}
Sorbus torminalis juv.	25^{r+}	38^{+1}	33^{+2}	4^{r+}	22^{+}	2^{1}	.	25^{r1}	.	7^{+1}	14^{r1}	30^{+}	.	11^{+}
Prunus spinosa juv.	10^{r+}	6^{r+}	6^{+}	5^{r+}	34^{r1}	.	.	17^{r1}	41^{r+}	3^{r+}	2^{r}	12^{+}	3^{+}	.
Inula conyza	20^{r+}	17^{r1}	11^{r2}	10^{r2}	17^{+1}	.	.	5^{r1}	14^{+}	7^{+}	5^{r+}	9^{+}	.	11^{+}
Centaurea triumfettii	15^{+1}	48^{+2}	17^{+}	4^{+}	.	.	9^{+}	1^{+}	.	3^{r+}	10^{r+}	3^{+}	3^{+}	11^{1}
Peucedanum cervaria	40^{+1}	23^{+2}	6^{2}	16^{+2}	5^{r+}	10^{+1}	9^{+}	19^{r2}	.	6^{r1}	.	9^{+}	.	.
Primula veris	.	56^{+3}	61^{+2}	27^{+3}	29^{+2}	2^{r}	9^{+}	30^{r2}	.	11^{r1}	2^{+}	3^{1}	.	.
Hypericum montanum	5^{+}	17^{r+}	11^{+}	11^{r+}	2^{+}	4^{r+}	.	27^{r2}	5r	14^{r+}	.	12^{+}	.	11^{+}
Asperula cynanchica	15^{+1}	8^{+2}	.	4^{+}	2^{+}	.	.	1^{+}	.	3^{r+}	17^{+}	9^{+}	18^{+}	22^{+}
Verbascum austriacum	30^{+1}	.	.	22^{r1}	.	16^{r1}	.	3^{+1}	.	34^{r1}	29^{r1}	24^{+2}	38^{+1}	44^{+1}
Carex montana	.	19^{+3}	44^{+2}	16^{+2}	2^{+}	53^{+4}	9^{+}	70^{+4}	50^{+3}	13^{r1}	.	.	.	.
Lathyrus niger	.	10^{+1}	33^{r2}	21^{r1}	39^{r2}	59^{+2}	.	62^{r2}	.	32^{r2}	14^{+2}	42^{+2}	.	.
Inula salicina	15^{+1}	4^{+1}	11^{+2}	3^{+1}	.	31^{r2}	18^{+}	4^{r2}	18^{r2}	.	.	.	.	.
Campanula bononiensis	20^{r+}	15^{+}	17^{+2}	10^{+1}	2^{+}	10^{+}	.	4^{+2}	.	1^{1}	2^{+}	.	.	.
Euphorbia polychroma	40^{r1}	.	.	25^{r1}	.	8^{r+}	.	1^{+1}	.	4^{r1}	2^{+}	6^{r}	.	22^{1}
Cornus mas juv.	.	13^{+1}	.	11^{r1}	17^{+1}	2^{+}	.	6^{r2}	.	1^{+}	3^{r+}	18^{+1}	.	.
Melittis melissophyllum	15^{+1}	15^{+}	11^{+}	22^{+2}	2^{+}	51^{r1}	.	28^{r1}	.	4^{r+}	.	.	.	.
Sorbus aria agg. juv.	10^{+}	6^{+}	6^{+}	.	.	.	.	1^{r}	.	3^{r+}	.	.	3^{+}	11^{+}
Pulmonaria mollis	5^{+}	.	.	10^{r+}	.	14^{r1}	9^{1}	4^{+2}	.	8^{r2}	.	3^{+}	.	.
Pyrus pyraster juv.	.	23^{+}	22^{+}	.	4^{+}	.	.	4^{+}	.	.	3^{+}	9^{+}	3^{+}	.
Arabis pauciflora	15^{+}	21^{+1}	.	15^{r+}	2^{+}	.	.	.	.	1^{+}	2^{+}	9^{+}	.	.
Viburnum lantana juv.	5^{+}	.	6^{+}	5^{+1}	.	2^{1}	.	3^{+}	.	.	.	.	.	.
Other species														
Achillea millefolium agg.	45^{+2}	21^{+1}	50^{r2}	19^{r2}	5^{+}	6^{r+}	73^{r1}	13^{r1}	36^{r+}	11^{r1}	21^{r2}	27^{+1}	8^{r+}	78^{+}
Campanula persicifolia	10^{+}	40^{r1}	28^{r+}	22^{+1}	22^{r+}	31^{r+}	45^{r+}	50^{r2}	55^{r+}	45^{r1}	19^{+1}	21^{+}	13^{r1}	11^{+}
Rosa sp. juv.	5^{r}	21^{+}	12^{+1}	28^{r2}	17^{+2}	2^{+}	9^{+}	28^{r1}	50^{r1}	32^{r1}	40^{+1}	57^{+1}	23^{r+}	11^{+}
Hieracium lachenalii	10^{+}	6^{+1}	6^{2}	8^{r+}	10^{r+}	6^{+}	36^{r+}	39^{r2}	27^{r1}	42^{r1}	40^{r2}	45^{r2}	41^{r1}	11^{+}
Poa nemoralis	15^{+1}	13^{r1}	61^{+3}	38^{r3}	73^{r2}	88^{r5}	9^{+}	83^{+5}	32^{+2}	93^{r5}	69^{r3}	94^{+3}	31^{+2}	.
Dactylis glomerata agg. (cf. *polygama*)	40^{+}	4^{+1}	39^{r2}	58^{r2}	39^{r3}	82^{r2}	100^{+2}	36^{r3}	28^{+1}	15^{r1}	10^{+1}	55^{+2}	3^{+}	.

