Plant communities of the thermophilous oak forests in Moravia

Rostlinná společenstva teplomilných doubrav na Moravě

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Chytrý M. et Horák J. (1997): Plant communities of the thermophilous oak forests in Moravia. – Preslia, Praha, 68(1996):193–240.

A phytosociological synthesis of the order *Quercetalia pubescenti-petraeae* Klika 1933 in Moravia, the eastern part of the Czech Republic, is based on 319 relevés. Three alliances and 8 associations are distinguished. The alliance *Quercion pubescenti-petraeae* Br.-Bl. 1932 includes thermophilous oak forests on calcareous bedrocks with two associations: *Pruno mahaleb-Quercetum pubescentis* Jakucs et Fekete 1957 and *Corno-Quercetum* Máthé et Kovács 1962. The alliance *Aceri tatarici-Quercion* Zólyomi 1957 occurs in southern Moravia only, and includes the Pannonian communities of flat landforms, namely the associations *Quercetum pubescenti-roboris* (Zólyomi 1957) Michalko et Džatko 1965 on chernozems over loess and *Carici fritschii-Quercetum roboris* ass. nova on sand. Communities of the Central European alliance *Quercion petraeae* Zólyomi et Jakucs ex Jakucs 1960 are mainly concentrated in the upland fringes of the Bohemian Massif. They comprise the associations *Sorbo torminalis-Quercetum* Svoboda ex Blažková 1962 and *Genisto pilosae-Quercetum petraeae* Zólyomi, Jakucs et Fekete ex Soó 1963 on shallow soils over siliceous rocks, as well as *Potentillo albae-Quercetum* Libbert 1933 on heavy loamy soils and *Asplenio cuneifolii-Quercetum petraeae* ass. nova on serpentines.

Keywords: Vegetation, phytosociology, syntaxonomy, *Quercetalia pubescenti-petraeae*, *Quercion pubescenti-petraeae*, *Aceri tatarici-Quercion*, *Quercion petraeae*, Czech Republic

Introduction

The thermophilous oak forests of the order *Quercetalia pubescenti-petraeae* Klika 1933 are a typical plant community type in Moravia. Being widespread in the comparatively warm and dry south and along the eastern margin of the Bohemian Massif, they reach the central part of the country (Mikyška et al. 1968–1972). Most of the communities possess a high floristic diversity and they harbour many endangered plant species (Horák 1960). Nevertheless, they have long been overlooked by phytosociologists, and their syntaxonomy and the distribution of particular community types has remained unknown.

The first Braun-Blanquet phytosociologist who occasionally sampled this vegetation in Moravia was Klika (1932, 1957). However, his two relevés were only used for a comparison with his extensive Bohemian and Slovakian relevé data and failed to infer syntaxonomical consequences. Similarly, Jakucs occasionally sampled some thermophilous oak forest stands in three Moravian localities during the International Phytogeographical Excursion in 1958 and tried to build a syntaxonomical scheme by means of the comparison with Hungarian and Slovakian communities (Jakucs 1961a,b). Šmarda (1961) studied the plant communities of Dúbrava Forest near Hodonín and he also dealt with the special type of thermophilous oak forest communities in that area.

Later on, Grulich et Grulichová (1986) paid attention to the forests in that area again. Further phytosociological studies were carried out only at the turn of the 1980s and 1990s in central Moravia (Kincl 1989, Duchoslav 1990, Chytil 1991) and south-western Moravia (Chytrý 1991, Chytrý et Vicherek 1995, Tichý 1995).

Apart from the research that followed the Braun-Blanquet approach, a study of the forest site types oriented on the applications in forestry was being carried out since the early 1950s. The results were summarized in an extensive manuscript (Horák 1972) and in a series of papers (Horák 1969, 1979, 1980, 1981, 1983). However, the recognition of this study by the Braun-Blanquet phytosociologists was hindered due to the application of different terminology and classification hierarchy.

The objective of this paper is to present a phytosociological classification of the thermophilous oak forest communities in Moravia, based, besides some literary data, on the relevé material of J. Horák which was originally used for the forest site type classification, and the unpublished material of M. Chytrý from the late 1980s and early 1990s.

Methods

This study follows the principles of the Braun-Blanquet approach (Braun-Blanquet 1964, Westhoff et van der Maarel 1978). The bulk of the relevés for the phytosociological synthesis was sampled by M. Chytrý in 1988–1994 and J. Horák in 1953–1970. Relevés of M. Chytrý were sampled using the 7-grade Braun-Blanquet scale (–, +, 1, 2, 3, 4, 5). J. Horák was using a modified version of this scale with the grades 2–5 subdivided into two subgrades; his relevés were transformed to the standard scale mentioned above. Relevés of M. Chytrý are indicated by "C" in the lists of localities, that of J. Horák by "H". Some other unpublished relevés were provided by J. Danihelka (12 rel.), J. Vorel (11), J. Chmelař (1) and V. Grulich (1), and with the kind permission of the authors, we used some relevés from unpublished theses of P. Chytil (6) and L. Tichý (5). This data set amounted to 203 unpublished relevés, and a further 116 relevés so far published in the literature were also included.

The whole data set (without the ground layer species which were not indicated in all the relevés) and, subsequently, subsets of similar relevés were analysed by the program TWINSPAN (Hill 1979). Divisive classifications provided by this program were used as a guideline for building a classification hierarchy of alliances, associations and subassociations. Patterns of variation within thermophilous oak forests described from the neighbouring territories (Slovakia, Hungary, Austria, Bohemia and Poland) were also taken into account. The names of the syntaxa distinguished were checked according to the Code (Barkman, Moravec et Rauschert 1986). For the presentation of the similarity patterns among communities, correspondence analysis of relevés was used with the default options from the program CANOCO (ter Braak 1987, 1990).

The FAO soil classification is used for naming soil types. The nomenclature of the plant taxa follows Ehrendorfer (1973) for vascular plants, Frahm et Frey (1992) for bryophytes, and Poelt (1969) for lichens.

In Moravia, Koblížek (1990) reports three species within the *Quercus petraea* group (*Q. petraea* (Matt.) Liebl., *Q. dalechampii* Ten. and *Q. polycarpa* Schur) and two species

within *Quercus pubescens* group (*Q. pubescens* Willd., *Q. virgiliana* Ten.). However, as the author himself admits, taxonomy and the patterns of morphological variation in oaks appear to be very complicated and need further study. On the basis of our field experience, we take the identification of taxa within these groups as impossible in phytosociological field research, and consequently we recognize only four native oak species in Moravia: *Quercus cerris* L., *Q. petraea* (Matt.) Liebl., *Q. pubescens* Willd. and *Q. robur* L.

In this paper, the name *Festuca ovina* is used for both *Festuca ovina* L. and for the populations that occur especially in the Bohemian Massif and probably better treated as a separate species *"F. firmula"* (see Fischer 1994 sub *F. guestfalica*).

Results

Three alliances of the order *Quercetalia pubescenti-petraeae* Klika 1933 with 8 associations were distinguished in Moravia:

Quercion pubescenti-petraeae Br.-Bl. 1932

This alliance comprises the thermophilous oak forests dominated by *Quercus pubescens*. In some places, outside the *Q. pubescens* range, *Q. petraea* may also dominate. The shrub layer is well developed. The trees may be dwarfed in extreme habitats of sunny slopes and then the separate tree and shrub layers can hardly be distinguished. These forests prefer south-facing slopes with base-saturated soils, usually over limestones or other calcareous parent materials. They are confined to the warm foothills of the Alps and the Carpathians, with several outposts north of the Alps. In Moravia, these forests are found in the limestone areas of the Pavlovské vrchy Hills and the Moravian Karst, on the carbonate-rich sandstones of the Carpathian flysch in southern Moravia, and scattered occurrences may be encountered on the patches of limestone or calcareous conglomerate outcrops in the Bohemian Massif.

Pruno mahaleb-Quercetum pubescentis Jakucs et Fekete 1957 (Table 1, Fig. 1)

The stands are characterized by low and open tree layer, dominated by *Quercus pubescens* which makes the development of a vigorous shrub layer possible. The shrubs often attain the height of the lower tree layer, thus the separate tree and shrub layers can hardly be recognized. Besides the suppressed individuals of *Quercus pubescens*, the most typical species of the shrub layer are *Viburnum lantana, Ligustrum vulgare* and *Cornus mas*. The prevailing species of the herb layer are the diagnostic species of the order and the alliance, as well as of the thermophilous forest fringes (e. g. *Dictamnus albus, Geranium sanguineum, Carex michelii, Vincetoxicum hirundinaria*), and species of dry grasslands (*Brachypodium pinnatum, Carex humilis, Festuca rupicola, Inula ensifolia, Stachys recta, Aster amellus, Salvia pratensis, Teucrium chamaedrys* etc.).

This community is usually found at altitudes of 280–350 m. Only on the slopes of the Pavlovské vrchy Hills, it reaches higher altitudes. Typical landforms are the south-facing slopes of 10–30°. It occurs on rendzinas over Jurassic limestones on the Pavlovské vrchy Hills and calcaric regosols over calcareous flysch sandstones of the Paleogene age in the

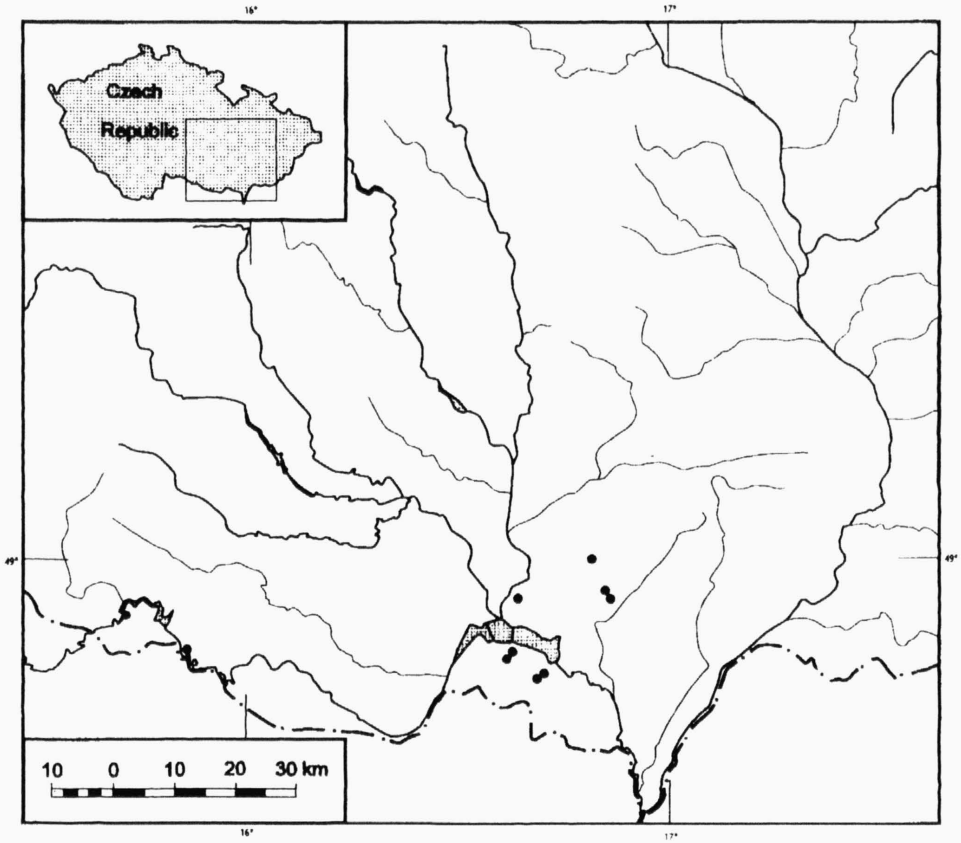

Fig. 1. – The distribution of the *Pruno mahaleb-Quercetum pubescentis* in Moravia according to the relevé data.
Obr. 1. – Rozšíření *Pruno mahaleb-Quercetum pubescentis* na Moravě podle fytocenologických snímků.

south-western part of the Ždánický les Hills (forest tracts around Boleradice, Kolby Forest near Pouzdřany) and in the Milovická pahorkatina Hills (Milovický les Forest). An isolated locality was found on marbles in the Dyje River valley near Čížov where the floristic composition is slightly impoverished and *Quercus robur* is the dominating tree species instead of *Q. pubescens* (Chytrý et Vicherek 1995). The *Pruno-Quercetum* forests are spatially connected with the natural thermophilous scrub and the forest fringe communities.

The *Pruno-Quercetum* is widespread in the Hungarian Central Range and on the southern fringes of the Western Carpathians in Slovakia (Jakucs et Fekete 1957, Jakucs 1961a,b, Chytrý 1994). It reaches its north-western distributional limits in north-eastern Austria (Wallnöfer, Mucina et Grass 1993) and in Moravia. Jakucs (1961a,b) noted that the Moravian communities are impoverished and included them in the subassociation *P.m.-Q.p. arabidetosum pauciflorae* Jakucs 1961a. However, among 5 relevés in the original diagnosis of this subassociation, three relevés correspond rather to the communities of *Corno-Quercetum* and, consequently, there seems to be no good reason to accept Jakucs's syntaxonomical treatment of variation patterns within this association.

Table 1. *Quercion pubescenti-petraeae*: 1–9 *Pruno mahaleb-Quercetum pubescentis*, 10–49 *Corno-Quercetum*, 50–54 *Corno-Quercetum*, synanthropic variant of the Rajsna Forest.