Community	PmQ	LQt	LQp	CQev	CQee	Qpr	CfQ	PaQ	BQ	SQt	SQc	SQp	GQ	AQ
Silene nutans	30^{+1}	21^{+1}	22^{+1}	19^{r1}	4^{+}	22^{r2}	45^{+}	36^{r2}	23^{+}	65^{r2}	33^{+1}	55^{+1}	8^{+}	.
Melampyrum pratense	10^{r2}	4^{+2}	17^{+2}	7^{r2}	2^{+}	10^{+2}	91^{+1}	69^{+4}	5^{+}	15^{r2}	3^{+}	3^{1}	8^{+}	.
Astragalus glycyphyllos	30^{+3}	50^{r2}	28^{+1}	12^{r1}	24^{+1}	22^{r1}	27^{+}	22^{r1}	27^{+1}	18^{r+}	3^{+}	21^{+1}	.	22^{+}
Pimpinella saxifraga agg.	35^{+}	2^{r}	6^{1}	3^{r+}	2^{+}	2^{+}	45^{r+}	6^{r1}	55^{r1}	8^{+}	12^{r+}	6^{+}	.	67^{+1}
Taraxacum officinale agg.	20^{r+}	13^{r+}	11^{+}	12^{r+}	27^{r+}	12^{r1}	27^{r+}	14^{r+}	32^{r1}	4^{+}	14^{r+}	24^{r+}	.	11^{+}
Hieracium sylvaticum	5^{r}	27^{+1}	50^{+1}	15^{r1}	12^{r+}	24^{r2}	.	68^{r2}	64^{+2}	65^{r1}	47^{r1}	42^{+1}	28^{r1}	22^{+}
Lembotropis nigricans	20^{+}	27^{+1}	11^{+1}	3^{r+}	.	4^{r}	9^{+}	15^{r2}	9^{r+}	34^{r2}	22^{r1}	21^{+1}	38^{+2}	22^{+}
Clinopodium vulgare	55^{+2}	27^{+2}	6^{1}	40^{r1}	66^{+2}	43^{r1}	82^{+1}	33^{r2}	23^{+1}	34^{r2}	10^{+1}	52^{+1}	.	.
Melica nutans	20^{+1}	37^{r2}	17^{+3}	16^{+1}	24^{+1}	16^{r2}	9^{1}	48^{r3}	41^{+2}	14^{r1}	.	6^{+}	.	11^{+}
Carex muricata agg.	10^{+}	19^{+1}	11^{+}	40^{r2}	27^{r1}	31^{r1}	.	10^{r2}	14^{+1}	18^{r1}	7^{+}	21^{+1}	.	11^{+}
Verbascum lychnitis	15^{r+}	23^{r+}	22^{+}	7^{+}	15^{r+}	4^{r}	.	2^{+1}	14^{r}	3^{r+}	7^{r+}	12^{+}	.	11^{+}
Galium pusillum agg.	15^{+}	2^{+}	11^{+2}	11^{r1}	7^{+}	12^{r1}	.	14^{r3}	63^{r1}	46^{+2}	10^{+1}	12^{+1}	21^{+1}	22^{+1}
Carpinus betulus juv.	10^{+}	19^{r+}	.	14^{r1}	32^{r1}	8^{+1}	.	36^{r2}	9^{+}	42^{r1}	21^{+1}	58^{r2}	10^{r+}	22^{r+}
Phleum phleoides	5^{+}	4^{+1}	11^{r1}	4^{+}	.	2^{r}	.	.	9^{+}	3^{+}	16^{+1}	15^{+1}	10^{+1}	33^{+1}
Crataegus sp. juv.	15^{+}	14^{+}	.	12^{r1}	20^{+1}	10^{+}	45^{+}	9^{+1}	18^{r+}	16^{r1}	5^{+1}	42^{r1}	.	.
Tilia cordata juv.	5^{+}	4^{r+}	.	5^{+}	.	2^{+}	18^{+}	16^{r1}	18^{r+}	7^{r1}	9^{r+}	3^{+}	3^{r}	.
Arrhenatherum elatius	5^{+}	4^{r}	.	15^{+3}	2^{+}	.	73^{+1}	1^{+}	9^{+}	8^{r+}	17^{+1}	9^{+1}	8^{+1}	11^{+}
Hieracium sabaudum	20^{+}	.	.	19^{r+}	.	39^{+1}	9^{+}	54^{r1}	9^{r}	51^{r1}	55^{r1}	61^{+1}	44^{r1}	33^{r+}
Silene vulgaris	5^{1}	.	.	8^{r+}	.	22^{r1}	73^{+1}	3^{+1}	5^{+}	17^{r2}	7^{+}	6^{+}	3^{+}	22^{+1}
Stellaria holostea	.	21^{+3}	44^{13}	12^{+3}	73^{r3}	4^{+}	.	51^{r3}	.	15^{+1}	26^{+2}	42^{+2}	3^{+}	11^{1}
Viola riviniana	.	2^{+}	.	3^{+}	12^{+1}	2^{1}	9^{+}	30^{r2}	14^{+1}	6^{r+}	2^{1}	18^{+}	.	11^{+}
Lathyrus vernus	5^{-}	46^{+2}	39^{+2}	12^{r1}	15^{r1}	31^{r2}	.	57^{r2}	14^{+1}	8^{+1}	2^{+}	.	.	.
Acer campestre juv.	10^{+}	13^{+1}	6^{+}	25^{r1}	61^{r2}	18^{+1}	.	20^{r2}	.	24^{r1}	10^{r+}	45^{+1}	.	.
Carex digitata	20^{+1}	6^{+1}	17^{+2}	18^{r1}	.	10^{+1}	.	24^{r2}	36^{+2}	25^{r1}	.	3^{+}	.	11^{+}
Solidago virgaurea	15^{r+}	2^{+}	.	3^{+1}	.	22^{r1}	45^{+}	20^{r1}	9^{+1}	4^{r1}	5^{+}	12^{+}	.	.
Convallaria majalis	25^{r2}	.	6^{+}	33^{r4}	5^{+}	67^{+4}	100^{+3}	54^{r3}	18^{r1}	21^{r2}	.	6^{+2}	.	.
Campanula trachelium	.	54^{r2}	17^{+}	14^{+2}	66^{r1}	20^{r+}	9^{r}	22^{r1}	.	7^{r1}	2^{+}	27^{+}	.	.
Campanula rapunculoides	.	23^{+1}	6^{+}	44^{r3}	54^{r2}	29^{r2}	.	23^{r2}	55^{+2}	14^{r1}	14^{+}	48^{r1}	.	.
Fraxinus excelsior juv.	.	15^{r1}	11^{+1}	11^{r1}	54^{+2}	12^{+2}	.	7^{r1}	14^{+}	10^{r2}	5^{+}	30^{+1}	.	.
Myosotis sylvatica	.	12^{+}	6^{+}	12^{r+}	22^{+1}	.	.	9^{r1}	18^{r1}	20^{r1}	5^{r+}	45^{r1}	3^{+}	.
Digitalis grandiflora	.	12^{+2}	6^{r}	12^{+1}	.	2^{1}	.	5^{r2}	18^{+1}	34^{+2}	5^{r2}	15^{+1}	3^{+}	.
Vicia cracca agg.	25^{+2}	27^{+1}	11^{+}	1^{+}	10^{+1}	2^{+}	.	1^{+}	23^{r1}	3^{r}	.	.	.	.
Polygonatum multiflorum	15^{+}	12^{1}	6^{1}	16^{r1}	5^{+}	33^{r2}	.	9^{r1}	.	1^{+}	.	3^{2}	.	.
Arabis hirsuta agg.	5^{+}	19^{+}	6^{+}	10^{r+}	2^{+}	4^{r}	.	1^{+}	.	1^{+}	.	3^{+}	.	.
Hepatica nobilis	5^{+}	48^{r2}	56^{+1}	7^{+1}	27^{r1}	.	.	41^{r2}	64^{+2}	4^{+2}	.	3^{+}	.	.
Lotus corniculatus	25^{r2}	56^{+2}	11^{+1}	1^{+}	.	.	.	6^{+1}	41^{r1}	4^{+}	10^{+1}	12^{+1}	.	.
Festuca rubra agg.	10^{+}	2^{2}	.	4^{+}	9^{r+}	2^{2}	9^{2}	1^{+}	23^{+2}	3^{+3}	.	.	.	.
Hieracium umbellatum	10^{+}	.	6^{1}	1^{+}	.	.	18^{+}	5^{+1}	.	7^{r1}	22^{r1}	3^{r}	13^{+1}	.
Carex caryophyllea	5^{+}	.	.	8^{+2}	.	4^{+1}	.	2^{+1}	18^{+1}	10^{+1}	3^{+}	6^{1}	8^{+}	.
Geum urbanum	.	12^{r+}	17^{+}	49^{r2}	68^{+2}	43^{r1}	.	11^{r1}	9^{+}	8^{r+}	.	15^{r+}	.	.
Calamagrostis arundinacea	.	4^{+1}	.	14^{r2}	2^{+}	43^{r3}	.	41^{r4}	27^{+3}	31^{+2}	16^{+1}	15^{r+}	3^{+}	.
Agrostis tenuis	.	2^{2}	.	.	.	.	9^{r}	12^{+2}	9^{+}	4^{+}	3^{+}	6^{+}	5^{+}	11^{+}
Rubus fruticosus agg.	.	.	6^{r}	1^{r}	12^{r+}	2^{+}	.	18^{r2}	23^{+1}	7^{r2}	2^{+}	3^{r}	.	.
Galium verum	.	.	17^{+2}	7^{+1}	.	12^{+1}	55^{+}	3^{+1}	55^{+1}	4^{+1}	.	3^{+}	.	56^{+}
Euonymus europaea juv.	5^{+}	2^{+}	6^{1}	4^{r+}	32^{+2}	4^{+}	.	4^{r1}	.	3^{r+}	.	.	.	.
Brachypodium sylvaticum	20^{r1}	4^{r+}	.	34^{+2}	46^{+1}	43^{+3}	.	15^{r3}	.	4^{+1}	.	18^{r1}	.	.
Pulmonaria officinalis agg.	15^{+1}	2^{+}	.	23^{r1}	17^{r1}	49^{r2}	.	24^{r2}	.	1^{+}	.	9^{+}	.	.
Viola mirabilis	5^{1}	12^{+}	.	32^{r2}	10^{+2}	45^{r2}	.	5^{r+}	.	1^{+}	.	3^{+}	.	.
Scabiosa ochroleuca	15^{+}	2^{+}	.	3^{+}	.	.	.	.	5^{r}	1^{r}	2^{r}	.	3^{+}	22^{+}
Seseli osseum	10^{r1}	4^{+}	.	1^{+}	.	.	.	.	.	4^{r+}	12^{r1}	3^{+}	15^{r1}	33^{+1}
Fallopia convolvulus	5^{r}	.	.	7^{r2}	2^{+}	8^{r+}	.	1^{+}	.	11^{r2}	22^{r+}	15^{+}	.	.
Veronica spicata	15^{+1}	.	.	1^{+}	.	2^{+}	.	1^{+}	.	6^{+}	3^{r1}	6^{+}	3^{+}	.
Festuca heterophylla	.	12^{+2}	28^{12}	3^{r+}	7^{r1}	24^{+3}	36^{+1}	40^{r2}	.	4^{+}	.	.	.	.

Community	PmQ	LQt	LQp	CQev	CQee	Qpr	CfQ	PaQ	BQ	SQt	SQc	SQp	GQ	AQ
Vicia pisiformis	.	2^{+}	6^{+}	1^{+}	10^{+}	16^{r+}	.	2^{r+}	.	4^{+1}	.	9^{+}	.	.
Cornus sanguinea juv.	.	10^{+1}	11^{+}	.	10^{+1}	4^{+1}	.	14^{r1}	9^{+2}	4^{r+}	.	3^{+}	.	.
Torilis japonica	.	4^{+}	.	7^{+2}	49^{r1}	16^{r1}	.	2^{+}	9^{+1}	4^{r+}	.	33^{r+}	.	.
Lapsana communis	.	4^{r+}	.	14^{r1}	37^{+2}	16^{r1}	.	2^{r+}	.	8^{r+}	10^{r+}	45^{r1}	.	.
Acer platanoides juv.	.	2^{+}	.	5^{+}	29^{r1}	.	.	9^{r1}	5^{r}	8^{r+}	2^{+}	12^{r+}	.	.
Mycelis muralis	.	10^{+}	.	4^{+}	.	2^{r}	.	13^{r1}	5^{+}	17^{r1}	2^{+}	6^{+}	.	.
Echium vulgare	.	2^{+}	.	.	2^{+}	.	.	1^{+}	5^{+}	1^{r}	3^{+}	6^{+}	8^{+}	11^{r}
Galium sylvaticum	.	.	17^{+1}	7^{r1}	7^{+}	41^{r2}	.	54^{r3}	9^{+1}	10^{+1}	.	3^{+}	.	.
Luzula campestris agg.	.	.	11^{+}	3^{+}	.	.	82^{+1}	6^{+1}	9^{+1}	13^{+2}	28^{+1}	.	61^{+}	.
Geranium robertianum	.	.	.	21^{r2}	29^{+2}	2^{2}	.	4^{+1}	23^{+}	7^{r2}	2^{+}	9^{+}	.	.
Moehringia trinervia	.	.	.	.	24^{r1}	8^{r+}	9^{+}	5^{r+}	.	6^{r2}	2^{+}	3^{+}	3^{+}	.
Viola hirta × *odorata*	10^{+}	8^{+1}	22^{+1}	10^{r1}	22^{+3}	.	.	1^{12}	.	.	.	.	.	11^{+}
Helianthemum ovatum	20^{+}	25^{+2}	11^{1}	3^{+}	.	.	.	1^{+1}	32^{+1}	3^{+}	.	.	.	.
Melampyrum nemorosum	15^{12}	8^{+2}	.	7^{+2}	.	2^{+}	.	12^{r3}	14^{+1}	1^{1}	.	.	.	.
Calluna vulgaris	5^{+}	4^{+}	.	3^{+}	.	.	.	2^{+2}	.	4^{r1}	22^{r2}	.	33^{+3}	.
Potentilla argentea	5^{+}	2^{+}	.	.	.	2^{+}	.	.	.	1^{r}	2^{r}	3^{+}	3^{+}	.
Acinos arvensis	5^{+}	.	6^{+}	8^{+}	.	2^{+}	.	1^{+}	5^{r}	1^{+}	.	.	.	.
Eryngium campestre	10^{+}	.	6^{+}	4^{+1}	.	2^{r}	.	.	.	.	2^{+}	.	5^{+}	11^{+}
Trifolium montanum	5^{+}	.	11^{+1}	.	.	4^{r}	.	7^{r1}	5^{+}	1^{+}	.	3^{+}	.	.
Leontodon hispidus	5^{+}	.	.	1^{+}	.	2^{+}	9^{+}	2^{+}	14^{+}	1^{+}	.	.	.	.
Melica uniflora	25^{r+}	.	.	48^{+4}	.	39^{r4}	.	1^{+}	.	10^{+3}	7^{+}	21^{+2}	.	.
Chamaecytisus ratisbonensis	20^{+}	.	.	1^{+}	.	.	18^{r+}	.	.	1^{1}	2^{+}	.	5^{+1}	11^{r}
Lilium martagon	.	12^{+}	6^{+}	1^{r}	.	4^{r1}	27^{+}	19^{r1}	.	1^{1}	.	.	.	.
Cotoneaster integerrimus juv.	.	19^{+1}	28^{+1}	1^{+}	2^{+}	.	.	1^{+}	.	.	2^{+}	3^{+}	3^{+}	.
Mercurialis perennis	.	8^{r+}	39^{+1}	4^{+1}	15^{+3}	14^{r4}	.	9^{+2}	18^{12}	.	.	.	.	.
Acer pseudoplatanus juv.	.	4^{+}	11^{+}	.	5^{r+}	.	.	6^{r1}	14^{+}	1^{+}	.	3^{r}	.	.
Genista germanica	.	4^{+2}	.	3^{r+}	.	.	18^{r+}	9^{r2}	.	24^{+2}	3^{+1}	.	3^{+}	.
Allium montanum	.	4^{+}	.	10^{+2}	.	.	.	1^{1}	.	24^{+2}	7^{r+}	3^{+}	15^{r1}	.
Cardaminopsis arenosa	.	12^{r1}	.	.	12^{+}	.	.	4^{r+}	9^{+}	15^{r1}	12^{r1}	3^{+}	.	.
Anthemis tinctoria	.	.	.	1^{+}	5^{+}	2^{+}	.	2^{+1}	.	3^{+1}	5^{+}	15^{+1}	.	.
Galeopsis pubescens	.	.	.	1^{r}	7^{+1}	8^{r+}	9^{r}	5^{+}	.	14^{r+}	7^{r+}	12^{+}	.	.
Hieracium maculatum	.	.	.	7^{r1}	.	2^{+}	9^{+}	5^{+}	.	20^{r1}	2^{+}	3^{1}	.	.
Festuca valesiaca	10^{1}	6^{r1}	22^{+2}	8^{+2}	.	.	.	.	.	.	2^{1}	3^{+}	.	.
Crepis praemorsa	10^{+}	2^{2}	11^{+}	.	.	2^{1}	9^{+}	1^{+}	.	.	.	.	.	.
Hieracium bauhinii	15^{+1}	4^{+}	.	4^{r+}	.	4^{r+}	.	.	.	11^{+1}	2^{+}	.	.	.
Prunus fruticosa	10^{+}	6^{+2}	.	.	.	.	.	1^{+}	.	.	2^{+}	12^{+}	3^{+}	.
Epipactis helleborine	30^{r1}	.	.	10^{+}	.	2^{+}	.	4^{r1}	27^{r+}	4^{r+}	.	.	.	.
Asarum europaeum	5^{+}	.	.	7^{+2}	2^{1}	14^{r2}	.	14^{+2}	5^{1}	.	.	3^{+}	.	.
Euonymus verrucosa juv.	15^{+}	.	.	19^{r1}	.	4^{1}	.	1^{+}	.	1^{+}	.	12^{+}	.	.
Viola tricolor subsp. *subalpina*	5^{+}	.	.	7^{+1}	.	2^{1}	.	.	.	.	2^{+}	9^{r+}	3^{+}	.
Allium flavum	5^{+}	.	.	3^{r+}	.	.	.	.	.	.	17^{r1}	9^{r+}	5^{+}	33^{+}
Rosa gallica	.	6^{+}	11^{+}	.	15^{+1}	6^{+}	.	2^{r+}	.	.	2^{+}	.	.	.
Cotoneaster integerrimus	.	13^{+1}	6^{+}	.	2^{+}	.	.	1^{+}	.	1^{r}	.	3^{+}	.	.
Thesium linophyllon	.	2^{+}	6^{+}	.	.	4^{r+}	.	1^{r}	.	.	3^{+}	.	8^{r+}	.
Bromus benekenii	.	4^{+1}	.	19^{+1}	10^{+}	18^{+1}	.	8^{r1}	.	1^{1}	.	.	.	.
Aurinia saxatilis	.	4^{+1}	.	3^{r+}	.	.	.	.	.	1^{r}	12^{r2}	3^{+}	3^{+}	.
Hieracium laevigatum	.	.	11^{+}	.	.	14^{r+}	.	7^{r+}	.	17^{+1}	7^{+}	.	5^{+1}	.
Heracleum sphondylium	.	.	.	1^{+}	5^{+}	10^{r1}	9^{1}	3^{r1}	14^{r1}	.	.	.	.	.
Veronica hederifolia agg.	.	.	.	7^{+2}	5^{12}	2^{1}	9^{+}	.	.	.	3^{+1}	3^{+}	.	.
Arabidopsis thaliana	.	.	.	4^{+}	.	2^{r}	.	.	.	6^{+}	12^{r1}	3^{+}	3^{+}	.
Antennaria dioica	.	.	.	.	.	2^{+}	.	1^{+}	14^{+1}	1^{+}	2^{+}	.	3^{+}	.
Thalictrum minus	15^{r+}	10^{+1}	6^{1}	1^{+}	.	.	9^{+}	.	.	.	.	.	.	.
Trifolium rubens	5^{+}	6^{+}	.	1^{+}	.	4^{r}	.	.	.	.	.	12^{+}	.	.
Agropyron intermedium	20^{+2}	.	11^{12}	14^{+3}	.	.	.	.	.	.	.	3^{1}	.	22^{+2}
Glechoma hederacea agg. (cf. *hirsuta*)	10^{+}	.	.	23^{+2}	2^{+}	12^{+2}	9^{+}	.	.	1^{2}	.	.	.	.