Relevé nr.	111111111122222222223333333333444444444455555
	123456789012345678901234567890123456789012345
E_3 – tree layer	
Diff. - *Corno-Quercetum*	
Quercus petraea	2...+...+3.32..+3233322321322.1241.2341.455.212.. .....
Carpinus betulus	.....2.2.2.2.12322235..1...+....++..... .....
Acer campestre	.....2.11....+1.....1...22.+2..... .....
Diff. – *Corno-Quercetum*, synanthropic variant of Rajsna Forest	
Robinia pseudacacia	..... 2.222
Diff. – high-ranked syntaxa and companions	
Quercus pubescens	334344454 .323344.1.....423434..3331.341..544335 43443
Sorbus torminalis	+....2... 1..1....11.1....1..2.....21.....1.. ..1..
Fraxinus excelsior	....2..+. .....222.....32. .....
Tilia cordata	.....2.....2..1..... .....
Prunus avium	....1++
E_2 – shrub layer	
Diff. – *Corno-Quercetum*	
Acer campestre	+..... .+2.122..++.+...+.1.2.++2++.+1.++..... .....
Quercus petraea	+.....+ ..+...+.+++.++.....-++.+..2.111...+.. .....
Rosa sp.	..+..... .+....+1.-+.-...+++.....+.....+.+..... +...+
Sorbus torminalis	.....+. ..1...-..++....+.+1...+.+.+..2.++...+... .....
Rhamnus catharticus	.....+...++..-..+...+.+.+...1..+...++..... ....+
Carpinus betulus	.....1...2..2+1+.....1.....+..... .....
Corylus avellana	.....--...11.....+.2.....4 ..+..
Diff. – high-ranked syntaxa and companions	
Ligustrum vulgare	1+2.+1122 1.....2.....2.121.1.21.1121+1122++.221+. 2+2.2
Crataegus monogyna	3+...1.++ 23+2.+2.+2+.+2211+..21..+1+2..2..... 11223
Cornus mas	2.+...3.21 32232334211.2222..2+2...+2.3.1.....3.... ....+
Euonymus verrucosa	....-.+++ 3.++..1..+..++12.+2++32+++.+..1++..... ..11.
Quercus pubescens	+++2+.222 .+..++1.....+.111...12.+.2.....+1++. .....
Cornus sanguinea	.+....+.. +1....+.....2.....2..12..... .....
Viburnum lantana	.....2.1+ .....++....2.....+. .+.-.
Fraxinus excelsior	.....+1 .....+++.++.....+.....2. .....
Prunus spinosa	+.+..... .....+...11.....1..... +...+
Crataegus laevigata	.....12.....11.1.....+..... .....
Rosa canina agg.	+..... .....2..2..++.....-..... .....
Euonymus europaea	+..... .....+.....1 +..+.
Lonicera xylosteum	.....1.+.....-.....+..... .....
Berberis vulgaris	.....+.....-. ...11
Juglans regia	.....++..... .2..1
Pyrus pyraster	.....+... .....-.....+..... .....
Cotoneaster integerrimus	.....+.....++..... .....
Tilia cordata	.....-.....+....+..... .....
Sambucus nigra	..... +1+..
E_1 – seedlings and juvenile tree and shrub species in the field layer	
Acer campestre	+..... +.+++11.-....++1...+..+..+....+.-.....+ .....
Rosa sp.	..... +..++++++..+...+.+.+..... .++++

Table 1. (continued)

Relevé nr.	111111111122222222223333333333444444444455555 123456789 012345678901234567890123456789012345678901234
Euonymus verrucosa	..... +.....+.+....+....1+.....+...++..... .-+++
Rhamnus catharticus	....+...-..+.+..+.1+.++..... .-.-+
Quercus pubescens	+....+... .+.++++.....1.....1.....+ ....+
Carpinus betulus	..... +.+.1.+.-..+.1+...+..... .....
Ligustrum vulgare	....-.....+1...+..+.....+..... ...+.
Prunus spinosa	+.....- .....+.....+..... .-..+
Crataegus monogyna	..... +.....+..11..... ++...
Cornus mas	....+.1....+.+.....- ...-.
Viburnum lantana	.....+... .....1..... .+++.
Quercus petraea	.....+..+.+.1.....+..... .....
Euonymus europaea	+..... .....- .+..+
Sorbus torminalis	.....-... .....-..+.+..... .....
Fraxinus excelsior	.....+..+.++..... .....
Rosa canina	.....2..-.....++..... .....
Ulmus minor	.....1..... +1+..
Berberis vulgaris	+.....+-..... .....
Fagus sylvatica	.....-+-..... .....
Acer platanoides	.....+.....++..... .....
Corylus avellana	.....+....+.....+..... .....

E_1 – field layer

Diff. – *Pruno mahaleb-Quercetum pubescentis*

Carex humilis	2232.2222	.1.....1.....1.+.+...+...-.+12.. .....
Inula ensifolia	11-3.111.	.....1..... .....
Adonis vernalis	+.++1-++.	....
Stachys recta	.-+1.-++-	.....+.....+..1.. .....
Aster amellus	111..++2.	.....1+.....+..... .....
Dorycnium germanicum	+++1...2.	.....+..... .....
Agropyron repens	.1+2+..3.	..... +....
Galium glaucum	.++-.++..	.....+..... .....
Geranium sanguineum	.112.+.1.	.....+....1+.....++..... .....
Iris pumila	.++1..++.	....
Inula hirta	11.1..1..	.....1.+.....1..... .....
Salvia pratensis	.1.1.+..+	....

Diff. – *Corno-Quercetum*

Polygonatum odoratum	.....1...	1+12111+1++.+1+1...+..+.....+..... ...++
Campanula rapunculoides	.....	2.2122+++...+....1...+1+.2.....1...-+1 .....
Poa nemoralis	.....	+.++.-.+.+.+.....11+...+....2..+33+.++1+ .....
Veronica chamaedrys agg.	.....	+..+.-.+++1.++++....+.....++.+.111....- .....
Convallaria majalis	-.....2	....+...+2+..1++.....3333.4.2.....-.442 ..+..
Poa pratensis agg.	..1.....	.2.1112.2.+.1+..+...21.....12..11.2..... .....
Geum urbanum	.....	.....=.....+.-.+.++...1....1..++....+ ++-++
Melica uniflora	+..-.....	3+1...+2+3+...23.124.....+.1..... ...1.
Carex muricata agg.	.....	-+11.1...-+.....1.....+...++++.-... +....
Alliaria petiolata	....-....	+...-..++.-....++22++.....++.....+ .....
Primula veris	.....	3.2....+1+++....1+..1.....+.....++2 .....
Viola mirabilis	1.....	....-.....1..+.+.....-.+..1.+.....-.. +2++1
Brachypodium sylvaticum	.....-.	...+.....12..++.....+1.+...++.+..... .1.+.
Lathyrus niger	.....	.....+1+++..+.....+...-.+1..++.....+ .....
Viola odorata	.....	.-..1.1.11+.1.....-.+.....2 .2..1
Silene nutans	.....	.....+-.++....1.++.....+++..... .....
Carex montana	.....	.....1+2.....+..1122..+...+... ....+

Table 1. (continued)

Relevé nr.	111111111122222222223333333333444444444455555
	123456789 012345678901234567890123456789012345678901234
Diff. – *Corno-Quercetum*, synanthropic variant of Rajsna Forest	
Mercurialis ovata	....+ 32133
Impatiens parviflora	....2.....+..... 12121
Stachys sylvatica	.... ++1++
Viola hirta × *V. odorata*	.... .1+11
Char., diff. – *Quercion pubescenti-petraeae*	
Buglossoides purpurocaerulea	111.12+1+ .....++221121+.....+.+.1-2.121+.2.+..2 1.4.2
Dictamnus albus	112132221 .....1++...12221+1.1++1++1+. .....
Veronica teucrium	...1+..+. .....+...+.....+..... .....
Char., diff. – *Quercetalia pubescenti-petraeae*	
Vincetoxicum hirundinaria	+121.+221 .2.3212111++2222.+113+.++–...+1.+2..++. .+..+
Tanacetum corymbosum	1+++++-+. .....+1+++1++.221121++..+1+++1.1+....+ .....
Teucrium chamaedrys	12211+111 .2.1.-1.+..121++1+.21+..+12.+..+..1.13.. .....
Viola hirta	111+1+.1- .1+11.1+....++.....1..1+1+.+.1+++..... 11111
Brachypodium pinnatum	22314222. 1.....4.+344..3211.3..1.3..132+.2..2.. 1...1
Bupleurum falcatum	11.+-1.1+ +1..++1.112111+1++..1.....2..++..... ....-
Carex michelii	..+1..2+1 .1.....1...21++.....1.+12+..1++.+231. +.+.+
Euphorbia cyparissias	+-+–+... +1+1..1+112.11++.....-...1...2..11. ....+
Anthericum ramosum	+.++...1. .1+.1...11-+11-1.1+-...+.....11.....+.. ....-
Coronilla varia	++.+...1. ...+..+.1+1.11.....+...++.2..++..+...+. .....
Sedum maximum	.++..... ++.+.+.-1.+.1+++.1.+1++.....+..... .....
Fragaria vesca	..+.+.... +.....1.121.....1.2..1+1..+..1++.-.... ...-1
Ajuga genevensis	.-1..1+++ .1.+....+.+.++.....+.+.....11-. .....
Euphorbia polychroma	1..-.+..+ -1.....++++.++.-+..+.....+..... .....
Melittis melissophyllum	1....+... .....+1+1.+.+.....+..+.2.1..++...+.. .....
Festuca rupicola	.2222.1.. +1....-.+....1+11..+.....+..... .....
Origanum vulgare	.11..... ....+..+2+21..+....+...11....++.....1.. .....
Peucedanum cervaria	+++1..... .....1.++.2++.....+1..... .....
Achillea millefolium agg.	.112..++. ...+.....++.....+++.....-..... .....
Hypericum perforatum	..+....+. .1.....+.+.+.....+.+.....+.+..+..... .....
Verbascum austriacum	.....1... +..+...-1.+.++.....1.-..+..... .....
Inula conyza	.-+....+. .2-+.....-.....-.....+..... .....
Melampyrum cristatum	.+1+..... .....+.....+..... .....
Trifolium alpestre	....1+.....+.1..... .....
Char., diff. – *Querco-Fagetea*, *Fagetalia* and companions	
Fragaria moschata	+.+..... ..1.+...11..21111122.1-..++++1+1+..... .....
Dactylis glomerata agg.	..+.+..+. .....-1212111..+21.1.-++.21.111..... .+...
Galium mollugo agg.	+.....+. 12.....-21311111+.+.+...++11...11.+..... .....
Clinopodium vulgare	+.2....+. +....-.+11+111+1.....1+.+1+1..-... ....+
Campanula persicifolia	..+..... +...+...+++..+.....+.....++..111..... .....
Fragaria viridis	1..-....+ .+.+-.1+..1.....+..1.....2..... .....
Pulmonaria officinalis agg.	1..... .....++.....1++.-.+..1...111..... .....
Betonica officinalis	..1..... ...++.+....1+1....+...-.....++.+..... .....
Melica nutans	1..... +.....+++..+.....+..+...+..1.+..... .....
Bromus benekenii	....+11.+1.....+.+.....+.....+ .1...
Taraxacum officinale agg.	+....+... +....+....-.....+.....+.....+..... .-...
Genista tinctoria	.+++..... .....-..+1+.....+.....+..... .....
Polygonatum multiflorum	.+..... .....+.....-+.....++...1.+ .+...
Hieracium sylvaticum	..-..... .....+...-+.....+....1+.....1+..... .....
Carex digitata	..... +.....11++.1.....1.1.1..... .....

Table 1. (continued)

Relevé nr.	111111111122222222223333333334444444444 55555 123456789 012345678901234567890123456789012345678901234
Hieracium sabaudum	. . . .+.....++.....++...++..++..... .....
Calamagrostis arundinacea	. . . .++-+.....+...+2...+.....+. .....
Campanula bononiensis	++-..... .....1....+.+1.....+..... .....
Pulmonaria mollis	..+..... .....-.....+.....-...+-.....+ .....
Iris variegata	....1+... .....+...++.-....22. .....
Stellaria holostea	. . . .1.+...1+....+.+.....13..... .....
Hypericum montanum	..+..... .....-+.....+.....+++..... .....
Galium pusillum agg.	.....+. .....-..1.....++.....+.....1..... .....
Galium aparine	. . . . . +...++.....+....+.....1.....+ .....
Lathyrus vernus	. . . . . -.....+++..-.+.....1..... .....
Myosotis sylvatica	. . . . . +.....-..+.-.....+.....+.+..... .....
Fallopia dumetorum	. . . . . .+..+.....11..... +-+..
Glechoma hederacea agg.	. . . .1.....2....1..+22.2..... .....
Astragalus glycyphyllos	.....+. .....-.....-...+...+..... ..+..
Allium montanum	. . . . . .+.....1..+2+.+..... .....
Arabis pauciflora	. . . .-.-.-.+.....+..+..... .....
Geranium robertianum	. . . .+.....+..++.+.....+ .....
Anemone ranunculoides	. . . .+.....+-....+-1 .....
Hieracium lachenalii	. . . .++.....+.-....+....+..... .....
Solidago virgaurea	+.+.....- .....1.+..... .....
Asarum europaeum	+..... .....+21.1..... .....
Silene vulgaris	...1..... .....-.....+.-.....+ .....
Melampyrum pratense	.....-.. .....+21..-..... .....
Carex praecox	. . . . . .1..+.....++.....+..... .....
Inula oculus-christi	. . . . . .1....+.....+...1+..... .....
Allium oleraceum	. . . .1.11.....+ ....-
Lapsana communis	. . . .+.....+....1.....+.....+..... .....
Digitalis grandiflora	. . . .1+.....+...1.....+..... .....
Hedera helix	. . . .+...-.1.....1.....+ .....
Festuca ovina	. . . .-.....1..+11..... .....
Valeriana wallrothii	. . . .+.+-.....+..... ....-
Myosotis arvensis	. . . .1.+.....12..-... .....
Clematis recta	. . . .+.....++...+....+ .....
Helianthemum ovatum	++.+..... .+..... .....
Veronica spicata	.+1....1. .....+..... .....
Arabis hirsuta agg.	.+..... .....-.....-+. .....
Thalictrum minus	..+-.... .+..... .....
Melica ciliata	..-+..... .....1...1..... .....
Medicago falcata	..+..... .....+..+...+..... .....
Festuca valesiaca	...1...1. .....+....1..... .....
Epipactis helleborine	.....-. .....++.....+..... .....
Galium sylvaticum	. . . . . -.....+.....+....1..... .....
Asperula tinctoria	. . . . . .1.....++.....+..... .....
Galium verum	. . . .+.+1.....+..... .....
Carex caryophyllea	. . . .2..+1.....+..... .....
Campanula trachelium	. . . .++.....+..+..... .....
Veronica officinalis	. . . .1+.....1...+..... .....
Corydalis pumila	. . . .+-.....+...+.. .....
Hieracium maculatum	. . . .+....-1....+..... .....
Melampyrum nemorosum	1..... .....1.....1..... .....
Potentilla patula	.2++..... ....
Inula ensifolia × *I. salicina*	.2+-..... ....
Lotus corniculatus	.-+..+... ....
Hieracium bauhinii	.1+..... .....-..... .....

Table 1. (continued)

Relevé nr.	111111111122222222223333333333444444444455555 123456789 012345678901234567890123456789012345678901234
Asparagus officinalis	..+.-..+ ....
Thymus glabrescens	..+....1. .+..... .....
Bromus inermis	..+.....+ ..... 1....
Acinos arvensis	..+..... .+.....+..... .....
Lathyrus pannonicus	...+..++. ....
Falcaria vulgaris	...-..+.. .....1..... .....
Rosa pimpinellifolia	.....+.+ .....1..... .....
Verbascum lychnitis	.....-.. .+.....+..... .....
Mercurialis perennis	..... +.....1+. .....
Myosotis ramosissima	..... .1..-.....+..... .....
Arabidopsis thaliana	....+.....++..... .....
Fallopia convolvulus	....1.-+..... .....
Festuca rubra agg.	....+.....+.....+..... .....
Torilis japonica	....1.....+..... .+...
Agropyron intermedium	....+.....11..... .....
Hepatica nobilis	....+1..+..... .....
Viola reichenbachiana	....+..... ..++.
Viola collina	....+.....+.....+..... .....
Lychnis viscaria	....++.....+..... .....
Corydalis solida	....-+1..... .....