Community	PmQ	LQt	LQp	CQev	CQee	Qpr	CfQ	PaQ	BQ	SQt	SQc	SQp	GQ	AQ
Thymus glabrescens	10^{+1}	.	.	1^{+}	.	.	.	.	.	.	.	3^{1}	3^{+}	11^{2}
Asparagus officinalis	15^{r+}	.	.	.	.	2^{r}	9^{r}	.	.	.	2^{+}	.	3^{+}	.
Myosotis arvensis	.	2^{r}	6^{+}	7^{r2}	.	.	.	1^{+}	.	.	2^{1}	.	.	.
Cephalanthera damasonium	.	2^{r}	11^{+}	.	2^{r}	2^{+}	.	.	14^{r+}	.	.	.	.	.
Hieracium cymosum	.	8^{r+}	22^{r+}	.	.	.	9^{+}	1^{+}	.	.	.	.	.	11^{+}
Myosotis ramosissima	.	4^{+}	6^{+}	.	.	.	.	3^{+1}	.	4^{r+}	5^{+}	.	.	.
Ranunculus auricomus agg.	.	4^{r+}	.	1^{r}	5^{+}	8^{r1}	.	11^{r1}	.	.	.	.	.	.
Fagus sylvatica juv.	.	4^{r+}	.	.	7^{r1}	.	.	1^{+}	9^{r+}	1^{r}	.	.	.	.
Galeopsis ladanum	.	2^{+}	.	.	15^{+}	.	.	.	.	1^{+}	7^{r+}	21^{+}	.	.
Leucanthemum vulgare agg.	.	2^{+}	.	.	.	2^{+}	.	4^{+1}	.	1^{r}	.	6^{+}	.	.
Senecio nemorensis agg.	.	2^{+}	.	.	.	.	.	2^{+1}	.	7^{r1}	2^{+}	3^{+}	.	.
Viola arvensis	.	.	6^{+}	1^{+}	2^{+}	2^{r}	.	.	.	.	2^{+}	.	5^{r+}	.
Carex praecox	.	.	6^{+}	10^{+2}	.	.	.	1^{+}	.	.	.	.	3^{1}	11^{+}
Turritis glabra	.	.	6^{r}	.	12^{r+}	.	.	1^{+1}	.	4^{r+}	2^{+}	.	.	.
Myosotis stricta	.	.	.	1^{+}	.	2^{1}	.	.	.	3^{+}	3^{+}	.	5^{+}	.
Hedera helix	.	.	.	11^{r1}	.	.	.	1^{+}	9^{+1}	3^{+1}	.	3^{+}	.	.
Allium oleraceum	.	.	.	10^{r1}	.	.	.	1^{+}	.	4^{r+}	2^{r}	3^{r}	.	.
Platanthera bifolia	.	.	.	.	.	6^{r+}	.	11^{r1}	9^{1}	1^{r}	3^{r+}	3^{+}	.	.
Pimpinella major	.	.	.	.	.	10^{r+}	.	3^{r+}	.	4^{+1}	.	3^{+}	.	11^{+}
Stipa capillata	15^{r+}	4^{+}	.	3^{+}	.	.	.	.	.	.	.	.	.	11^{1}
Medicago falcata	15^{+}	.	6^{1}	11^{+2}	2^{+}	.	.	.	.	.	.	.	.	.
Ranunculus polyanthemus	10^{+}	.	6^{+}	7^{r+}	.	.	36^{+}	.	.	.	.	.	.	.
Peucedanum alsaticum	25^{+}	.	.	3^{+}	.	20^{r1}	.	1^{+}	.	.	.	.	.	.
Melica ciliata	20^{r+}	.	.	14^{+1}	.	.	.	.	.	.	.	.	.	11^{+}
Frangula alnus juv.	.	.	.	.	.	.	9^{+}	15^{r1}	6^{+}	.	.	.	.	.
E_0 – ground layer														
Pruno mahaleb-Quercetum pubescentis														
Homalothecium lutescens	$\boxed{33^{+}}$	.	.	3^{+}	.	.	.	.	5^{+}	.	.	.	.	.
Carici fritschii-Quercetum roboris														
Brachythecium rutabulum	.	.	.	.	.	2^{+}	$\boxed{40^{+1}}$	1^{2}	5^{+}	.	.	.	.	.
Lophocolea heterophylla	.	.	.	.	.	.	$\boxed{20^{r}}$	.	.	.	.	.	.	.
***Brachypodium pinnatum-Quercus robur* community**														
Pleurozium schreberi	.	.	.	10^{+2}	.	6^{r2}	.	26^{+2}	$\boxed{68^{+4}}$	13^{r2}	7^{1}	.	.	11^{3}
***Genisto pilosae-Quercetum petraeae* (and partly *Sorbo torminalis-Quercetum*)**														
Polytrichum piliferum	.	.	.	.	.	.	.	.	.	17^{r+}	10^{+1}	.	$\boxed{72^{+3}}$	.
Hypogymnia physodes	.	.	.	.	.	.	.	.	.	4^{+}	27^{+1}	5^{+}	$\boxed{67^{+2}}$	.
Cladonia rangiformis	.	.	.	.	.	.	.	.	5^{+}	6^{r2}	15^{+1}	5^{+}	$\boxed{59^{+2}}$	11^{+}
Parmelia conspersa	.	.	.	.	.	.	.	.	.	2^{+}	22^{+1}	14^{+}	$\boxed{59^{+2}}$	.
Ceratodon purpureus	11^{1}	.	.	5^{+}	.	.	.	.	.	26^{r2}	29^{+2}	.	$\boxed{56^{+2}}$	22^{1}
Parmelia pulla	.	.	.	.	.	.	.	.	.	4^{r+}	12^{+}	5^{+}	$\boxed{46^{+1}}$	.
Parmelia stenophylla	.	.	.	.	.	.	.	.	.	2^{r}	7^{+}	5^{+}	$\boxed{44^{+2}}$	.
Cladonia foliacea	.	.	.	.	.	.	.	.	.	.	2^{1}	.	$\boxed{38^{+2}}$	11^{1}
Cladonia rangiferina	.	.	.	.	.	.	.	.	.	.	7^{+1}	.	$\boxed{28^{+2}}$	.
Parmelia saxatilis	.	.	.	.	.	.	.	.	.	2^{+}	7^{+1}	.	$\boxed{18^{+1}}$	.
Cladonia arbuscula	.	.	.	.	.	.	.	.	.	.	.	.	$\boxed{15^{+2}}$	.
Asplenio cuneifolii-Quercetum petraeae														
Dicranum polysetum	.	.	.	.	.	.	.	10^{+1}	14^{+1}	8^{+}	2^{2}	.	5^{1}	$\boxed{55^{+2}}$
Rhytidium rugosum	11^{1}	.	.	3^{+}	.	.	.	.	9^{12}	4^{+}	.	5^{+}	.	$\boxed{33^{+1}}$
Cladonia chlorophaea	.	.	.	.	.	.	.	.	.	6^{+}	10^{+}	.	8^{+1}	$\boxed{22^{+1}}$

Community	PmQ	LQt	LQp	CQev	CQee	Qpr	CfQ	PaQ	BQ	SQt	SQc	SQp	GQ	AQ
Quercion petraeae														
Dicranum scoparium	.	.	.	3^{+}	.	2^{+}	.	15^{+2}	18^{1}	13^{+2}	29^{+3}	5^{1}	44^{+2}	22^{+}
Cladonia fimbriata	11^{+}	.	.	.	.	.	.	7^{+2}	22^{r+}	13^{r+}	17^{+1}	.	46^{+2}	22^{+}
Polytrichum juniperinum	.	.	.	.	.	9^{+1}	.	7^{+2}	.	17^{+2}	27^{+2}	19^{1}	46^{+3}	11^{r}
Other species														
Plagiomnium affine	11^{+}	.	.	$5^{r+}3^{+}$		11^{r+}	40^{1}	26^{+2}	64^{+2}	4^{+1}	2^{1}	10^{+}	3^{r}	11^{r}
Brachythecium velutinum	11^{1}	.	.	$15^{+1}3^{+}$	.	2^{1}	20^{+}	7^{+1}	18^{+}	32^{+2}	12^{+2}	10^{+}	13^{+1}	11^{+}
Hypnum cupressiforme	33^{+1}	.	.	31^{+2}	.	13^{+2}	80^{12}	33^{+2}	64^{+3}	66^{+2}	71^{+3}	76^{+2}	87^{r3}	89^{+3}
Cladonia sp.	11^{+}	.	.	.	.	4^{r1}	20^{r}	6^{+1}	5^{+}	13^{r1}	7^{1}	.	3^{+}	.
Cladonia coniocraea	11^{+}	.	.	.	.	.	20^{+}	.	.	2^{+}	22^{+}	5^{+}	26^{+1}	11^{+}
Polytrichum formosum	.	.	.	8^{+}	.	6^{+2}	.	39^{+3}	14^{+1}	17^{+1}	2^{2}	.	8^{+1}	.
Atrichum undulatum	.	.	.	5^{+1}	.	13^{r1}	.	17^{+2}	.	11^{r2}	10^{+1}	14^{+}	3^{1}	.
Pohlia nutans	.	.	.	3^{+}	.	.	20^{+}	1^{+}	5^{+}	15^{+1}	7^{12}	.	.	11^{1}
Abietinella abietina	11^{+}	.	.	10^{+1}	.	2^{+}	.	.	9^{1}	17^{+2}	.	.	.	11^{+}
Hylocomium splendens	.	.	100	3^{1}	.	.	.	.	41^{13}	4^{+}	.	5^{+}	3^{+}	.
Plagiomnium cuspidatum	.	.	.	3^{+}	.	2^{+}	20^{+}	4^{+1}	.	6^{+}	.	.	.	.
Peltigera canina	.	.	.	3^{+}	.	.	.	1^{+}	5^{+}	4^{1}	.	.	3^{+}	.
Grimmia cf. *pulvinata*	.	.	.	3^{+}	.	.	.	1^{1}	5^{+}	.	.	.	3^{+}	11^{1}
Dicranella heteromalla	.	.	.	3^{r}	.	.	.	4^{+}	.	15^{+1}	2^{+}	.	8^{+1}	.
Cladonia pyxidata	.	.	.	.	.	2^{+}	.	.	5^{+}	6^{+}	5^{+}	.	18^{+1}	.
Bryum sp.	.	.	.	.	.	.	40^{+}	3^{+}	.	2^{+}	.	.	8^{+1}	11^{+}
Tortula ruralis	.	.	.	15^{+2}	.	.	.	.	9^{+}	4^{+}	.	.	.	11^{1}
Cladonia furcata	.	.	.	.	.	.	.	.	.	6^{+}	2^{1}	.	15^{+1}	.
Parmelia caperata	.	.	.	.	.	.	.	.	.	.	24^{+1}	14^{r+}	8^{+}	.
Tortella inclinata	22^{+2}	.	.	.	.	.	.	.	.	.	.	.	.	11^{1}

Syntaxonomy and nomenclature of the Czech *Quercetalia pubescenti-petraeae* syntaxa

Order: *Quercetalia pubescenti-petraeae* KLIKA 1933 nom. mut. propos.