E_0 - ground layer

Hypnum cupressiforme	.	+	2.	1+.+..+.+.+...+.+...+1..... .
Brachythecium velutinum	.	1	..	+.....+1.+.....1... .
Tortula ruralis	.	.	+2	.+.+....+..... +
Abietinella abietina	.	+	.1	.....+1.....+..... .
Homalothecium sericeum	.	.	+.	.....11..... +
Pleurozium schreberi	.	.	..	.....1...2...+.....+..... .
Eurhynchium swartzii	.	.	..	.....1++.1..... .
Ceratodon purpureus	.	1	..	+.....+..... .
Anomodon viticulosus	.	.	+.	.....1.2..... .
Porella platyphylla	.	.	+.	.....11..... .
Homalothecium philippeanum	.	.	..	.+.+..1..... .

In two or one relevés:

E_3: *Pyrus pyraster* 13:1, 40:1, *Fagus sylvatica* 21:1, 23:1, *Tilia platyphyllos* 37:1, 48:2; *Crataegus laevigata* 13:+, *Pinus nigra* 16:+, *Pinus sylvestris* 23:+, *Sorbus domestica* 32:4, *Acer platanoides* 37:2, *Juglans regia* 52:1;

E_2: *Robinia pseudacacia* 13:+, 52:+, *Acer platanoides* 19:-, 20:-, *Prunus avium* 28:1, 29:+; *Daphne mezereum* 16:-, *Staphylea pinnata* 19:-, *Fagus sylvatica* 21:+, *Sorbus aria* agg. 29:+, *Colutea arborescens* 30:+, *Crataegus* sp. 32:+, *Rosa pimpinellifolia* 37:+, *Rosa vosagiaca* agg. 40:2, *Tilia platyphyllos* 48:1, *Clematis vitalba* 51:+, *Humulus lupulus* 54:-;

E_1 – Seedlings and juveniles: *Tilia cordata* 25:+, 29:+, *Sambucus nigra* 49:+, 52:-; *Robinia pseudacacia* 13:+, *Crataegus laevigata* 14:1, *Sorbus domestica* 32:-, *Crataegus* sp. 49:-, *Prunus mahaleb* 49:-,

E_1: *Cirsium pannonicum* 1:+, 2:-, *Euphorbia amygdaloides* 1:+, 37:1, *Inula salicina* 1:1, 39:1, *Asperula cynanchica* 2:+, 3:1, *Erysimum hieraciifolium* 2:+, 3:+, *Stipa capillata* 2:+, 8:-, *Peucedanum alsaticum* 3:+, 4:+, *Filipendula vulgaris* 3:+, 54:-, *Linaria vulgaris* 4:-, 8:+, *Centaurea triumfettii* 4:1, 30:+, *Vicia dumetorum* 6:+, 28:-, *Centaurea stoebe* 7:-, 8:+, *Potentilla arenaria* 8:+, 11:2, *Erysimum odoratum* 8:+, 36:1, *Arrhenatherum elatius* 11:3, 16:+ *Avenochloa pubescens* 11:1, 16:-, *Hieracium pilosella* 11:2, 21:+, *Thymus praecox* 11:1, 22:1, *Sanguisorba minor* 11:1, 22:-, *Thlaspi perfoliatum* 11:+, 47:1, *Corydalis intermedia* 14:1, 16:1, *Chelidonium majus* 16:-, 17:-, *Cardamine impatiens* 17:-, 43:+, *Arenaria serpyllifolia* agg. 18:-, 27:+, *Melilotus officinalis* 18:+, 33:2, *Genista germanica* 19:-, 21:+, *Verbascum*

Table 1. (continued)

nigrum 19:-, 21:+, *Lembotropis nigricans* 21:+, 23:-, *Medicago prostrata* 22:+, 30:+, *Ornithogalum kochii* 30:+, 49:+, *Neottia nidus-avis* 39:+, 42:-, *Melica picta* 41:2, 42:+, *Luzula campestris* 41:+, 42:+, *Lithospermum officinale* 41:+, 44:+, *Avenella flexuosa* 42:+, 43:+, *Clematis vitalba* 50:+, 53:+; *Chamaecytisus* cf. *virescens* 1:+, *Crepis praemorsa* 1:+, *Pimpinella saxifraga* agg. 1:+, *Salvia verticillata* 1:+, *Viola rupestris* 1:+, *Echium rubrum* 2:1, *Thymus pannonicus* 2:1, *Potentilla argentea* 2:+, *Onopordon acanthium* 2:-, *Cardaria draba* 3:1, *Phleum phleoides* 3:+, *Seseli annuum* 3:-, *Seseli osseum* 4:1, *Bromus erectus* 4:+, *Eryngium campestre* 4:+, *Chamaecytisus austriacus* 4:-, *Stipa joannis* 4:-, *Thymus pulegioides* 4:-, *Muscari racemosum* 7:+, *Veronica austriaca* 7:-, *Bothriochloa ischaemum* 8:2, *Astragalus onobrychis* 8:+, *Lactuca quercina* 8:+, *Pulsatilla pratensis* 8:+, *Crepis biennis* 8:-, *Hieracium* sp. 9:-, *Echium vulgare* 11:1, *Sedum acre* 11:1, *Asplenium trichomanes* 11:+, *Calluna vulgaris* 11:+, *Medicago lupulina* 11:+, *Viola arvensis* 11:+, *Lactuca viminea* 11:-, *Carlina vulgaris* agg. 13:+, *Agrimonia eupatoria* 16:-, *Turritis glabra* 18:1, *Dentaria bulbifera* 18:+, *Koeleria macrantha* 18:+, *Sedum sexangulare* 18:+, *Alyssum alyssoides* 18:-, *Alyssum montanum* 18:-, *Carex pilosa* 19:1, *Luzula luzuloides* 19:+, *Cephalanthera longifolia* 19:-, *Galeopsis pubescens* 19:-, *Sanicula europaea* 19:-, *Myosotis sparsiflora* 22:+, *Ranunculus polyanthemos* 22:-, *Rubus fruticosus* agg. 23:-, *Mycelis muralis* 25:+, *Chamaecytisus* sp. 26:+, *Valerianella carinata* 26:+, *Geranium pusillum* 26:-, *Sesleria varia* 27:2, *Hieracium umbellatum* 27:+, *Melampyrum* sp. 27:+, *Myosotis stricta* 27:+, *Sedum reflexum* 27:+, *Gagea minima* 28:+, *Muscari comosum* 30:1, *Allium flavum* 30:+, *Aster linosyris* 30:+, *Chamaecytisus ratisbonensis* 30:+, *Melica transsilvanica* 30:+, *Senecio integrifolius* 30:+, *Fumaria vaillantii* 30:-, *Campanula glomerata* 31:+, *Arctium lappa* 33:+, *Hieracium laevigatum* 33:-, *Hypericum hirsutum* 35:-, *Laser trilobum* 36:3, *Molinia caerulea* agg. 39:1, *Serratula tinctoria* 39:1, *Cephalanthera rubra* 39:+, *Polygala major* 39:+, *Cypripedium calceolus* 39:-, *Prunella grandiflora* 39:-, *Carex tomentosa* 41:+, *Leontodon hispidus* 41:+, *Vicia pisiformis* 41:+, *Viola riviniana* 41:+, *Anemone nemorosa* 42:+, *Avenochloa pratensis* 42:+, *Festuca heterophylla* 42:-, *Potentilla alba* 43:+, *Potentilla heptaphylla* 43:+, *Chaerophyllum temulum* 44:+, *Galanthus nivalis* 49:1, *Anthriscus sylvestris* 49:+, *Galium odoratum* 49:+, *Heracleum sphondylium* 49:+, *Lamiastrum montanum* 49:+, *Urtica dioica* 49:+, *Phlomis tuberosa* 50:+, *Arctium tomentosum* 51:-, *Rubus caesius* 52:+, *Allium scorodoprasum* 54:+, *Colchicum autumnale* 54:+, *Trifolium rubens* 54:+;

E_0: *Plagiomnium affine* 1:+, 26:+, *Amblystegium serpens* 10:+, 20:+, *Atrichum undulatum* 38:1, 42:+, *Polytrichum formosum* 38:+, 42:+; *Cladonia* sp. 8:+, *Cladonia subulata* 11:+, *Grimmia* cf. *pulvinata* 11:+, *Weissia brachycarpa* 18:+, *Rhytidium rugosum* 18:+, *Plagiomnium cuspidatum* 18:+, *Tortella tortuosa* 20:+, *Peltigera canina* 23:+, *Plagiochilla asplenioides* 23:-, *Anomodon attenuatus* 24:1, *Pseudoleskeella catenulata* 25:+, *Hylocomium splendens* 26:1, *Rhytidiadelphus squarrosus* 26:+, *Homalothecium lutescens* 37:+, *Dicranella heteromalla* 37:-, *Dicranum scoparium* 38:+, *Plagiomnium undulatum* 38:+, *Pohlia nutans* 38:+.

Corno-Quercetum Máthé et Kovács 1962 (Table 1, Fig. 2)

This is a community dominated by *Quercus pubescens* which may be replaced by *Q. petraea* in the marginal areas of the Pannonian part of Moravia. In some places the dominant *Quercus*-species are accompanied by *Carpinus betulus* which possesses a better capability for regeneration from coppice shoots. The tree layer is more closed and higher than in the *Pruno mahaleb-Quercetum pubescentis*. The shrub layer is well developed with *Cornus mas, Crataegus monogyna, Acer campestre, Euonymus verrucosa, Ligustrum vulgare* and other thermophilous species. The most prominent group in the field layer are the species of the thermophilous oak forests on rich calcareous soils which are also encountered in the *Pruno mahaleb-Quercetum pubescentis*. In addition, many species of mesic forests occur (e.g. *Poa nemoralis, Dactylis polygama, Melica uniflora, Viola mirabilis*), as well as the species of nutrient-rich soils (*Geum urbanum, Alliaria petiolata, Geranium robertianum, Fallopia dumetorum* etc.).

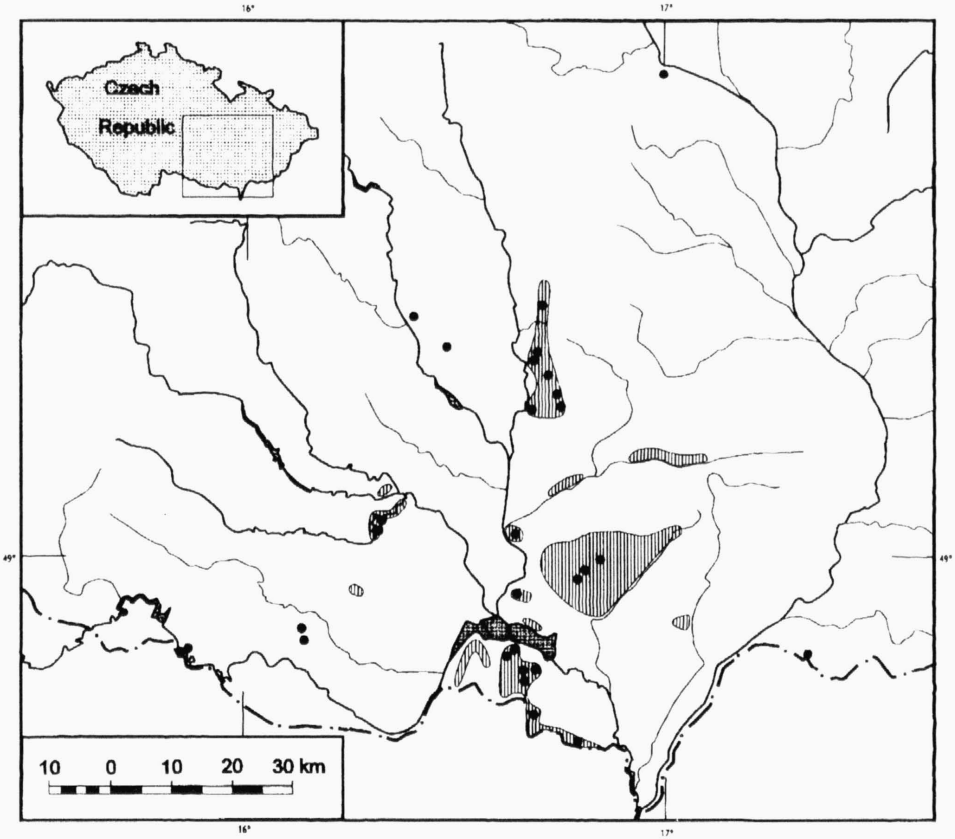

Fig. 2. – The distribution of the *Corno-Quercetum* in Moravia according to the relevé data. Hatching – areas with the tentative potential distribution of this association.
Obr. 2. – Rozšíření *Corno-Quercetum* na Moravě podle fytocenologických snímků. Šrafovaně jsou znázorněny oblasti s hypotetickým potenciálním výskytem této asociace.

The altitudinal range of this association varies approximately from 250 to 480 m, except in the Pavlovské vrchy Hills where it is also encountered at higher altitudes. In low-lying and warmer areas, particularly in the southern Moravian flysch landscapes, it may occur on gentle slopes or on the flat tops of convex landforms. On the other hand, in higher altitudes of the upland fringes of the Bohemian Massif which are slightly cooler, this community is confined to steeper south-facing slopes with inclination of about 20–30°. It prefers habitats on rendzinas over Jurassic limestones in the Pavlovské vrchy Hills, Devonian limestones in the Moravian Karst, on the Květnice and Čebínka Hills near Tišnov and on the Třesín Hill near Mladeč, and on Neogene limestones in the Milovická pahorkatina and Valtická pahorkatina Hills. The other soil type favouring this community is the calcaric regosol (Pararendsina). On this soil type, the community is developed on calcareous flysch sandstones in the Milovická pahorkatina and the Ždánický les Hills and on the Žerotín Hill in the Bílé Karpaty Mts., and on Permo-Carboniferous conglomerates in the Rokytná River valley near Moravský Krumlov. The soils are usually deeper and more nutrient-rich than is the case of the *Pruno mahaleb-Quercetum pubescentis*. In vegetation zonations in warmer areas, this is a transitional community

between the *Pruno-Quercetum* and *Primulo veris-Carpinetum*, whereas on the cooler upland fringes of the Bohemian Massif it usually occupies small patches in the driest and warmest habitats.

The *Corno-Quercetum* is common in the Hungarian Central Range and on the southern fringes of the Western Carpathians (Jakucs 1961b, Soó 1963, Chytrý 1994). Similarly to the *Pruno-Quercetum*, it reaches its north-western limits in Lower Austria (Wallnöfer, Mucina et Grass 1993) and Moravia, however, its range extends to the slightly cooler areas.

Aceri tatarici-Quercion Zólyomi 1957

This is an alliance of thermophilous oak forests with *Quercus petraea*, *Q. pubescens* and *Q. robur*, usually with a closed tree canopy and vigorous shrub layer. The communities prefer plains or gentle south-facing slopes. They are developed on chernozems over loess or cambisols over sand. This continental alliance with its distribution centre in the Pannonian basin, Romania, Ukraine and southern Russia, reaches its north-western distribution limit in Moravia. It occurs in southernmost part of Moravia where it is encountered in low-lying areas formed from Carpathian flysch which is overlaid by loess, and on the Quarternary and Tertiary sand plains.