Original form of the name: "*Quercetalia*"

Nomenclature type: *Quercion pubescenti-petraeae* BRAUN-BLANQUET 1932 – holotypus.

Nomenclature synonyms: *Quercetalia pubescenti-sessiliflorae* QUANTIN 1935 (nomenclature type: *Quercion pubescenti-sessiliflorae* BRAUN-BLANQUET 1932 holotypus), *Orno-Cotinetalia* JAKUCS 1960 (nomenclature type: *Buxo-Quercion pubescentis* ZÓLYOMI et JAKUCS ex JAKUCS 1960 – **lectotypus hoc loco designatus**).

Syntaxonomical synonyms: *Orno-Ostryetalia* JAKUCS 1959 (nomenclature type: *Syringo-Carpinion orientalis* JAKUCS 1959 – **lectotypus hoc loco designatus**), *Quercetalia petraeae-pubescentis* JAKUCS 1960 (nomenclature type: *Quercion petraeae* ZÓLYOMI et JAKUCS ex JAKUCS 1960 – **lectotypus hoc loco designatus**), *Brachypodio-Quercetalia petraeae* PASSARGE et HOFMANN 1968 (nomenclature type: *Euphorbio-Quercion* HOFMANN in PASSARGE et HOFMANN 1968 – holotypus), *Festuco-Quercetalia robori-petraeae* PASSARGE et HOFMANN 1968 (nomenclature type: *Peucedano-Quercion* HOFMANN in PASSARGE et HOFMANN 1968 – holotypus), *Quercetalia robori-pubescentis* FÖRSTER 1979 (nomenclature type: *Trifolio-Quercion petraeae-roboris* FÖRSTER 1979 – **lectotypus hoc loco designatus**).

Remark 1: The often cited name *Quercetalia pubescentis* BRAUN-BLANQUET 1931 was published as nomen nudum (BRAUN-BLANQUET 1931).

Remark 2: To avoid misunderstandings, it is necessary to add the specific epithet to the original KLIKA's name *Quercetalia*. MORAVEC (see BÉGUIN & THEURILLAT 1984) suggested the form "*Quercetalia pubescenti-sessiliflorae*", because the relevés in BRAUN-BLANQUET (1932) to which KLIKA (1933) refers, contain *Quercus pubescens* and *Q. sessiliflora* (= *Q. petraea*). However, the author citation "*Q. p.-s.* KLIKA 1933 corr. MORAVEC in BÉGUIN & THEURILLAT 1984", used by BÉGUIN & THEURILLAT (1984) is not correct, because this is not the case of a correction due to taxonomical errors in sense of art. 43 and 48 of the Code (MORAVEC, pers. comm., 1994). I prefer to use the form "*Quercetalia pubescenti-petraeae*", because the name *Q. sessiliflora* is no longer used in current taxonomical literature.

Alliance: *Quercion pubescenti-petraeae* BRAUN-BLANQUET 1932 nom. mut. propos.

Original form of the name: "*Quercion pubescentis-sessiliflorae*"

Nomenclature type: *Lithospermo-Quercetum* BRAUN-BLANQUET 1932 nom. invers. propos. – **lectotypus hoc loco designatus**.

Nomenclature synonyms: *Buxo-Quercion pubescentis* ZÓLYOMI et JAKUCS ex JAKUCS 1960, *Quercion pubescentis* BRAUN-BLANQUET ex KLIKA 1937 (nomenclature type for the above two alliance names: *Lithospermo-Quercetum* BRAUN-BLANQUET 1932 nom. invers. propos. – **lectotypus hoc loco designatus**).

Remark 3: The name *Quercion pubescenti-petraeae* was rejected by JAKUCS (1960) in his proposal of the syntaxonomical classification of the European thermophilous oak forests. From the nomenclature point of view, this approach contradicts art. 29 of the Code so the alliance name *Buxo-Quercion pubescentis* proposed in JAKUCS's paper is a synonym for the *Quercion pubescenti-petraeae*.

Remark 4: KLIKA (1955: 321-322) divided the *Quercion pubescentis* into the suballiances of *Prunenion spinosae* KLIKA 1955, *Eu-Quercenion pubescentis* KLIKA 1955 and *Querco-Carpinenion* KLIKA 1955. In the syntaxonomical scheme accepted in this paper, the first suballiance does not belong to the *Quercetalia pubescenti-petraeae*, the *Eu-Quercenion pubescentis* corresponds to the *Quercion pubescenti-petraeae* and the *Querco-Carpinenion* is identical with the *Quercion petraeae*.

Association: *Pruno mahaleb-Quercetum pubescentis* JAKUCS et FEKETE 1957

Original form of the name: "*Quercus pubescens-Prunus mahaleb* Assoziation"

Nomenclature type: MICHALKO (1957: 69-71, Tab. 6, rel. 1) – lectotypus in CHYTRÝ (1994: 122).

Synonymy: *Quercetum lanuginosae pannonicum* DOSTÁL 1933 p. p., *Quercetum pubescentis praecarpaticum* subass. *Cotinus coggygria* FUTÁK 1947, *Querceto-Torminaletum orientale* JURKO 1951, as. *Quercus pubescens-Lithospermum purpureo-coeruleum* MICHALKO 1957, *Quercetum pubescentis caricetosum humilis* MICHALKO 1957, *Pruno mahaleb-Quercetum pubescentis* JAKUCS et FEKETE 1957 *arabidetosum pauciflorae* JAKUCS 1961 p. p.

Remark 5: JAKUCS (1961a) proposed the subassociation *P. m.-Q. p. arabidetosum pauciflorae* for Moravian communities of this association to reflect their presumed impoverishment compared to the Hungarian and Slovakian stands. The original diagnosis, however, also includes relevés which correspond to the *Corno-Quercetum*. For this reason, this subassociation is not accepted in the present paper.

Association: *Lathyro versicoloris-Quercetum pubescentis* KLIKA (1928) 1932

Original form of the name: "Asociace *Quercus lanuginosa-Lathyrus versicolor*"

Nomenclature type: KLIKA (1932: 331-333, Tab. I, rel. 5) – **lectotypus hoc loco designatus**.

Synonyms: *Quercetum lanuginosae* KLIKA 1928 nom. ambig., *Quercetum pubescentis* DOMIN 1928 nom. ambig., *Quercetum lanuginosae bohemicum* KLIKA 1933, *Quercetum pubescentis* SAMEK 1964.

***L. v.-Q. p. typicum* BLAŽKOVÁ 1997**

Nomenclature type: MORAVEC et al. (1991: Tab. 15, rel. 4) – holotypus in BLAŽKOVÁ (1997: 301).

Synonyms: *L. v.-Q. p. typicum* BLAŽKOVÁ in MORAVEC et al. 1991 nom. inval.

***L. v.-Q. p. poëtosum nemoralis* CHYTRÝ subass. nova hoc loco**

Nomenclature type: KLIKA (1932: 331-333, Tab. I, rel. 11) – **holotypus hoc loco designatus**.

Association: *Corno-Quercetum* MÁTHÉ et KOVÁCS 1962

Nomenclature type: MÁTHÉ et KOVÁCS (1962: 317-319, Tab. 2, rel. 1) – lectotypus in CHYTRÝ (1994: 124).

Synonyms: *Quercetum lanuginosae pannonicum* DOSTÁL 1933 p. p., *Quercetum pubescentis praecarpaticum* KLIKA 1937 p. min. p., *Pruno mahaleb-Quercetum pubescentis* JAKUCS et FEKETE 1957 *arabidetosum pauciflorae* JAKUCS 1961 p. p.

Pseudonym: *Lithospermo-Quercetum* sensu auct. bohem. non BRAUN-BLANQUET 1932.

***C.-Q. euonymetosum verrucosae* CHYTRÝ subass. nova hoc loco**

Nomenclature type: MÁTHÉ & KOVÁCS (1962: 317-319, Tab. 2, rel. 1) – **holotypus hoc loco designatus**, identical with the type of the association.

***C.-Q. euonymetosum europaeae* CHYTRÝ subass. nova hoc loco**

Nomenclature type: BLAŽKOVÁ (1989: 91-93, Tab. 3, rel. 5) – **lectotypus hoc loco designatus**.

Synonyms: *Lathyro versicoloris-Quercetum pubescentis alliarietosum* BLAŽKOVÁ 1962, *Torilido--Quercetum* BLAŽKOVÁ 1989 prov., *Torilido-Quercetum petraeae* BLAŽKOVÁ 1997.