Quercetum pubescenti-roboris (Zólyomi 1957) Michalko et Džatko 1965 (Table 2, Fig. 3)

This association has been better known under the illegitimate name *Aceri tatarici-Quercetum pubescenti-roboris* Zólyomi 1957. The majority of the present stands have developed from coppice shoots and they possess an open canopy with a cover of 60–70 %. The dominant tree species is usually *Quercus petraea* but *Q. pubescens* and *Q. robur* often attain co-dominance. A well-developed shrub layer occurs in undisturbed stands, formed from *Ligustrum vulgare, Acer campestre, Crataegus monogyna* etc. The most common dominants of the field layer are *Melica uniflora, Convallaria majalis, Poa nemoralis* and *Brachypodium pinnatum*. Thermophilous oak forest species (*Dictamnus albus, Buglossoides purpurocaerulea, Lathyrus niger, Carex michelii, Iris variegata, I. graminea* etc.) are frequent, as well as the species of mesic forests (*Galium odoratum, G. sylvaticum, Polygonatum multiflorum, Pulmonaria officinalis* agg., *Asarum europaeum, Viola mirabilis, Mercurialis perennis, Campanula rapunculoides* etc.).

The *Quercetum pubescenti-roboris* is a community of plains, broad convex landforms or gentle slopes usually up to 15°. It occurs in the altitudinal range of 200–300 m. It is encountered on loess tables covering the Paleogene flysch sandstones and claystones in the south-western part of the Ždánický les Hills (forest tracts around Boleradice, the Kolby Forest near Pouzdřany), in Milovický les Forest between Milovice, Bulhary and Mikulov, and in the Horní Kapánsko Forest near Starý Poddvorov. About 50 cm deep haplic or luvic chernozems, sometimes degraded into luvisols, are developed in this habitat type. Contact communities of the *Quercetum pubescenti-roboris* are *Corno-Quercetum* and *Pruno mahaleb-Quercetum pubescentis* on steeper slopes and outcrops of hard rocks, and *Primulo veris-Carpinetum* on deeper soils on north-facing slopes, in shallow ravines etc. Further stands of this community were sampled on gravely-sandy terraces of the Jihlava and Svratka Rivers near Medlov, Smolín and in the Vranovický hájek Forest near Vranovice. These terraces are locally overlaid by loess layers of variable thickness. On

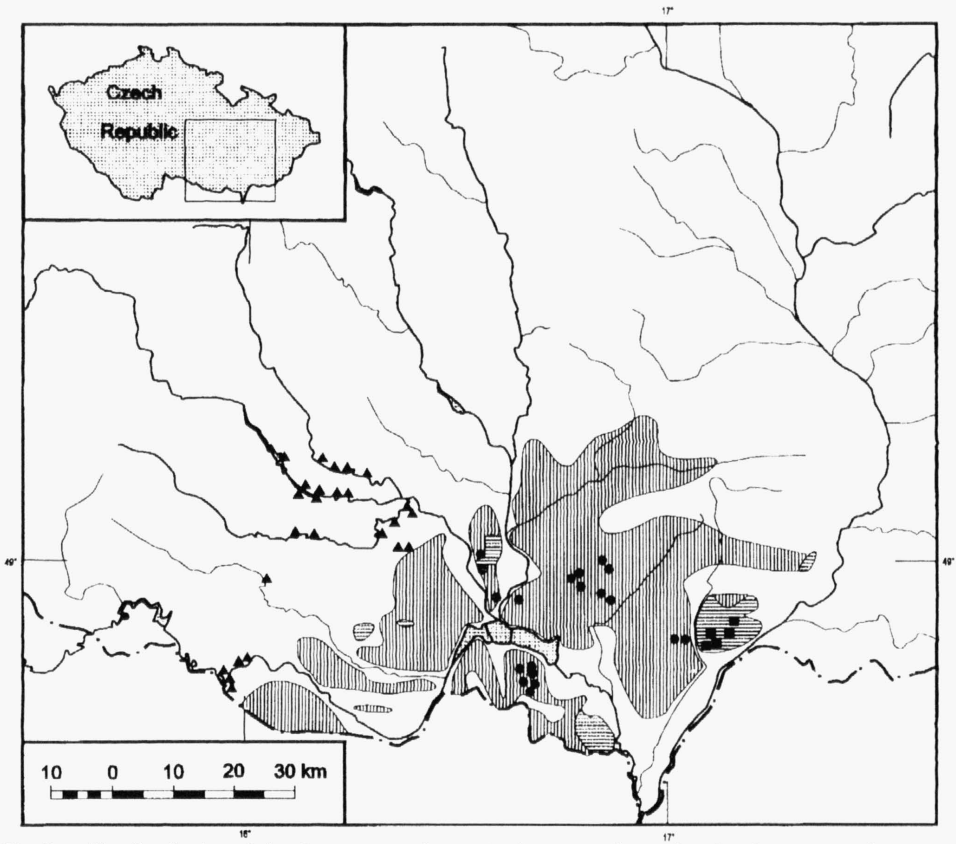

Fig. 3. – The distribution of the *Quercetum pubescenti-roboris* (●), *Carici fritschii-Quercetum roboris* (■) and *Genisto pilosae-Quercetum petraeae* (▲) in Moravia according to the relevé data. Vertical hatching – areas with the tentative potential distribution of the *Quercetum pubescenti-roboris*, horizontal hatching – areas with tentative potential distribution of the *Carici fritschii-Quercetum roboris* and its derivatives.
Obr. 3. – Rozšíření asociací *Quercetum pubescenti-roboris* (●), *Carici fritschii-Quercetum roboris* (■) a *Genisto pilosae-Quercetum petraeae* (▲) na Moravě podle fytocenologických snímků. Svislé šrafování – oblasti s hypotetickým potenciálním výskytem asociace *Quercetum pubescenti-roboris*, vodorovné šrafování – oblasti s hypotetickým potenciálním výskytem asociace *Carici fritschii-Quercetum roboris* a jejích derivátů.

the river terraces with a comparatively shallow loess layer, chernozems are replaced by cambisols. The thermophilous oak forests of the river terraces have been strongly influenced by man and it is hard to draw any conclusions about their species composition in their natural state. We suggest that transitional types between the *Quercetum pubescenti-roboris* and the *Carici fritschii-Quercetum roboris* occurred there, depending on the thickness of the loess deposits overlying the fluvial sands and gravels. The stands sampled in Vranovický hájek Forest represent typical *Quercetum pubescenti-roboris* stands, whereas the stands on the Jihlava River terraces near Medlov and Smolín where loess cover is sparse, can be treated as impoverished types of this association, and the forests on the gravely-sandy Dyje River terraces in the Boří les Forest between Valtice and Břeclav are more closely related to the *Carici fritschii-Quercetum roboris* (see below).

The *Quercetum pubescenti-roboris* was an important community of the original forest cover of the Pannonian plains, occupying extensive areas of the Great Hungarian Plain

Table 2. *Aceri tatarici-Quercion*. 1–47 *Quercetum pubescenti-roboris*, 48–52 *Carici fritschii-Quercetum roboris*, 53–58 *Carici fritschii-Quercetum roboris*, synanthropic variant of the Boří les Forest.

Relevé nr.	1111111111222222222233333333334444444444555555
	1234567890123456789012345678901234567890123456789012345678
E_3 – tree layer	
Diff. - *Quercetum pubescenti-roboris*	
Quercus petraea	+..242343334341....444223233543543434444234 4.+2
Quercus pubescens	..43.2.++.212.....1223.2..+.....+..1.....3
Fraxinus excelsior	.............2..2.....2.+...-2.21.2-...322.44.
Diff. – *Carici fritschii-Quercetum roboris*, synanthropic variant of the Boří les Forest	
Quercus cerris	454552
Char., diff. – high-ranked syntaxa and companions	
Quercus robur	43.....44444...32.....1..... 54444
Acer campestre	..22....2.1.....++.....1.....2
Carpinus betulus	.....+2.2.....31.....1.....
Tilia cordata	.....3.....2..... ..11..
E_2 - shrub layer	
Diff. – *Quercetum pubescenti-roboris*	
Quercus petraea	...1212+++++.+.....2..+++2++21+2+1.++++.++1++. -.....
Acer campestre	..21.+.+2+1+..++..+++221+++..++1++.....+...-1 +.....
Fraxinus excelsior	.....-.....1++12..+.2++.1..+..1+111..212.2..
Cornus sanguinea	.....3.++.....++..4132+..+..+2.2....++.....
Sorbus torminalis	...+...++.1++.....-.+..1....+11..-....+...+..
Euonymus verrucosa	...1...+2.1--.....+..++...+....-..-.....+
Corylus avellana	..3++..++.....++..+....+3.+..+.....
Cornus mas	..2+....1.3.....1221.4...2.....
Quercus pubescens	...2.2....+++.....+11.+.....1.....
Viburnum lantana	...+.....1.....1++.....+.....+..
Carpinus betulus	.....+2.....1+.+....+..1.....
Char., diff. – high ranked syntaxa and companions	
Ligustrum vulgare	..1+.1.+..11133..+.2+11122+1.11+1...+2-.1221.-+ .+... 2+.12.
Crataegus monogyna	..++.++22.1.+.+.....2++1.1..+1.....--.....+ .....+.+2.
Rosa canina agg.	.....-.....-.+.-.....+.+.....+..-..... .....++....
Tilia cordata	+.....+..-.....+..... 1...1 ..22..
Rosa sp.	.....+.....-...+.....-..-.....+ .....+....
Quercus robur	1+.....++.+.....+.....
Robinia pseudacacia	.-....+.+....-.....+.....-.....
Prunus spinosa	.....-....1.....-....1..... ....1.
Euonymus europaea	.....-++.-.....+.....
Sorbus domestica	.....-.....++....+.....+.....
Pyrus pyraster	.....+....-.....+..... ....+.
Crataegus laevigata	.....1.....-.....+..... 11...
Ulmus minor	.....1...++.....
Lonicera xylosteum	.....-.....+.....+.....
Quercus cerris	.....+++..
E_1 – seedlings and juvenile tree and shrub species in the field layer	
Diff. - *Carici fritschii-Quercetum roboris*	
Quercus robur	.....+.....1..... 1++++
Crataegus cf. *laevigata*	.....+++++

Table 2. (continued)

Relevé nr.	111111111122222222223333333333444444444 44555 555555 123456789012345678901234567890123456789012345678901234567 89012 345678
Diff. - *Carici fritschii-Quercetum roboris*, synanthropic variant of the Boří les Forest	
Quercus cerris	..... +++.+.
Rosa canina	..... ++-..+
Char., diff. – high-ranked syntaxa and companions	
Acer campestre	..++.....1+1..+...+.....+... ....
Ligustrum vulgare	.....11..+..... 1..+. 1..+..
Fraxinus excelsior	.....+..2.....2.....+.+..... ..... -.....
Carpinus betulus	.....++.....+1..... ....+...
Quercus petraea	.....1.....+...+.+.....+... ....
Crataegus monogyna	...+.....+....+..... ..... -.....
Quercus pubescens	..2+.....+..... ....
Euonymus europaea	.....+.....+..... ....+.
Tilia cordata	.....+..... ..+.+ .....
E_1 – field layer	
Diff. - *Quercetum pubescenti-roboris*	
Dictamnus albus	..1111.+..1+++....11+11+1111+-21+.+.11..1+--..+ ....11..
Lathyrus niger	.....+1++.+++.1+++1+11.1+.+.+1+12.1.+++.+..... ....
Buglossoides purpurocaerulea	..12-..++.1+-.1..2.1..111++2.11+.1.1.+..12...22 ....
Carex montana	..1+1+21.1+1..1....332...12.41.+3.+1.131...+... ....
Melittis melissophyllum	..11.-..1.+.....++1111++1...+1++++.+.1+-.... ....
Pulmonaria officinalis agg.	..+1...+1.+..++..22.-+..+..++..1+1+-..-..2...+- ....
Carex michelii	....12.+...1..2.2.1.+.1..+1..1+.1..2+.+.+.2+112 ....
Viola mirabilis	..++...+1.1.+...1++.1111..2..-+.2.+....11..+1. ....
Tanacetum corymbosum	..+..++1+.+++.....1111....++..+.++..+++.+..... ....
Calamagrostis arundinacea	1+..1-1..3++.....1.....1.1.+11...1222...2+.. 2
Galium sylvaticum	..+...11++1+.....++1...++....+2+.++.1...-.... ....
Campanula rapunculoides	..-+....1.1.....+....++1-..+...+.....+.....2. ....
Lathyrus vernus	.....+.+.....1..+..+1....2+.1+-+.+..... ....
Melica picta	.....2--12.....1.+2+++.....+.... ....
Galium odoratum	.....13.1.....1131..3...1+2..... ....
Peucedanum alsaticum	.....-....+.....+.....+..+1+...+.+..+..... ....
Diff. – *Carici fritschii-Quercetum roboris*	
Carex fritschii	..... 32112 .1...2
Festuca ovina	..... 11211 .....
Geranium sanguineum	.....- +11+1 .....
Arrhenatherum elatius	..... +1++. .+.+.+
Vicia cassubica	..... ++1.1 .....
Potentilla alba	..... +1.11 .....
Asperula tinctoria	..... .++++ .....
Viola reichenbachiana	..... ++.+. .....
Peucedanum oreoselinum	..... +.+.+ .....
Galium boreale	..... .+1+. .....
Vicia sepium	.....-..... .++1. .....
Anthoxanthum odoratum	.....+..... .1+.+ .....
Molinia caerulea agg.	....223 .....
Ajuga reptans	...+..... ..+++ .....
Pulmonaria angustifolia	....+++ .....
Diff. - *Carici fritschii-Quercetum roboris*, synanthropic variant of the Boří les Forest	
Impatiens parviflora	..... +2+111
Galium aparine	.....+.....+.....-.....-1 ..... ++1++.