Remark 6: In syntaxonomical literature, the *Corno-Quercetum* is usually cited with author citation "ZÓLYOMI et JAKUCS 1957". However, ZÓLYOMI & JAKUCS (1957) proposed several new names without original diagnoses and their references to earlier published diagnoses are ambiguous, because the paper contains no list of the literature cited (Art. 2b). Consequently the name "*Corneto-(Lithospermo-) Quercetum*", proposed by ZÓLYOMI & JAKUCS (1957) is a nomen nudum, similarly to the other names proposed in this paper (e.g. *Quercion petraeae*, *Genisto pilosae-Quercetum petraeae*).

Remark 7: In Germany and Bohemia, basiphilous communities with the field layer dominated by *Buglossoides purpurocaerulea* have been traditionally identified with *Lithospermo-Quercetum* BRAUN-BLANQUET 1932 (e.g. SCHUBERT 1972, MORAVEC et al. 1995). However, this association includes forests from northern Switzerland with several submediterranean species that do not occur in central Bohemia and central Germany (cf. BLAŽKOVÁ 1997).

Alliance: *Aceri tatarici-Quercion* ZÓLYOMI 1957

Nomenclature type: *Aceri tatarici-Quercetum roboris* ZÓLYOMI 1957 – **lectotypus hoc loco designatus**.

Association: *Quercetum pubescenti-roboris* (ZÓLYOMI 1957) MICHALKO et DŽATKO 1965

Nomenclature type: MICHALKO & DŽATKO (1965: Tab. 17, rel. 1) – **neotypus hoc loco designatus**.

Synonyms: *Aceri tatarici-Quercetum pubescenti-roboris* ZÓLYOMI 1957, *Quercetum pubescentis pannonicum molinietosum* KLIKA 1957.

Association: *Carici fritschii-Quercetum roboris* CHYTRÝ et HORÁK 1997

Nomenclature type: CHYTRÝ & HORÁK (1997: 206-211, Tab. 2, rel. 49) – holotypus.

Synonyms: *Querco-Potentilletum albae pannonicum* KLIKA 1957, *Quercetum roboris stepposum* SOÓ 1937 *caricetosum fritschii* ŠMARDA 1961.

Alliance: *Quercion petraeae* ZÓLYOMI et JAKUCS ex JAKUCS 1960

Nomenclature type: *Potentillo albae-Quercetum* LIBBERT 1933 – **lectotypus hoc loco designatus**.

Nomenclature synonyms: *Potentillo albae-Quercion petraeae* JAKUCS in ZÓLYOMI 1967, *Dactylido-Quercion* PASSARGE et HOFMANN 1968, *Querco-Carpinion* (KLIKA 1957) A. O. HORVÁT 1976, *Trifolio-Quercion petraeae-roboris* FÖRSTER 1979 (nomenclature type for the above 4 alliance names: *Potentillo albae-Quercetum* LIBBERT 1933 – **lectotypus hoc loco designatus**).

Syntaxonomical synonyms: *Euphorbio-Quercion* HOFMANN in PASSARGE et HOFMANN 1968 (nomenclature type: *Cynancho-Quercetum* PASSARGE in SCAMONI et PASSARGE 1959 – **lectotypus hoc loco designatus**), *Peucedano-Quercion* HOFMAN in PASSARGE et HOFMAN 1968 (nomenclature type: *Peucedano-Quercetum* PASSARGE 1956 – holotypus).

Association: *Potentillo albae-Quercetum* LIBBERT 1933

Original form of the name: "*Quercus-Potentilla alba*-Assoziation"

Nomenclature type: LIBBERT (1933: 297-299, Tab. XXV, rel. 1) – lectotypus in CHYTRÝ (1994: 125).

Synonyms: *Quercus sessiliflora-Melampyrum vulgatum*-Ass. FIRBAS et SIGMOND 1928 (var. *Potentilla alba*); *Serratulo-Quercetum* MRÁZ 1963.

Pseudonym: *Querceto-Carpinetum festucetosum heterophyllae* auct. p. p. non KLIKA 1939.

Remark 8: The association of *Melampyro vulgati-Quercetum sessiliflorae* was published by FIRBAS & SIGMOND (1928) and documented by a constancy table with three columns, representing three variants. The "*Potentilla alba*-Variante" is identical with *Potentillo albae-Quercetum*, whereas the other two variants correspond to the oak-hornbeam forest of the *Melampyro nemorosi-Carpinetum* PASSARGE 1957. Thus the name *Melampyro vulgati-Quercetum sessiliflorae* could be the correct name for either the *Potentillo albae-Quercetum* or the *Melampyro nemorosi-Carpinetum*. As a lectotypification which is necessary for the syntaxonomical interpretation, is not possible on the basis of the constancy table, I propose to reject the name *Melampyro vulgati-Quercetum sessiliflorae* as a nomen ambiguum.

Community: *Brachypodium pinnatum-Quercus robur*

Synonym: *Brachypodium pinnatum-Pinus sylvestris* community (MORAVEC 1972).

Association: *Sorbo torminalis-Quercetum* SVOBODA ex BLAŽKOVÁ 1962

Original form of the name: "*Torminaleto-Quercetum*"

Nomenclature type: BLAŽKOVÁ (1962: 263-265, rel. 6) – **lectotypus hoc loco designatus**.

Synonyms: *Quercus sessiliflora-Calamagrostis arundinacea-Anthericum ramosum*-Ass. FIRBAS et SIGMOND 1928; as. *Quercus-Brachypodium-Cynanchum vincetoxicum* MÁLEK 1961.

Pseudonym: *Cynancho-Quercetum* auct. bohem. non PASSARGE in SCAMONI et PASSARGE 1959.

Remark 9: In the Czech Republic, a widely used name for this association has been the *Cynancho-Quercetum* PASSARGE 1957. However, this name may not be used because of both syntaxonomical and nomenclature reasons: (1) the relevés by PASSARGE (1957) distinctly differ from that of this community from the Bohemian Massif and have a very similar species composition to the *Potentillo albae-Quercetum*; (2) PASSARGE (1957) actually did not describe an association but a "*Vincetoxicum-Quercus petraea*-Gesellschaft". The first relevé of the Bohemian Massif community was published by SAMEK (1960: 114-115) and labelled as the *Cynancho-Quercetum*. However, this name must be treated as a later homonym, because of the earlier publication of the association name *Cynancho-Quercetum* by SCAMONI & PASSARGE (1959). Despite the fact that it was published without an original diagnosis and without a reference to the *Vincetoxicum-Quercus petraea*-Gesellschaft or to the relevés in PASSARGE (1957), merely by means of a reference to the paper by PASSARGE (1957), this publication is considered as valid by both MORAVEC (in litt., 1995) and PASSARGE (in litt., 1995). Consequently, the correct name for the Bohemian Massif community is the *Sorbo torminalis-Quercetum* of BLAŽKOVÁ (1962) who supplied an original diagnosis to the name *Torminarieto-Quercetum*, published by SVOBODA (1955) as nomen nudum.

Remark 10: The subdivision of the *Sorbo torminalis-Quercetum* (sub *Cynancho-Quercetum*) into three subassociations was already proposed by NEUHÄUSL & NEUHÄUSLOVÁ-NOVOTNÁ (1977). The subassociation *C.-Q. caricetosum humilis* was proposed for the stands of xeric habitats, the *C.-Q. poëtosum nemoralis* for that of comparatively mesic habitats, and the *C.-Q. typicum* for intermediate types between the above two extremes. Such a classification of an association along a single gradient (xericity) into three subassociations is hardly acceptable. In this paper, three subassociations are also accepted, although they have different meaning, reflecting two gradients (xericity and pH, respectively).

***S. t.-Q. typicum* (NEUHÄUSL et NEUHÄUSLOVÁ-NOVOTNÁ 1977) CHYTRÝ et HORÁK 1997**

Nomenclature type: SAMEK (1962: 161-163, Tab. VI, rel. 36) – holotypus.

Synonyms: *Cynancho-Quercetum* PASSARGE 1957 *typicum* NEUHÄUSL et NEUHÄUSLOVÁ-NOVOTNÁ 1977.

***S. t.-Q. caricetosum humilis* (NEUHÄUSL et NEUHÄUSLOVÁ-NOVOTNÁ 1977) CHYTRÝ in CHYTRÝ et VICHEREK 1995**

Nomenclature type: CHYTRÝ & VICHEREK (1995: Tab. 6, rel. 24) – holotypus.

Synonyms: *Cynancho-Quercetum* PASSARGE 1957 *caricetosum humilis* NEUHÄUSL et NEUHÄUSLOVÁ-NOVOTNÁ 1977.

***S. t.-Q. poëtosum nemoralis* BLAŽKOVÁ 1962**

Nomenclature type: BLAŽKOVÁ (1962: 263-265, rel. 6) – **lectotypus hoc loco designatus**, identical with the type of the association.

Association: *Genisto pilosae-Quercetum petraeae* ZÓLYOMI et al. ex SOÓ 1963

Nomenclature type: FEKETE (1956: 357-358, Tab. sine no., rel. 1) – **lectotypus hoc loco designatus**.

Synonyms: *Quercus sessilis-Genista pilosa* soc. MAGYAR 1933.

Pseudonym: *Querceto-Luzuletum* FEKETE 1956 non HILITZER 1932.

Association: *Asplenio cuneifolii-Quercetum petraeae* CHYTRÝ et HORÁK 1997

Nomenclature type: CHYTRÝ & HORÁK (1997: 216-226, Tab. 3, rel. 83) – holotypus.

Relevé data used for synthesis

In the references not cited in the above text, shortened citations are given.

Pruno mahaleb-Quercetum pubescentis

JAKUCS (1961a: Tab. III, rels. 3, 5), southern Moravia, 2 rels.
HORÁK (1969: Tab. 2, rels. 8, 9, 12, 13), Pálava Hills, 4 rels.
CHYTRÝ & VICHEREK (1995: 145-156, Tab. 6, rels. 1-5), Podyjí National Park, 5 rels.
CHYTRÝ & HORÁK (1997: 197-202, Tab. 1, rels. 1-9), southern Moravia, 9 rels.

Lathyro versicoloris-Quercetum pubescentis typicum

DOMIN (1928: 21-22, rel. sine no.), Bohemian Karst, 1 rel.
KLIKA (1932: 331-333, Tab. I, rels. 4, 5, 8), Bohemian Karst, 3 rels.
KLIKA (1933: 769-770, Tab. X, rels. 2-3), Bohemian Karst, 2 rels.
KLIKA (1937): *Krása našeho domova* 29: 126-132 (pp. 129-130, rel. sine no.), Bohemian Karst, 1 rel.
KLIKA (1942: Tab. 1, rels. 17, 9, 10, 12-16, 19), Bohemian Karst, 15 rels.
KLIKA (1957: 575, 1st rel. sine no.), Bohemian Karst, 1 rel.
JAKUCS (1961a: Tab. I, rels. 21-25), Bohemian Karst, 5 rels.
BLAŽKOVÁ (1962: 255-259, rels. 1-10), Bohemian Karst, 10 rels.
SAMEK (1964: Tab. XI, rels. 3-5, 7-10), Bohemian Karst, 7 rels.
KUBÍKOVÁ (1977): *Folia Geobot. Phytotax.* 12: 167-199 (pp. 179-181, Tab. 8, rels. 46, 47, 49, 50), SW surroundings of Prague, 4 rels.
MORAVEC et al. (1991: 124-129, Tab. 15, rel. 4), SW surroundings of Prague, 1 rel.

Lathyro versicoloris-Quercetum pubescentis poëtosum nemoralis

KLIKA (1932: 331-333, Tab. I, rels. 10-12), České středohoří Mts., 3 rels.
KLIKA (1933: 769-770, Tab. X, rels. 6-8), České středohoří Mts., 3 rels.
KLIKA (1936): *Beih. Bot. Centralbl.* 54B: 489-514 (p. 501, rel. sine no.), České středohoří Mts., 1 rel.
ŠIMR (1948): *Ochr. Přír.* 3: 124-130 (p. 127, 2nd rel. sine no.), České středohoří Mts., 1 rel.
KLIKA (1952: 89, rel. sine no.; 10-11, rel. sine no.; 11, 2nd rel. sine no.; 12, rel. sine no.), České středohoří Mts., 4 rels.
KOLBEK (1978): *Folia Geobot. Phytotax.* 13: 235-303 (p. 297, 1st rel. sine no), České středohoří Mts., 1 rel.
KOLBEK (1983): *Preslia* 55: 325-341 (pp. 331-332, Tab. 2, rels. 1-2), České středohoří Mts., 2 rels.
STUDNIČKA (1987): *Severočeskou Přír.*, Append. 1987: 27-37 (p. 30, rel. sine no.), České středohoří Mts., 1 rel.
TOMAN (1988): *Feddes Repert.* 99: 565-602 (p. 578, 2nd rel. sine no.; p. 579, rel. sine no.), České středohoří Mts., 2 rels.

Corno-Quercetum euonymetosum verrucosae

JAKUCS (1961a: Tab. III, rels. 1, 2, 4), southern Moravia, 3 rels.
ŠMARDA (1960): *Česká Mykol.* 14: 222-228 (p. 224, rel. sine no.), Čebínka Hill near Tišnov, 1 rel.
HORÁK (1969: Tab. 2, rels. 5-7, 10-11, 14-19, 21-29), Pálava Hills, 20 rels.
KINCL (1989): *Acta Univ. Palack. Olomouc Fac. Rerum Nat., Ser. 2, Biol.* 29: 37-64 (pp. 40-41, Tab. 1, rel. 3), Třesín Hill near Litovel, 1 rel.
CHYTRÝ & VICHEREK (1995: 145-156, Tab. 6, rels. 6-8), Podyjí National Park, 3 rels.
CHYTRÝ & HORÁK (1997: 197-202, Tab. 1, rels. 10-54), south and central Moravia, 45 rels.

Corno-Quercetum euonymetosum europaeae

KLIKA (1933: 769-770, Tab. X, rels. 9, 10), middle Labe Basin, 2 rels.
KLIKA (1939): *Čas. Nár. Mus., Sect. Natur.* 113: 63-74, 84-90 (p. 87, 1st rel. sine no.; rel. on pp. 87-88 is identical with the relevé published by KLIKA 1933: 769-770, Tab. X, rel. 9), middle Labe Basin, 1 rel.
BLAŽKOVÁ (1962: 255-259, rels. 11-14), Bohemian Karst, 4 rels.
KOLBEK (1983): *Preslia* 55: 325-341 (pp. 331-332, Tab. 4, rels. 1-3), České středohoří Mts., 3 rels.
TOMAN (1988): *Feddes Repert.* 99: 565-602 (p. 578, 1st rel. sine no.), České středohoří Mts., 1 rel.

BLAŽKOVÁ (1989: 91-93, Tab. 3, rels. 1-8), SW surroundings of Prague, 8 rels.
MORAVEC et al. (1991: 124-129, Tab. 15, rels. 5-10), SW surroundings of Prague, 6 rels.
BLAŽKOVÁ (1997: 292-296, Tab. 1, rels. 7-9, 14-23, 26, 27, 29), S and SW surroundings of Prague, Křivoklát area, 16 rels.

Quercetum pubescenti-roboris

KLIKA (1932: 325-326, rel. sine no.), southern Moravia, 1 rel.
KLIKA (1957: 575, 1. rel. sine no.), southern Moravia, 1 rel.
CHYTRÝ & HORÁK (1997: 206-211, Tab. 2, rels. 1-47), southern Moravia, 47 rels.

Carici fritschii-Quercetum roboris

KLIKA (1957: 579, rel. sine no.), Dúbrava Forest near Hodonín, 1 rel.
GRULICH & GRULICHOVÁ (1986): *Zprávy Československ. Bot. Společn.* 21: 181-188 (pp. 184-185, Tab. 1, rels. 15), Dúbrava Forest near Hodonín, 5 rels.
CHYTRÝ & HORÁK (1997: 206-211, Tab. 2, rels. 48-52), Dúbrava Forest near Hodonín, 5 rels.

Potentillo albae-Quercetum

MIKYŠKA (1943): *Věstn. Král. České Společn. Nauk, Tř. Mat.-Přír.* 1944 (1943)/13: 160 (Tab. 7, rels. 12-21), Plzeň area, 10 rels.
KLIKA (1944): *Příroda (Brno)* 36: 39-40 (p. 39, rel. sine no.), middle Labe Basin, 1 rel.
KLIKA (1952: 16-17, Tab. 1, rels. 1-10), České středohoří Mts., 10 rels.
MRÁZ (1958a: Tab. I., rels. 2-11, 14-16, 19), middle Labe Basin, 14 rels.
MRÁZ (1958b: 720-723, Tab. 1, rels. 1, 2; rels. 38 in this table are identical with relevés 8, 11, 14, 9, 4 and 10, respectively, in MRÁZ 1958a: Tab. I), middle Labe Basin, 2 rels.
KLIKA (1959: 228-230, Tab. I, rels. 1-12), Křivoklát area, 12 rels.
BLAŽKOVÁ (1962: 266-271, rels. 1-11), Bohemian Karst, 11 rels.
MRÁZ (1963: 175-176, Tab. 4, rel. 329), middle Vltava Basin, 1 rel.
MIKYŠKA (1964): *Preslia* 36: 144-164 (pp. 158-160, Tab. IX, rels. 12-16), E part of the Labe Basin, 5 rels.
SAMEK (1964: Tab. IV, rels. 1-13), Bohemian Karst, 13 rels.
SOFRON (1967): *Sborn. Západočeského Muz. Plzeň, Ser. Natur.* 1: 20-37 (p. 21, rel. sine no.), Plzeň area, 1 rel.
MIKYŠKA (1968: 73-75, Tab. 1, rels. 95-99), E part of the Labe Basin, 5 rels.
NEUHÄUSL & NEUHÄUSLOVÁ-NOVOTNÁ (1968: 257-259, Tab. 17, rels. 48-57), central Bohemia, 10 rels.
NEUHÄUSL & NEUHÄUSLOVÁ-NOVOTNÁ (1969: 268-270, Tab. 2, rels. 46-49), Cidlina and Mrlina Basin, 4 rels.
NEUHÄUSL & NEUHÄUSLOVÁ-NOVOTNÁ (1979): *Stud. ČSAV* 1979/2: 1-208 (pp. 142-143, rel. 85), Železné hory Mts., 1 rel.
NOVOTNÝ & PETŘÍČEK (1980): *Stud. ČSAV* 1980/1: 177-188 (pp. 184-186, Tab. 1, rels. 17), Jizera Basin, 7 rels.
KOLBEK (1983): *Preslia* 55: 325-341 (pp. 333-334, Tab. 4, rels. 1-5), České středohoří Mts., 5 rels.
MORAVEC et al. (1991: 139-141, Tab. 17, rels. 1-3), SW surroundings of Prague, 3 rels.
DUCHOSLAV (1993): *Acta Univ. Palack. Olomouc Fac. Rerum Nat., Ser. 2, Biol.* 32, 107(1992): 25-42 (p. 39, rel. 19), Mentour bei Vysoké Mýto, 1 rel.
KOLBEK (1994): *Příroda (Praha)* 1: 207-219 (p. 208, 1st rel. sine no.), Křivoklát area, 1 rel.
CHYTRÝ & VICHEREK (1995: 145-156, Tab. 6, rels. 55-58), Podyjí National Park, 4 rels.
CHYTRÝ & HORÁK (1997: 216-226, Tab. 3, rels. 66-82), southern and central Moravia, 17 rels.