Table 2. (continued)

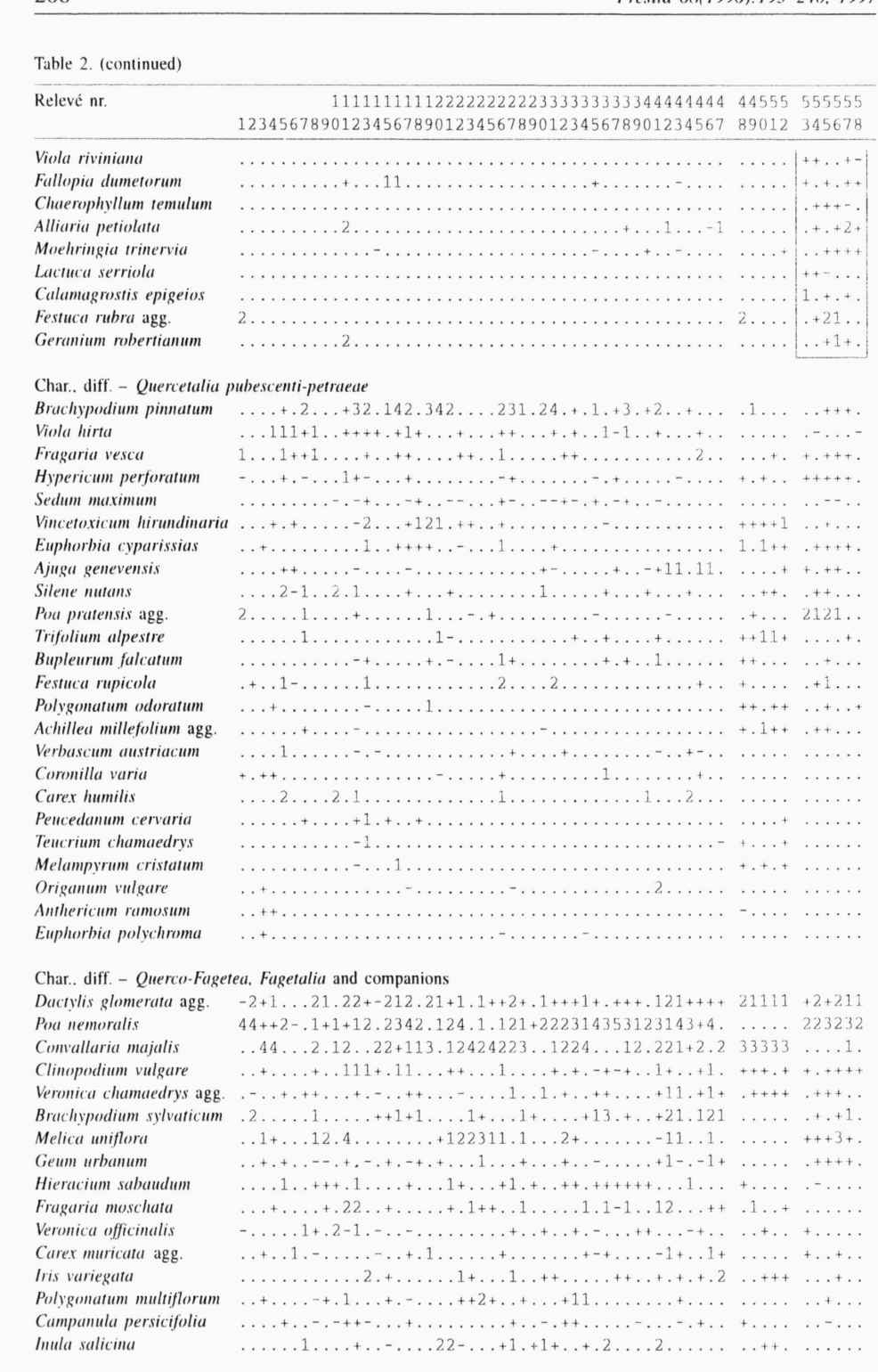

Table 2. (continued)

Relevé nr.	111111111122222222223333333333444444444 44555 555555 123456789012345678901234567890123456789012345678901234567 89012 345678
Hieracium sylvaticum	....1.+1-2.1.....-.....+.++...+...+... ..... ++...+
Betonica officinalis	.....1....11.+....++-.....-..... +1+11 ...+1.
Silene vulgaris	.....11++.+.-....+.....+.....1+ +1+++ .....
Festuca heterophylla	.....+.....1.....+...12+.3..+....1+.+ 1..+. ....1.
Astragalus glycyphyllos	-.+.-.....-1.....+..+.....1....1...-+. ++... .....
Lapsana communis	.....-..-.1.....-.....-.....-.-..-..... ..... +++++.
Solidago virgaurea	.....1....+.....-.1....1+++-..-.1..... .+... .....
Campanula trachelium	.....+....-+.-.+..-.....-..-.....-..-.. ...-. .....
Galium mollugo agg.	..+..++.....--....+.....+..... +.++. .....
Torilis japonica	-.....+.1....+..+...+...-.....+... ..... .+....
Glechoma hederacea agg.	..1....12.....+.....+....+ +.... ++....
Serratula tinctoria	.....2....2.....+1+..... --.++ .....
Bromus benekenii	.....1.1.....++.+.1.....+..+....+. ....
Scrophularia nodosa	.....-+...+.....+.....-... +.++. .....
Galium verum	.....+1.....1.....+.....+....1..... .+++. .....
Fragaria viridis	..+.....+..+1..... +.... .+++..
Taraxacum officinale agg.	...+.....-...+..+.....-.....1.. .-... +.....
Hieracium laevigatum	....-.+..-.....+.....-+...+... ....+
Melampyrum pratense	.....2..+.....+.....+..... .++1+ .....
Melica nutans	..+1..--.1.....+..... ....+
Pulmonaria mollis	..1.+.+.1.1-..... .1... .....
Vicia pisiformis	.....-.....-+..+.....-.....-..+..... ....
Galeopsis pubescens	.....+.-.....-.-..... -.... +.1...
Mercurialis perennis	.....+.....231.....1.....-....4 ....
Valeriana wallrothii	.....+.....1.+..+..... .+++. .....
Galium pusillum agg.	.....1.....+...+.....+.....-.+..... ....
Luzula campestris agg.	.....+..1..... .++.+ .....-
Genista tinctoria	.....+....++..... .1+.. .-....
Asarum europaeum	.....+2.1.....-.-.....+..... ....
Filipendula vulgaris	.....+-.....+..... -..++ .....
Hieracium lachenalii	.....+.+.....+..... ..... ++...+
Carex digitata	..1+...+1.....+..... ....
Pimpinella saxifraga agg.	.....+..... .+++. .+....
Pimpinella major	.....++.....-.+.....-.. ....
Heracleum sphondylium	.....+.....-.1-..... .1... .....
Campanula bononiensis	.....+..+..++.....+..... ....
Ornithogalum kochii	.....+..1..... ....+ ..++..
Ranunculus polyanthemos	.....-.....+..... .++.+ .....
Hieracium sp.	..-.....+-.....+..... ....
Dentaria bulbifera	.....-.1.....1....+..... ....
Fallopia convolvulus	.....-+...+.....-..... ....
Ranunculus auricomus agg.	.....-.....+1-.... ....
Anemone ranunculoides	.....+2.....+.....+ ....
Stellaria graminea	.....+..... .+... ++....
Agropyron caninum	1.....+.....2..... ....
Carex pallescens	1..... ..+.+ .....
Lembotropis nigricans	..-...-..... ..+.. .....
Rosa gallica	..+.....+.....+..... ....
Hieracium pilosella	....+.....1.....+..... ....
Briza media	.....1..... ..+.+ .....
Platanthera bifolia	.....+.....+-..... ....
Lactuca quercina	.....+.+..... ....+...
Lychnis viscaria	.....+..... ....+ .+....

Table 2. (continued)

Relevé nr.	1111111111222222222233333333334444444444555555
	1234567890123456789012345678901234567890123456789012345678
Iris graminea	..................1.....1.............2.....
Allium scorodoprasum	..................-.....................+1
Colchicum autumnale	..................+.....................+.
Vicia dumetorum	....................-.........+.........-....
Hypericum hirsutum	..........................+.................+..
Bromus inermis	..........................1.....
Milium effusum	..........................1....+.....
Hieracium maculatum	..............................+.....+.....
Verbascum phoeniceum	..............................-+....
Cerastium arvense	.....

E_0 - ground layer

Hypnum cupressiforme	2.....1+.+..+.+.+.+...+.+...+1.....
Brachythecium velutinum	.....+.....+1.+.....1.....
Tortula ruralis	+2.....+.+....+.....
Abietinella abietina	.1.....+1.....+.....
Pleurozium schreberi	.....1...2...+.....+.....
Eurhynchium swartzii	.....1++.1.....
Anomodon viticulosus	+.....1.2.....
Homalothecium sericeum	+.....11.....
Porella platyphylla	+.....11.....
Homalothecium philippeanum	.....+.+..1.....
Plagiomnium affine	.....+.....

Species in two or one relevés:

E_3: *Robinia pseudacacia* 4:1, 35:+, *Sorbus torminalis* 6:-, 38:1, *Ulmus minor* 19:1, 47:1, *Acer pseudoplatanus* 36:1, *Sorbus domestica* 47:2, *Crataegus monogyna* 47:1;

E_2: *Rhamnus catharticus* 6:-, 54:+, *Malus sylvestris* 23:+, 24:+, *Lonicera caprifolium* 28:+, 46:+, *Prunus avium* 33:+, 44:+, *Frangula alnus* 49:+, 51:1, *Betula pendula* 10:-, *Ulmus glabra* 42:+;

E_1 – Seedlings and juveniles: *Corylus avellana* 3:+, 49:+, *Robinia pseudacacia* 4:+, 52:+, *Ulmus minor* 6:+, 13:-, *Euonymus verrucosa* 24:1, 57:-, *Cornus sanguinea* 15:+, *Sorbus domestica* 23:+, *Malus sylvestris* 24:+, *Rhamnus catharticus* 25:+, *Berberis vulgaris* 32:+, *Cornus mas* 32:+, *Rosa* sp. 49:+, *Betula pendula* 50:+, *Frangula alnus* 50:+, *Prunus avium* 53:-, *Tilia* sp. 54:-;

E_1: *Asparagus officinalis* 2:-, 48:-, *Viola collina* 3:+, 4:+, *Erysimum odoratum* 4:+, 6:2, *Rosa pimpinellifolia* 6:-, 26:+, *Hieracium bauhinii* 7:+, 12:-, *Thymus pulegioides* 7:-, 12:+, *Thesium linophyllon* 7:-, 13:+, *Trifolium rubens* 7:-, 27:-, *Leontodon hispidus* 7:+, 49:+, *Carex caryophyllea* 8:+, 10:1, *Hypericum montanum* 10:-,27:+, *Solidago canadensis* 11:-, 14:+, *Trifolium montanum* 12:-, 33:-, *Agropyron repens* 13:2, 38:+, *Mycelis muralis* 14:-, 58:+, *Lithospermum officinale* 15:-, 18:-, *Symphytum officinale* 15:+, 49:+, *Arabis hirsuta* agg. 17:-, 45:-, *Verbascum lychnitis* 17:-, 45:-, *Carex pilosa* 18:3, 24:+, *Clematis recta* 19:2, 25:+, *Stellaria holostea* 21:+, 26:+, *Isopyrum thalictroides* 22:+, 47:+, *Primula veris* 22:-, 57:+, *Corydalis pumila* 23:+, 24:2, *Clematis vitalba* 23:+, 45:-, *Rubus fruticosus* agg. 23:+, 53:+, *Lilium martagon* 24:1, 42:-, *Veronica teucrium* 26:+, 41:+, *Potentilla recta* 36:-, 41:-, *Campanula rotundifolia* agg. 48:+, 50:+, *Laserpitium prutenicum* 49:1, 51:1, *Lysimachia vulgaris* 49:1, 51:1, *Rumex acetosa* 49:+, 51:+, *Succisa pratensis* 49:+, 51:+, *Carex curvata* 49:+, 52:+, *Platanthera chlorantha* 49:+, 52:+, *Avenochloa pubescens* 50:+, 56:+, *Vicia tetrasperma* 55:-, 56:+, *Myosotis sparsiflora* 56:-, 57:+; *Koeleria macrantha* 1:+, *Agrostis stolonifera* 2:1, *Epipactis helleborine* 4:+, *Viola tricolor* subsp. *subalpina* 5:1, *Laser trilobum* 6:2, *Myosotis stricta* 6:1, *Cardaria draba* 6:+, *Arabidopsis thaliana* 6:-, *Antennaria dioica* 7:+, *Leucanthemum vulgare* agg. 7:+, *Cnidium dubium* 7:-, *Viola canina* 8:+, *Gnaphalium sylvaticum* 12:-, *Viola arvensis* 12:-, *Inula hirta* 13:+, *Potentilla argentea* 13:+, *Veronica spicata* 13:+, *Eryngium campestre* 13:-, *Phleum phleoides* 13:-, *Euphorbia virgata* 14:-, *Acinos arvensis* 15:+, *Humulus lupulus* 15:-, *Allium* sp. 17:+, *Sonchus oleraceus* 17:-, *Crepis praemorsa* 19:1, *Vicia cracca* agg. 19:+, *Allium rotundum* 20:+, *Viola suavis* 22:+, *Vinca minor* 23:2, *Rubus caesius* 23:+, *Viola odorata* 23:+,

Table 2. (continued)

Lepidium campestre 27:1, *Trifolium arvense* 27:+, *Dianthus armeria* 27:-, *Galium schultesii* 28:1, *Chamaecytisus austriacus* 30:2, *Anthemis tinctoria* 30:+, *Hierochloe australis* 30:+, *Stachys recta* 31:-, *Melampyrum nemorosum* 33:+, *Digitalis grandiflora* 34:1, *Lathyrus pratensis* 36:+, *Orchis militaris* 38:-, *Lysimachia nummularia* 42:2, *Tragopogon orientalis* 45:-, *Veronica hederifolia* agg. 46:1, *Scorzonera hispanica* 46:-, *Phlomis tuberosa* 47:-, *Dryopteris filix-mas* 48:+, *Linaria vulgaris* 48:+, *Stachys sylvatica* 48:+, *Agrostis tenuis* 48:-, *Chamaecytisus ratisbonensis* 48:-, *Genista germanica* 48:-, *Selinum carvifolia* 49:+, *Hieracium umbellatum* 50:+, *Potentilla erecta* 50:+, *Festuca amethystina* 51:1, *Euphorbia villosa* 51:+, *Phragmites australis* 51:-, *Thalictrum minus* 52:+, *Cirsium arvense* 53:+, *Urtica dioica* 53:+, *Cirsium vulgare* 53:-, *Festuca valesiaca* 53:-, *Sieglingia decumbens* 54:+, *Vicia hirsuta* 54:-, *Chamaecytisus* cf. *virescens* 55:+, *Cardamine impatiens* 56:1, *Galeopsis* sp. 56:1, *Ranunculus bulbosus* 56:+, *Tripleurospermum inodorum* 56:-, *Stellaria media* 57:+;

E_0: *Amblystegium serpens* 1:+, 11:+, *Ceratodon purpureus* 8:+, 28:+, *Plagiomnium cuspidatum* 9:+, 48:+, *Atrichum undulatum* 29:1, 33:+, *Polytrichum formosum* 29:+, 33:+, *Pohlia nutans* 29:+, 48:+, *Brachythecium rutabulum* 48:1, 51:+, *Bryum* sp. 49:+, 50:+; *Cladonia subulata* 2:+, *Grimmia* cf. *pulvinata* 2:+, *Weissia brachycarpa* 9:+, *Rhytidium rugosum* 9:+, *Tortella tortuosa* 11:+, *Peltigera canina* 14:+, *Plagiochila asplenioides* 14:-, *Anomodon attenuatus* 15:1, *Pseudoleskeella catenulata* 16:+, *Hylocomium splendens* 17:1, *Rhytidiadelphus squarrosus* 17:+, *Homalothecium lutescens* 28:+, *Dicranella heteromalla* 28:-, *Dicranum scoparium* 29:+, *Plagiomnium undulatum* 29:+, *Scleropodium purum* 48:+, *Cladonia coniocraea* 48:+, *Cladonia* sp. 48:-, *Lophocolea heterophylla* 48:-.