***Brachypodium pinnatum-Quercus robur* community**

MORAVEC (1972: 21-23, Tab. 1, rels. 1, 2a, 2b, 3-5), Strakonice area, 6 rels.
CHYTRÝ (ined.), Strakonice, Horažďovice, Sušice and Český Krumlov area, 16 rels.

Sorbo torminalis-Quercetum typicum

SAMEK (1962: 161-163, Tab. VI, rels. 12, 36, 27, B3), NE part of the Hřebeny Hills, 4 rels.
NEUHÄUSL & NEUHÄUSLOVÁ-NOVOTNÁ (1971): *Zprávy Československ. Bot. Společn.* 6: 13-26 (pp. 23-24, Tab. 3, rels. 57), SE surroundings of Prague, 3 rels.

PETŘÍČEK & KOLBEK (1976): *Preslia* 48: 230-246 (p. 236, rel. sine no.), Ploučnice River Valley, 1 rel.
KOLBEK & PETŘÍČEK (1979): *Sborn. Severočesk. Muz., Ser. Natur.* 11: 5-95 (pp. 46-47, rel. sine no.), Bezděz Hill near Doksy, 1 rel.
NEUHÄUSL & NEUHÄUSLOVÁ-NOVOTNÁ (1979): *Stud. ČSAV* 1979/2: 1-208 (p. 139, rel. 84), Železné hory Mts., 1 rel.
JAROŠ (1980): *Preslia* 52: 71-95 (pp. 85-86, Tab. 9, rels. 23, 25, 26), middle Sázava area, 3 rels.
KOLBEK et al. (1980): *Stud. ČSAV* 1980/1: 131-176 (pp. 152-153, rel. sine no.), Baba Hill near Křivoklát, 1 rel.
KOLBEK & PETŘÍČEK (1985): *Bohemia Centr.* 14: 109-160 (pp. 134-135, Tab. 24, rels. 1-3); Křivoklát area, 3 rels.
ŘEPKA (1986): *Zprávy Československ. Bot. Společn.* 21: 199-202 (p. 199, rel. sine no.), Moravský Krumlov area, 1 rel.
KINCL (1989): *Acta Univ. Palack. Olomouc Fac. Rerum Nat., Ser. 2, Biol.* 29: 37-64 (pp. 40-41, Tab. 1, rels. 12), Doubrava Forest near Mohelnice, 2 rels.
DUCHOSLAV (1990): *Zprávy Krajsk. Vlastiv. Muz. Olomouc* 263: 19-22 (pp. 20-21, 4 rels. sine no.), Vilémov bei Olomouc, 4 rels.
MORAVEC et al. (1991: 134-137, Tab. 16, rels. 4, 5, 7), S surroundings of Prague, 3 rels.
CHYTRÝ & HORÁK (1997: 216-226, Tab. 3. rels. 1-38), SW and central Moravia, 38 rels.

Sorbo torminalis-Quercetum caricetosum humilis
BLAŽKOVÁ (1962: 260-262, rels. 14, 6-11), Bohemian Karst, 10 rels.
MRÁZ (1963: 170-172, Tab. 2, rels. 328, 334, 327, 324, 187, 304), middle Vltava and lower Sázava Valleys, 6 rels.
KUBÍKOVÁ (1982): *Nat. Pragensis* 1: 5-70 (pp. 42-44, Tab. 7, rel. DŠ29), NW surroundings of Prague, 1 rel.
BÖSWARTOVÁ (1984): *Bohemia Centr.* 13: 83-133 (pp. 88-90, Tab. 2, 2a, rels. 1-5), middle Vltava Valley, 5 rels.
BLAŽKOVÁ (1989: 94-98, Tab. 4, rels. 4-7, 10), SW surroundings of Prague, 5 rels.
MORAVEC et al. (1991: 134-137, Tab. 16, rels. 1-2), S surroundings of Prague, 2 rels.
CHYTRÝ & VICHEREK (1995: 145-156, Tab. 6, rels. 10-12, 14-24, 26-33), Podyjí National Park, 22 rels.
CHYTRÝ & HORÁK (1997: 216-226, Tab. 3, rels. 39-45), SW and central Moravia, 7 rels.

Sorbo torminalis-Quercetum poëtosum nemoralis
MÁLEK (1961): *Vlastiv. Sborn. Vysočiny, Odd. Věd Přír.* 5: 67-86 (p. 70, rel. sine no.), Vranov Reservoir area, 1 rel.
BLAŽKOVÁ (1962: 260-262, rels. 5; 263-265, rels. 1-7), Bohemian Karst, 8 rels.
BLAŽKOVÁ (1989: 94-98, Tab. 4, rels. 13, 8, 9, 11-13), SW surroundings of Prague, 8 rels.
CHYTRÝ & VICHEREK (1995: 145-156, Tab. 6, rels. 36-43, 45, 46), Podyjí National Park, 10 rels.
CHYTRÝ & HORÁK (1997: 216-226, Tab. 3, rels. 46-51), SW Moravia, 6 rels.

Genisto pilosae-Quercetum petraeae
CHYTRÝ (1991: 194-195, Tab. 1, rels. 1-20), SW Moravia, 20 rels.
CHYTRÝ & VICHEREK (1995: 145-156, Tab. 6, rels. 49-51, 53, 54), Podyjí National Park, 5 rels.
CHYTRÝ & HORÁK (1997: 216-226, Tab. 3, rels. 52-65), SW Moravia, 14 rels.

Asplenio cuneifolii-Quercetum petraeae
CHYTRÝ & HORÁK (1997: 216-226, Tab. 3, rels. 83-91), middle Jihlava Valley, 9 rels.

Folia Geobot. Phytotax. 32: 259-281, 1997

HEATHLAND VEGETATION OF THE NORTHERN-CENTRAL PART OF THE IBERIAN PENINSULA

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Keywords: *Calluno-Ulicetea*, Classification, Multivariate analysis, Ordination, Phytosociology, Syntaxonomy

Abstract: Heathland vegetation of northern Spain, included in the *Calluno-Ulicetea*, was studied using a set of 802 phytosociological relevés. The existing syntaxonomy has been tested and most of the types (associations and subassociations) fit satisfactorily with the observed groupings. Two main problems were encountered within the *Ulex* dominated communities of the Cantabrian fringe and the Castilian-Cantabrian heathland communities. Both groups of communities were subject to ordination in order to clarify relationships between them. For the former group, ordination suggests that three associations can be distinguished: the *Ulici-Ericetum vagantis* (lowlands up to the submontane belt), the *Vaccinio-Ulicetum gallii* for the communities of higher altitudes (montane belt) and the *Ulici-Ericetum ciliaris* (hygrophilous heathlands). The Castilian-Cantabrian heathlands show a variable Mediterranean influence and have a dispersed distribution due to lithological conditions. This results in the distinction of two new associations, viz. the *Arctostaphylo crassifoliae-Daboecietum cantabricae* (marly, water-retaining soils) and the *Ericetum scopario-vagantis* (sandy soils). A complete classification of the *Calluno-Ulicetea* in the studied area and short ecological and biogeographical diagnoses are given.

INTRODUCTION

Heathlands, dominated by ericaceous shrubs on acid soils, are one of the most characteristic vegetation types of Atlantic Europe. They are abundant in the Eurosiberian Region with a wet and oceanic temperate climate, extending to the northern part of the continent and including the British Isles. In the Mediterranean part, they are much less frequent, due to drier climatic conditions, and are present only in exceptionally rainy areas of the western and southwestern part of the Iberian Peninsula. The species richness of heath communities shows an inverse relationship to their abundance: the Ibero-Mediterranean communities bear a much richer flora than the northern ones, probably due to the absence of impoverishment during the recent Ice Age. Their development and proliferation have been traditionally related to man-induced fire and grazing. In most of the Atlantic regions of Europe, heathlands occupy large areas, particularly in mountains or on siliceous substrata (e.g. sandstone), considered unsuitable for arable use. Historically, they have been often subject to grazing and harvesting in the context of traditional land use of the Atlantic countries. The communities discussed are included in the *Calluno-Ulicetea* (for a comprehensive monography see RIVAS-MARTÍNEZ 1979). From the biogeographical point of view, this heathland vegetation is distributed in the Atlantic and Mediterranean-Iberoatlantic Superprovinces, being also present in the rainy siliceous areas of NW Morocco.