(Zólyomi 1957), lowlands in southern Slovakia (Michalko et Džatko 1965), northern Burgenland and eastern Lower Austria (Wallnöfer, Mucina et Grass 1983, see also Jelem, Kilian et Neumann 1965), and Moravia (Horák 1980, 1983). As the habitats of these forests were very suitable for agriculture (productive soils, warm climate), most stands were clear-cut early and only small fragmentary tracts have remained in a natural state up to the present. The last remnants of these forests at the southern Moravian localities are in need of protection. The large areas of this vegetation in the Milovický les Forest were destroyed after 1965–1966 when a game preserve was established with extremely high densities of wild ungulates (Chytrý et Danihelka 1993).

Klika (1957) described a subassociation *Quercetum pubescentis pannonicum molinietosum* Klika 1957 on the basis of one relevé from the Milovický les Forest. Although he sampled a facies with *Molinia caerulea* agg., this relevé can be identified with the *Quercetum pubescenti-roboris*.

Carici fritschii-Quercetum roboris **ass. nova hoc loco** (Table 2, Fig. 3)

Nomenclature type relevé: Table 2, rel. 49 (holotypus)

The association includes even-aged, straight stemmed, open forests with a tree layer cover of 40–80 %. They are formed of almost pure *Quercus robur* stands. The shrub layer is poorly developed at present; it is characterized by *Frangula alnus* and suppressed individuals of *Quercus robur* and *Tilia cordata*. The field layer is usually very rich in species and striking dominants are seldom found, except facies with *Molinia caerulea* agg. and *Convallaria majalis*. *Carex fritschii* is a significant constant of this community. The species composition is characterized by both the thermophilous oak forest species (*Geranium sanguineum, Trifolium alpestre, Iris variegata, Vincetoxicum hirundinaria* etc.) and mesic forest species (e.g. *Dactylis polygama*). Oligotrophic species (e.g. *Festuca ovina, Anthoxanthum odoratum*) are also typical of this community, as well as the species

of intermittently wet soils (*Potentilla alba, Serratula tinctoria, Galium boreale, Succisa pratensis* etc.).

These forests are confined to the plains at 160–220 m a.s.l. in the south-western part of the Dúbrava Forest near Hodonín where they grow on Pleistocene sand plains. Sand has been blown out from fluvial sediments and deposited over calcareous Tertiary clays. Cambisols are developed on the sand layers which are in average 0.5–2 m thick, and sometimes they may be moderately leached or initial processes of gleying may take place in them. They are enriched with basic cations that arise from the water-bearing clay layers (Novák et Pelíšek 1943, Šmarda 1961).

Similar forest types, at present strongly disturbed by high densities of game, particularly wild boar, are known from the Boří les Forest between Valtice and Břeclav where they occur on sandy-gravely Neogene terraces of the Dyje River at 180–200 m a. s.l. (Table 2, rel. 53–58). These forests are mainly dominated by pure *Quercus cerris* but patches of pure *Quercus robur* stands are also found there. Very old individuals of *Q. cerris* may be found in the Boří les Forest and regeneration of this species is common there. Consequently, this species is considered native in the area by Koblížek (1990). However, the pattern of the changing patches of *Q. cerris* and *Q. robur* stands which is not linked with the differences in topography, and the fact that *Q. cerris* used to be planted for regular and heavy crop of acorns, suggest that despite the fact that this species may be native in the area, the larger part of the *Q. cerris* stands may rather be the remains of old plantations. Field layer composition of the stands in the Boří les Forest, although significantly altered by human influences, indicates close relationships to the *Carici-Quercetum*. Similar forests probably used to be developed in other parts of southern Moravia where acidic sand and gravel of river terraces have not been overlaid by loess, e.g. between the villages of Hrušovany u Brna and Pohořelice and near the villages of Oleksovice and Litobratřice.

The *Carici-Quercetum* forests were used for grazing and a part of oak stands was also felled. In the Dúbrava Forest, sandy grasslands and even mobile sand dunes unsuitable for agricultural exploitation developed in the deforested areas and, that is why, an extensive pine afforestation was carried out in the first half of the 19th century (Šmarda 1961).

The *Carici-Quercetum* is an endemic association of sand plains in the lower Morava River area. Besides Dúbrava Forest, fragmentary occurrences were also recorded near Gbely and Lakšárská Nová Ves in the northern part of Záhorská nížina lowland in the adjacent part of Slovakia (Michalko et Plesník 1982). Closely related forests were described by Soó (1937) as *Quercetum roboris stepposum* from the sand area of Nyirség in the north-eastern part of the Great Hungarian Plain. Klika (1957) noticed certain similarities between these forests and the *Potentillo albae-Quercetum* Libbert 1933 and considered them to be a geographical vicariant of the association *Querco-Potentilletum albae pannonicum*. This approach can hardly be correct because a number of Pannonian and perialpine species (e. g. *Carex fritchii, Festuca amethystina, Iris variegata, Valeriana wallrothi*) markedly distinguish these forests from the Central European (predominantly sarmatic) association *Potentillo albae-Quercetum*. Šmarda (1961) who studied this vegetation in Dúbrava Forest realized the similarity with the Hungarian community and classified the stands as an subassociation *Quercetum roboris stepposum* Soó 1937 *caricetosum fritschii* Šmarda 1961. There are still differences in the floristic composition between the Hungarian and Moravian/Slovakian communities due to their geographical isolation which require treating the latter as a separate association.

Quercion petraeae Zólyomi et Jakucs ex Jakucs 1960

The alliance *Quercion petraeae* includes thermophilous oak forests in that *Quercus petraea* or *Q. robur* dominate. They are widespread on poorer soils which are usually developed on siliceous bedrock, and in regions that are slightly cooler and more humid than in the case of the alliances *Quercion pubescenti-petraeae* and *Aceri tatarici-Quercion*. The range of this alliance includes low-lying areas of Central Europe; its distribution comprises the German and Polish lowlands, and the upland fringes of the German, Czech and Austrian hercynids, as well as of the Carpathians. Its Moravian distribution is concentrated to the upland fringes of the Bohemian Massif where the siliceous bedrock of the Pre-Paleozoic age prevails. Scattered localities are also found in the south-western part of the Bílé Karpaty Mts. on Tertiary flysch sandstones.

Sorbo torminalis-Quercetum Svoboda ex Blažková 1962 (Table 3, Fig. 4)

The *Sorbo torminalis-Quercetum* comprises usually even-aged stands of coppice-shoot trees of *Quercus petraea*, with *Carpinus betulus* being a common constituent of the tree layer. The cover of the tree layer usually reaches 60–90 % but in extremely dry habitats the oaks become more scattered and the canopy cover decreases to as little as 40 %. In that case the trees are usually dwarfed, generally under 10 m. The shrub layer is usually sparse, consisting of *Rosa canina* agg. and suppressed individuals of tree layer species. The field layer is characterized by the occurrence of the species of thermophilous oak forests (*Vincetoxicum hirundinaria, Euphorbia cyparissias, Anthericum ramosum, Polygonatum odoratum, Carex humilis, Tanacetum corymbosum* etc.), species tolerant of moderately shaded oligotrophic habitats (*Festuca ovina, Luzula luzuloides, Avenella flexuosa, Veronica officinalis, Lychnis viscaria, Sedum maximum, Cardaminopsis arenosa, Hieracium sabaudum, Silene nutans* etc.), and also some species of mesic forests (*Poa nemoralis, Dactylis polygama, Calamagrostis arundinacea* etc.). Regeneration of *Quercus petraea* takes place commonly in the field layer.

These forests are encountered in an altitudinal range of 250–450 m, usually between 300 and 400 m a. s. l. At lower altitudes they are found on gentle south-facing slopes of crystalline plateaus, whereas at higher altitudes or in more humid areas they usually occur on steeper south-facing slopes. The soils are rankers or comparatively shallow cambisols over granitoids, gneiss and granulite of the crystalline complexes of the south-eastern margin of the Bohemian Massif, or over acidic sedimentary rocks of Carboniferous age on the eastern margin of the Drahanská vrchovina Highland and in the Zábřežská vrchovina Highland. Contact communities are usually the oak-hornbeam forests of the association *Melampyro nemorosi-Carpinetum*. The *Sorbo-Quercetum* is widespread along the south-eastern margin of the Bohemian Massif from the northern surroundings of Brno up to the Austrian boundary in the Dyje River valley. At lower altitudes, it is common on plateaus, whereas further towards the centre of the Bohemian-Moravian Upland, it is found only on the south-facing slopes in the river valleys (Chytrý et Vicherek 1995, see also Jelem 1976). The distribution in south-western Moravia extends to Lower Austria (Wallnöfer, Mucina et Grass 1993, Chytrý et Vicherek 1995). A scattered distribution was also reported from central Moravia where it is encountered on the eastern margin of the Drahanská vrchovina Highland, in the Zábřežská vrchovina Highland and near the village of Moravičany (Kincl 1989, Duchoslav 1990, Chytil 1991). Besides the Moravian

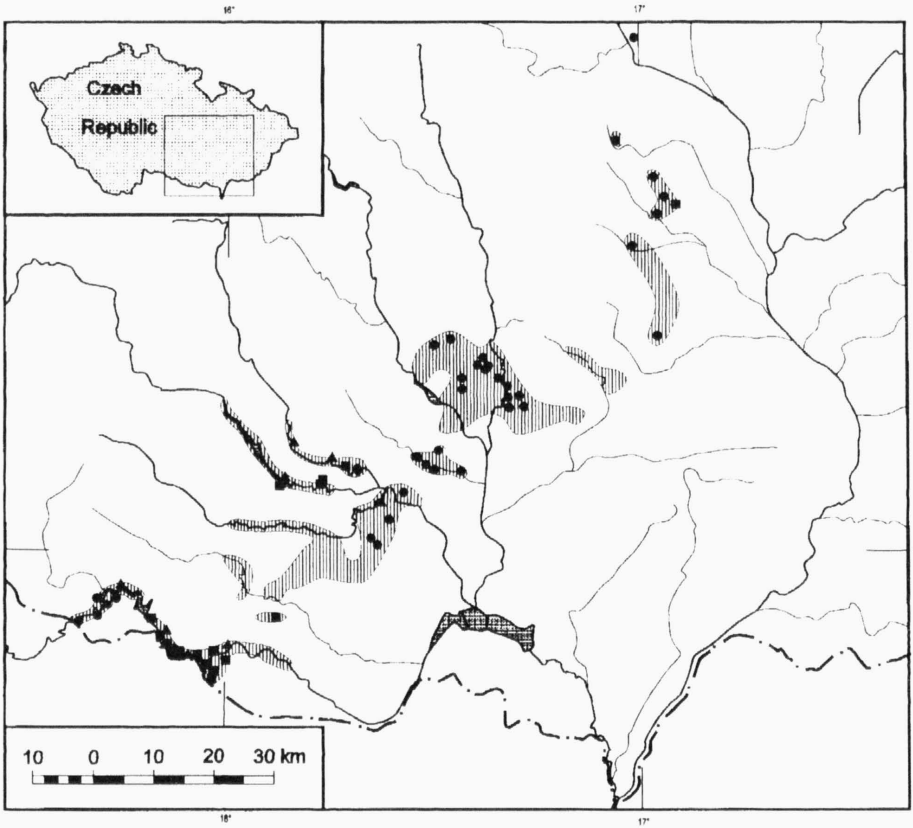

Fig. 4. – The distribution of the *Sorbo torminalis-Quercetum* in Moravia according to the relevé data. ● *S.t.-Q. typicum*; ■ *S.t.-Q. caricetosum humilis*; ▲ *S.t.-Q. poetosum nemoralis*. Hatching – areas with the tentative potential distribution of this association.
Obr. 4. – Rozšíření *Sorbo torminalis-Quercetum* na Moravě podle fytocenologických snímků. ● *S.t.-Q. typicum*; ■ *S.t.-Q. caricetosum humilis*; ▲ *S.t.-Q. poetosum nemoralis*. Šrafovaně jsou znázorněny oblasti s hypotetickým potenciálním výskytem této asociace.

distribution which extends to Lower Austria, this association is widespread in Central Bohemia (Blažková 1962, Neuhäusl et Neuhäuslová-Novotná 1977 sub *Cynancho-Quercetum* etc.).

Three subassociations can be distinguished in Moravia:

1. ***S.t.-Q. typicum* (Neuhäusl et Neuhäuslová-Novotná 1977) Chytrý et Horák comb. nova hoc loco** (syn.: *Cynancho-Quercetum* Passarge 1957 typicum Neuhäusl et Neuhäuslová-Novotná 1977; nomenclatural type relevé: Samek 1962:161–163, Table VI, rel. 36). This is a subassociation characterized by impoverishment in some thermophilous species, being confined to less dry habitats in moderately cooler areas. Differential species are *Allium montanum, Carex digitata, Convallaria majalis, Galium valdepilosum, Genista germanica, Melampyrum pratense*, and *Melica nutans*. It is encountered in the Dyje River valley above Vranov reservoir and from the Krumlovský les Forest northwards. From the Bobrava River northwards, almost all the *Sorbo torminalis-Quercetum* communities can be assigned to this association.

2. *S.t.-Q. caricetosum humilis* (Neuhäusl et Neuhäuslová-Novotná 1977) Chytrý in Chytrý et Vicherek 1995. This subassociation comprises the stands of the dry and warm habitats of south-facing slopes in river valleys, with shallow, oligotrophic soils. Differential species are *Allium flavum, Asperula cynanchica, Calluna vulgaris, Genista pilosa, Hieracium umbellatum, Jasione montana, Rumex acetosella* agg., *Sedum reflexum,* and *Thymus praecox*. It is documented from the valleys of the Oslava, Jihlava, Únanovka and Dyje Rivers, and from the Kosíř Hill. This is a transitional community between the *Sorbo torminalis-Quercetum* and the *Genisto pilosae-Quercetum petraeae*.

3. *S.t.-Q. poetosum nemoralis* Blažková 1962. This subassociation is, similarly to the preceding one, confined to warm and dry habitats. However, it tends to occur on soils with better base saturation and nitrification over siliceous bedrock with intrusions of basic rocks, e.g. crystalline limestones, erlans, and amphibolites. The differential species are basiphilous shrubs (*Acer campestre, Cornus mas, Ligustrum vulgare, Pyrus pyraster*) and in field layer *Brachypodium sylvaticum, Bupleurum falcatum, Campanula rapunculoides, C. trachelium, Dictamnus albus, Fraxinus excelsior, Geum urbanum, Lactuca quercina, Myosotis sylvatica, Origanum vulgare, Torilis japonica*, and *Viola riviniana*. This subassociation was found in the Oslava, Jihlava and Dyje River valleys. From the syntaxonomical point of view it represents a transition to the impoverished types of the *Corno-Quercetum*.

Genisto pilosae-Quercetum petraeae Zólyomi, Jakucs et Fekete ex Soó 1963 (Table 3, Fig. 3)

This is an association composed of low and open stands of dwarfed individuals of *Quercus petraea*, attaining a height under 10 m. The trees are usually scattered in wide spacing with a cover of 30–70 %. *Loranthus europaeus* usually grows in the oak crowns. The shrub layer is usually sparse or absent. It is often represented by juvenile oaks. The field layer is usually dominated by *Festuca ovina* and *Genista pilosa* which are accompanied by a suite of oligotrophic, heliophilous species confined to shallow soils (*Jasione montana, Rumex acetosella* agg., *Calluna vulgaris, Scleranthus perennis, Avenella flexuosa, Luzula luzuloides* etc.). Besides them, thermophilous species tolerating acid soils are present (*Carex humilis, Linaria genistifolia, Lychnis viscaria, Hypericum perforatum, Festuca pallens, Verbascum austriacum, Thymus praecox, Sedum reflexum, Agrostis stricta, Koeleria macrantha* etc.). The species of mesic forests are largely absent.

The *Genisto-Quercetum* was reported to occur in an altitudinal range of 250–430 m. It is confined to sunny, south- to west-facing slopes, with an inclination of 15–40°. The soils are oligotrophic, shallow rankers developed among the outcrops of the siliceous bedrock: usually granitoides, gneisses or granulites. The *Genisto-Quercetum* is usually spatially related to the *Sorbo torminalis-Quercetum*. It replaces the *Sorbo-Quercetum* in more extreme habitats. This association was only recorded in the area of the south-eastern margin of the Bohemian Massif where it tends to occur in the upper parts of the south-facing slopes of the river valleys (Chytrý 1991). The Moravian distribution extends to the upland fringes of the Bohemian Massif in adjacent Lower Austria (Wallnöfer, Mucina et Grass 1993, Chytrý et Vicherek 1995). A further distribution centre is in the Hungarian Central Range (Magyar 1933, Fekete 1956, Horánszky 1964, Kovács 1975) and this association also occurs rarely in the Mecsek Hills (Horvát 1972).

Table 3. *Quercion petraeae*. 1-38 *Sorbo torminalis-Quercetum typicum*, 39-45 *S.t.-Q. caricetosum humilis*, 46-51 *S.t.-Q. poetosum nemoralis*, 52-65 *Genisto pilosae-Quercetum petraeae*, 66-82 *Potentillo albae-Quercetum*, 83-91 *Asplenio cuneifolii-Quercetum petraeae*.

Relevé nr.	111111111122222222223333333333444444444455555555566666666667777777777888888888899
	123456789012345678901234567890123456789012345678901234567890123456789012345678901
E_3 – tree layer	
Diff. – *Asplenio cuneifolii-Quercetum petraeae*	
Pinus sylvestris	....-..2.......21122..2...1.........3 .2..+.. ..... 12.2..2+1..+.1 ..2.........2..+. 3332.3413
Char., diff. – high-ranked syntaxa and companions	
Quercus petraea	4544555453442554355445455555555553333 3444444 344353 31424433444443 55355555555544414 2..143.4.
Carpinus betulus	...1...1....3.....+.++.....11.. ......+ 1..1.. ....1..... .....
Tilia cordata	.....2....+...+.....1.....3.. ..1.... 1....+ ....
Betula pendula	.... +..+..11..... .11..... .....
Larix decidua	.....1.....+..1..... ....+. .....
Quercus robur	....242 ...3.....
E_3 – epiphytes in the crowns of trees	
Viscum laxum	.... +..+....+
E_2 – shrub layer	
Diff. – *Sorbo torminalis-Quercetum poetosum nemoralis*	
Cornus mas	....[.323+.] ....1.. .....
Diff. – *Genisto pilosae-Quercetum petraeae*	
Sorbus aucuparia	.... [++.....+.....] ....
Betula pendula	.... [.2.+...+.....] ....
Sorbus aria agg.	.... [...+..++.....] ....
Diff. – *Potentillo albae-Quercetum*	
Crataegus monogyna	.....++..... ...2... ....[.....+.1122] .....
Diff. – *Asplenio cuneifolii-Quercetum petraeae*	
Prunus mahaleb	....+.. .... [22111....]
Berberis vulgaris	.... [2+.21.1..]
Juniperus communis	.....+..... ..... +..... +.....+..... ..... [.+.2...11]

Table 3. (continued)

Relevé nr.	111111111122222222223333333333	3444444	444455	55555555666666	66667777777777888	888888899
	123456789012345678901234567890123456789012345678	9012345	678901	23456789012345	67890123456789012	345678901
Char., diff. – high-ranked syntaxa and companions						
Quercus petraea	1..1...1.+221...2++2..+..1....1....11.	1222+.1	2.+.+.	++.1..111++22.	1+...2+.+..1..+..	.+.++.+1.
Ligustrum vulgare	.........+.............+..............	1.12...	.1122.	.........++...	11+..+..12.+...2.	1........
Carpinus betulus	...+...1..++2...2....1.....1.....1..	.....	+.+...	+..+..........	..1.............+.	.....-..
Tilia cordata	............+....+++..+.............2..	1	2.....	....1.........	....1...+......+2	....
Corylus avellana	.....3..3..+...+...........1.....1..	+.....	.....	....	.1+.....+....12..	....
Frangula alnus	.....	.....	.....	....+..+.....	+1...+2.+....1...	+..+23...
Rosa canina agg.	.........1.+.....	.....	.....	.....+.+.....	..+..............	..+..1..1
Pinus sylvestris	.......+.....	.....	.....	+1....+1.....	..+..............	.++.....
Cornus sanguinea	......1.....	.....	.....	....	..+..+.1+......2.	....
Rosa sp.	.........+.............1.....	1.....	....+.	..............+	.....1.+.....	....
Rhamnus catharticus	.........+.....	.....+	...+..	..............+	..+...........+..	....
Euonymus verrucosa	......1...+.....	...1...	.....	..............+	..1..............	....
Prunus spinosa	.........+.....	.....	...1..	..............+	.....+.........1.	....
Rubus fruticosus agg.	.....	1.....	.....	..............+	.+...+.+.....	....
Abies alba	.......+.........+.+.....	.....	.....	..............+	.....	....
Sorbus torminalis	.......+.....1..	..+....	.....	..............+	.....	....
Cotoneaster integerrimus	.....	...+...	.....	.+.....	.....	+.....
E_1 – Seedlings and juvenile tree and shrub species in the field layer						
Quercus petraea	2211+12.1....11+..+....++1+21+111.1+++	.1.111.	1++++.	..1..11++1++1.	++.2121.121211+.+	++..1..++
Rosa sp.	.1....+.....+-....+..++...+++.+-...	1.....	....1.	.........-...+	+..++..++++++..+.	..+.....
Carpinus betulus	...++.....+..+..++++.-.....++-	.....+	2.++..	...+.....-....	.-.+...+.....+.+.	.....+-..
Ligustrum vulgare	.1....+.2.....+....+..+...+.....1....	...+...	.+....	..............+	++.....+.1+.+.+..	.......+.
Acer campestre	.1....-.....-.....+-...+...-....	+.....	.+....	..............+	.....+++.+-++-	....
Crataegus monogyna	.....-.+.....+..++...-..+.-....	.....	....-.	..............+	-.....++..	....
Tilia cordata	.....+.....+.....	.+.....	.....	.....-....	...+...1.+.....++	....
Pinus sylvestris	...-.....-.....	.+.....	.....	.....+.+..+..	.....	....
Cornus sanguinea	.-....-.....	.....	.....	..............+	.....++.....	....
Corylus avellana	......+.....	.....	.....	..............+	.+...+.....+..	....
Sorbus torminalis	.....	...1...	..+...	..............+	.....+	.....+.
Fraxinus excelsior	.2.....-	.....	.+....	..............+	.....	....

Table 3. (continued)

Relevé nr.	111111111122222222223333333333	3444444	444455	55555555666666	66667777777777888	888888899
	123456789012345678901234567890123456789012345678	9012345	678901	23456789012345	67890123456789012	345678901
Euonymus verrucosa	.....+.....	.....	.+....	.....	.....+.....	.....
Prunus spinosa	.....	.....	..+...	.....+.....	.....+..	.....
Cornus mas	.....	.....	...+..	.....	.....-.+	.....
Sorbus aucuparia	.....	.....	...+...+.....	.....	.....	.....-
Berberis vulgaris	.....	.....	.....	.....	.....+.	+1.....
Prunus mahaleb	.....	.....	.....	.....	.....	.1.++....
E_1 – field layer						
Diff. – *Sorbo torminalis-Quercetum*						
Fragaria vesca	.....+1+2.311.+..-+.1.....2.....+	..1+..+	..1+..	.....	..++.....+.....	....+....
Calamagrostis arundinacea	1.....1...+1...++1++21.....2.....+	.....	+..-..	.....+.....	...+.....1...	.....
Carex michelii	.....1.2.1...+.+..-....++.....	1..1...	.++..+	.....	.....-.....	.....+.
Diff. – *Sorbo torminalis-Quercetum typicum*						
Genista germanica	.....+..1+1..+1+++1+1.....	.....	.....	.....	.....+1.....+...	.....
Allium montanum	1..+.....+.1..+2.++...+..+.+..+....+.	.....	.....	..-.....	.....	.....
Diff. – *Sorbo torminalis-Quercetum poetosum nemoralis*						
Lactuca quercina	.....	.....	..++.1	.....	.....	.....
Diff. – *Genisto pilosae-Quercetum petraeae*						
Genista pilosa	.....+.....	.++.1.+	.....	1112111121122+	.....	22..+.1+2
Rumex acetosella agg.	.....+.....	+-.....	.....	11-.-.+2++...+	.....	.1.....
Jasione montana	.....-.....+.....+.+.	.-....+	.....	1.+.+.12+1.-..	.....	.....
Campanula rotundifolia agg.	..111.....+.....+.....	1+.....	.....	+11+..+.+..+..	...+...+.-.....	.1.....
Calluna vulgaris	.....+.....	.....	.....	3+.1..23.....+	.....	.....
Linaria genistifolia	.....+.....-..	.....+.	.....	+....+.+++.+..	.....	.1.....
Scleranthus perennis	.....	.....	.....	.....+..1-.+..	.....	.....
Diff. – *Potentillo albae-Quercetum*						
Fragaria moschata	.....+.....++..+.....	...+..+	.++1..	.....	+1.+1111222+.+1++	.....
Carex montana	.....+1+.....-.....1....	.....	.....	.....	121.+.321.+.23223	.....

Table 3. (continued)

Relevé nr.	111111111122222222223333333333	3444444	444455	55555555666666	66667777777777888	888888899
	123456789012345678901234567890123456789012345678	9012345	678901	23456789012345	67890123456789012	345678901
Convallaria majalis	1...+..2.1.+1....-..+1.....	.....	2..+..	.....	.2.+.+222+21.22..	.....
Betonica officinalis	.....-+.....+.....+.....	.....	.....	.....	++1..11...1..++++	.....
Melampyrum pratense	+.....+..2.....+.-..+.....	+.....	.....	.....+.....	.++21..1..++.12.+	.....
Melittis melissophyllum	.....-.....+.....	.....	.....	.....	.+1.+..+..++.++.+	.....
Potentilla alba	.....	.....	.....	.....	11++11+.....+	.....
Serratula tinctoria	.....	.....	.....	.....	.-+.....-..-++1	.....
Symphytum tuberosum	.....-.....	..-1...	..-...	.....	++.++++.....	.....
Taraxacum officinale agg.	.....+.....+.....	.....-	.....	.....	..+..-+-+-.....	.....+.
Solidago virgaurea	.....+.....	.....	.....	.....	..+...-+.....1+..	.....
Geum urbanum	.....-.....	.....	.....	.....	..+....-.-+-.....	.....
Ranunculus polyanthemos	.....	.....	.+....	.....	....+..++.....-.+	.....
Viola reichenbachiana	.....+.....+....	.....	.....	.....	.....+1...+..++..	.....
Brachypodium sylvaticum	.1.....+.....	.....	.....	.....	.....111...1+..	.....
Diff. – *Asplenio cuneifolii-Quercetum petraeae*						
Potentilla arenaria	.....	.....++	..+...	.....1.....	.....	121++.++2
Dorycnium germanicum	.....	.....	.....	.....	.....	.3-.++++1
Pimpinella saxifraga agg.	.....+.....+.+..++....+..	.....	....+.	.....	....-....+.....+.	+..+++1+.
Koeleria macrantha	.....	2....-.	.....	.....2...1.+..	.....	-.-.+..+1
Galium verum	.....	.....	..+...	.....	.....	..+.++.++
Alyssum montanum	.....1.+.....+.....	.....	.....	1.....	.....	+1-+.....
Scorzonera austriaca	.....	.....	.....	.....	.....	-+-...-..
Centaurea stoebe	.....	.....	.....	.....+....	.....	+++.....+
Asplenium cuneifolium	.....	.....	.....	.....	.....	-1....-..
Avenochloa pratensis	.....	.....	.....	.....	.....	+.2....+.
Diff. – *Sorbo torminalis-Quercetum caricetosum humilis* & *Genisto pilosae-Quercetum petraeae*						
Luzula campestris agg.	2..1.....+...+.....-.....++	++..++1	+.....	..+.+.+.+++.++	.....	.....
Sedum reflexum	.....+.	.++-.+.	.....	..+..1...+.1.+	.....	.....

Table 3. (continued)

Relevé nr.	111111111122222222223333333333	3444444	444455	55555555666666	66667777777777888	888888899
	123456789012345678901234567890123456789012345678	9012345	678901	234567890123456	789012345678901	234567890
Diff. – *Sorbo torminalis-Quercetum caricetosum humilis, Genisto pilosae-Quercetum petraeae* & *Asplenio cuneifolii-Quercetum petraeae*						
Carex humilis	..132+.....+.....	22+1+21	.....	..1.232.2432.2	.....	213+313+3
Thymus praecox	.....	1....++	.....	....+1...+..-.	.....	..1.++1..
Diff. – *Sorbo torminalis-Quercetum poetosum nemoralis* & *Potentillo albae-Quercetum*						
Brachypodium pinnatum	..-.....2.....1+...+.....1	..41...	3343.4	.....+....	..4.11....++..232	.....
Campanula rapunculoides	.....-1.....	.....	-.+1..	.....	..+-.+...1....-.+	.....
Diff. – *Sorbo torminalis-Quercetum poetosum nemoralis* & *Asplenio cuneifolii-Quercetum petraeae*						
Bupleurum falcatum	.....+..2..++.+.1+..+.....--+.+	.+-....	2+11+.	.....	..1....+1+.....	...21+11.
Achillea millefolium agg.	.....+.....-....++..-....	.....	1.+++.	.....-	....+.-..-.....++	+.++++.++
Diff. – *Genisto pilosae-Quercetum petraeae* & *Asplenio cuneifolii-Quercetum petraeae*						
Seseli osseum	.....++.....-	.....+.	.....	..+..+...1.-..	.....	.1++.....
Char., diff. – *Quercion petraeae*						
Lychnis viscaria	2.21+....+.11+++11+11.11111+++1..-1.1+	12++1+1	11+++.	1.2+1..1+11+++	...+.++.+-.....	...+.....
Hieracium sabaudum	..11+++.+..1++.+.++.+..11++++++.....-	-+111-.	1++++.	.+-.....+111+.	..+++++++.++++++.	...+-+...
Luzula luzuloides	2.+1..+3.111+1.+1111111....+..+.1.+.+.	+.....+	....+.	1..++.++.....	...1..11+.++.1...	.....
Hieracium pilosella	1.....11-++2..1+.2+.-+...+.+....1	1+...+1	.....	2.+.+++.+1+11+	.....-.....	1....+.+.
Hieracium laevigatum	.....+..++1+.+...+.++....+.....	..++...	.....	.....+1..	.....	.....
Dianthus carthusianorum agg.	+.....+.....+	.....	..++..	..+.....+.1	.....+	..+++...+
Sedum sexangulare	.....+.....+.1+....-.....	.....+1	.....	..+.-....+....	.....	..+.....
Festuca pallens	.....+.....	.....	.....	22.....+.....	.....	+311.....
Avenella flexuosa	.....1.....+.	2	.....	12.....	.....1....	.....
Polypodium vulgare	.....++.....	.....	.....	...+-.....+..	.....	.....
Calamagrostis epigeios	....1.....	.....+	2.....	.....	.....	.....+...
Asplenium septentrionale	.....++.....	.....	.....	..+.....	.....	.1.....
Char., diff. – *Quercetalia pubescenti-petraeae*						
Vincetoxicum hirundinaria	2-1-+1+.33..12112.+.11+.12+11+12+1+313	.+..1+.	1-1111	+++..+.1+1+.-.	...231-...1+...+.	.1.2++.2.

Table 3. (continued)

Relevé nr.	111111111122222222223333333333	3444444	444455	55555555666666	66667777777777888	888888899
	123456789012345678901234567890123456789012345678	9012345	678901	23456789012345	67890123456789012	345678901
Euphorbia cyparissias	1.....+1+1+1.+++.+.1++++.-+-1++.+++.+	1....++	1+111.	..+..1..+1-...	...++.++++.+...1+	+1.+.1++.
Anthericum ramosum	11111.+2.2.+1+-++.2+1+2.++11.+..+..+-	1.1..++	1+.1.-	1.....11.2-...	..+1+1-..-.-...1+	.1...2...
Trifolium alpestre	...+.+..1+2221+..+1.2++.1...+1+...+..1	1111..+	2+111.	..-..2..++++.-	-++11.122+.+.....	.....+...
Sedum maximum	1.11+.+++1.+++.+.++++.++.+.+-+-.....-	1++++..	+++++.	+.+..++.++++.+	....+.-....+.....	...+.....
Tanacetum corymbosum	...+-++++22.2..++-+.1+++..++1.+...++++	.+12+.+	11+1.+	.........+++..	..1.1+...+.+.+..1	.....1.+.
Verbascum austriacum	....-...++1.1+++1.+.++.+.1++.++...++++	++11.11	2.11++	..1.+1...11+++	....+..........+.	.+..+1.+.
Silene nutans	2.11+.++..1111+12111212++1+.+.....1.+	1...+.+	..+.+.	.........+...+	++.+++-+.+.+..+++	....
Polygonatum odoratum	1111...2.2..1++.+.+.++...+++..+-...++1	1++++..	1+.1..	+++...12.+1...	..++.11+..++.....	....
Hypericum perforatum	+...-.....1++.+...+....+++.++++.++..+.	+1-+.-+	..++++	....-+++++...+	-.........+..-..+.	+.........
Poa pratensis agg.	...-...+2.+..........+...+.....+	..+2..+	1.2+..	.....1...++..-	++.....+++.-...+.	..-....++
Teucrium chamaedrys	..........+.+.........+....1++.....	...1.++	1+111-	.....1........	..+-+..+++.....1.	+......+.
Ajuga genevensis	.......+.++...+...+.1+.....-.....	...+..+	.....	.........+....	..............+	+........
Viola hirta	..................+........+.....	.....	.....	....	.....-..+...-..+.	.1.....+.
Inula conyza	.......+.....................++..	......+	...++.	....	..............+	+........
Origanum vulgare	...........1...1...1.....-.-	.....	2-....	....	....	....
Coronilla varia	..................-..	.....	....-.	..........+	..+.+.........+.	....
Peucedanum cervaria	.....	.....	.+....	....	..+.+.........+.+	....
Geranium sanguineum	..........-..	1.....	...+..	....	.....+..........	....
Festuca rupicola	.....	..+....	.....	...+..........	.............+.	.....3.
Char., diff. – *Querco-Fagetea, Fagetalia* and companions						
Festuca ovina	3112111112232223431322421132+232213233	23.1432	11.+3.	..433134312333	+..2+++1+++.....	+..1+2+1.
Poa nemoralis	252123222221+252212+121342234423342..+	231...1	+2113.	......+.+1+..+	33.4332323354++.+	....
Veronica chamaedrys agg.	1.+.++-1111+++++++1.11+++1+++++++....	.++...+	.+....	..1.++..++.+.-	+..+..+++++++.-+.	....
Genista tinctoria	+..++-.1+112121112111+21+11++.1.1.+++-	1+11++.	1+21+.	1.+..2...21...	...+.+...+.....	...+.-...
Hieracium lachenalii	1-11+++.....+++.+.+1+.+..1+1+..1.....	.++.1..	1.-...	..+1....+..+.	+..+++++2+..+1..	.....+...
Hieracium sylvaticum	1.1.1++111.+1+....+.1+.+++.+-.+....++..	-+..+..	+.....	....+....-.-.-	++....+++++.-..++.	..+....+.
Campanula persicifolia	.-...-.++.+1+-.+.-..+++....++..-..+1..	..11+.+	.+++..	....+....+1...	--...--+-+++..-.+	....+....
Galium pusillum agg.	1.....+++111+++11+11+1+.++.+++.++...+	..1..++	.....	....1+...+....	..+....+.+.+.....	1....+...
Veronica officinalis	+.-+++-.1.+1+..-+.+++..+.++.++...1+....	1	.....	....-.....+-	...+..+.++..+++-.	....+....
Lembotropis nigricans	...1.+...+.+2.1.1112.2+1..-1....+.....	...+...	..1...	+.+..1...2+1.+	...+-.-+++.....	...+...+.
Lathyrus niger	.....+-..+.1.++.-.+.+..1...11...-+....	...2...	11+...	....	11.++++1..21+12.1	....

Table 3. (continued)

Relevé nr.	111111111122222222223333333333	3444444	444455	55555555666666	66667777777777888	888888899
	12345678901234567890123456789012345678	9012345	678901	23456789012345	67890123456789012	345678901
Clinopodium vulgare	.....+-..12.1.+..-+.+..++..+....++....	.....	++.11.	.....	..+.+++....++....	.....
Hieracium maculatum	.....+++...1...-...1.+.++..+.+.+.+....1	.+....	.1....	.....	++....+..+..++..+	.....
Galium mollugo agg.	.....+.+..2.1...2.1.+1...-.+.....++..	...+...	.+....	.....	...-+.++....+....	.-.2.+...
Digitalis grandiflora	+.11...1...12...1...21+..+++1.....1+.+	..+....	+.....	.....+....	.....-.....	.....
Carex digitata	.....111111..-.+-.++.....+.....+..	.....	.....	.....	..+.....++....+..	...+.....
Melica nutans	.....1+1.+..+.+.....+..+.....	.....	....+.	.....	21....++1.....++.	....+....
Myosotis sylvatica	.....1+.+...++..11.....+.....	....-..	+-.+..	....+.....	-+.-.....+.....	.....
Silene vulgaris	.....++.....-....+.2....1+.....1.	.+....	+...+..	.....	....+.....1....+	.1...+...
Astragalus glycyphyllos	.....+.....+.+.....+..+	..+....	+....+	.....	+...1..+11.....	+....+...
Mycelis muralis	....-..1.+.....-.....-..-..+.....	.....	...+..	.....	....++.+..++.....	.....
Primula veris	.....1.1...1...+...+-.....-.....	.....	1	.....	...++.....+...++	.....
Carex muricata agg.	.1.....+.....+.+..+.....+..+...	.....	+..+..	.....	.....+....	.....+.
Galium aparine	.1.....-.....-	.....+	.-.+.+	.....-...-	....+.....-.....	.....
Pulmonaria mollis	.....2+...-.....+..-.....	.....	....+.	.....	+.....1+2+.....	.....
Carex caryophyllea	.....1.1...+.+.....	...+...	..11..	.....+...++..	..1.....	.....
Stellaria holostea	.....1.....1.....+	1	.....	.....	..+.....2++....	...1.....
Arrhenatherum elatius	.....+.....++....+.....	1.....	....+.	....+.....	....+.....	+.....
Hieracium umbellatum	.....-.+1..	1.+....	..-...	1+.....	.....+.....	.....
Hypericum montanum	.....-.....-+.+.+.....	.....	+.....	.....	+.....	....+....
Viola riviniana	.....-.....	.....	+.....	.....	++..+...++.....	....+....
Torilis japonica	.....+.....-.-.....	.....	..-+..	.....	.....+++.....	.....
Agrostis tenuis	.....+.....	.....	+.....	.....+.....+	...+..+.....+...	.....+
Phleum phleoides	.....+	.....	1.++..	.....1....	.....	.+.....11
Fallopia dumetorum	-1..+.....-.....-+...	.....	.....	.....	.....1.....	.....
Dactylis glomerata agg.	.....+.....-....+.....	.....	.+....	.....+	.....-.....+..	.....
Alliaria petiolata	.....+...-.1..	.....	1	.....+	.....-.....	.....+.
Hieracium bauhinii	....1.....1+1+1.....	.....	.....	.....	.....	.....
Galium sylvaticum	.....+.....+.....+..	.....	.....	.....	++.....+.....	.....
Euphorbia polychroma	.....1.....	.....	.-...-	.....	..+.....	.1.1.....
Lapsana communis	.....+.....-.....-	.....	.-.1..	.....	.....-.....	.....
Arabidopsis thaliana	.....++.....	..1+.-.	.....	....+.....	.....	.....
Centaurea triumfettii	.....+-.	.....	.....	.....+....	.....	1.....

Table 3. (continued)

Relevé nr.	111111111122222222223333333333	3444444	444455	55555555666666	66667777777777888	888888899
	123456789012345678901234567890123456789012345678	9012345	678901	23456789012345	67890123456789012	345678901
Galeopsis pubescens	..-.....-...-.....	.-.....	...+..	.....	.....	.....
Melica uniflora	.....+.....1...	.....	+..1..	.....	.....+...	.....
Rubus fruticosus agg.	.....1.+.....+.....	.....	.....	.....	....+.....+..	.....
Campanula glomerata	.....+.....+.....	.....	.....	.....	....-.....	.....-+..
Viola collina	.....+1.....	.....	.....	.....	.....	+....+-..
Ajuga reptans	.....1+.....+.....	.....	.....	.....	..1.....+..	.....
Senecio viscosus	.....-....-+-	.....	.....	.....	.....	.....+..
Fumaria officinalis	.....1+...	+.11..	.....	.....	.....	.....
Impatiens parviflora	+.....+.....1	.....	.....	.....	.....+.....	.....
Chamaecytisus ratisbonensis	1.....	+.....	.....	.....1....	.....	.....-..
Anthoxanthum odoratum	....+.....1.....	1.....	.....	.....	.....+	.....
Neottia nidus-avis	.....+.1+.....	.....	.....	.....	...-.....	.....
Galium odoratum	.....+.....+.....	.....	.....	.....	.....+.....+..	.....
Festuca heterophylla	.....+.....	.....	.....	.....	.....1+.2	.....
Pimpinella major	.....1+.....	.....	.....+	.....	.....	.+.....
Cardaminopsis arenosa	.....-..+..+.....	.....	..+...	.....	.....	.....
Senecio nemorensis agg.	.....++.....-.....	.....	...+..	.....	.....	.....
Fragaria viridis	.....+.....	.....	....+.	.....	.....	1.....+
Campanula trachelium	.....-+..	.....	.+....	.....	.....-..	.....
Allium oleraceum	.....+..-	.....	.-....	.....	.....+.	.....
Allium flavum	.....	.....1.	.....	.....	.....	.+.+...+.
Viola tricolor subsp. *subalpina*	.....	.....	..-+.+	+.....	.....	.....
Vicia sepium	.....	.....	.....	.....	.++.1..-.....	.....
Melampyrum nemorosum	.....	.....	.....	.....	..1...2.....+..	.....
Centaurea scabiosa	.....	.....	.....	.....	.....+	.1.1..+..
Crepis biennis	.....+1..+.....	.....	.....	.....	.....	.....
Campanula bononiensis	.....1.....	.....+	.....	.....	.....+.	.....
Carex pilosa	.....+.....+.....	.....	.....	.....	.....+...	.....
Lilium martagon	.....1.....	.....	.....	.....	...-.+.....	.....
Vicia pisiformis	.....+.....+.....	.....	.....	.....	.....-....	.....

Table 3. (continued)

Relevé nr.	111111111122222222223333333333444444444455555555566666666667777777777888888888899
	123456789012345678901234567890123456789012345678901234567890123456789012345678901
Geranium robertianum	.....-.....+.....+.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Scrophularia nodosa	.....-.....+.....+.....+.....+.....+.....+.....++....+.....+.....+.....
Thymus pulegioides	.....+.....+.....+.....+.....+.....+..+.....+.....+.....+.....+.....2.....
Vicia tetrasperma	.....+.....+.....+.....+.....+.....+.....-....+.....+.....+.....+.....
Fallopia convolvulus	.....+.....++.....+.....+.....+.....+.....+.....+.....+.....+.....
Vicia cracca agg.	.....-..-.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Veronica spicata	.....1.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Galium glaucum	.....+.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Inula hirta	.....++.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Prunus fruticosa	.....+.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Pyrus pyraster	.....+.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Asperula cynanchica	.....+.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Myosotis stricta	.....+.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Thymus glabrescens	.....1.....+.....+.....+.....+.....+.....+.....+.....+.....2.....
Platanthera sp.	.....-.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Agropyron intermedium	.....1.....+.....+.....+.....+.....+.....+.....+.....+.....2+
Carlina vulgaris agg.	.....+.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Euphorbia angulata	.....+.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Cruciata glabra	.....+.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Knautia drymeia	.....+.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Lathyrus vernus	.....1.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Asarum europaeum	.....2.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Pulmonaria officinalis agg.	.....2.....+.....+.....+.....+.....+.....+.....+.....+.....+.....
Epipactis helleborine	.....-1.....-.....+.....+.....+.....+.....+.....+.....+.....+.....
Molinia caerulea agg.	.....+2.+.....+.....+.....+.....+.....+.....+.....+.....+.....
Lepidium campestre	.....+.....+.....+.....+.....+.....+.....+.....+.....+.....+.....

E_0 – ground layer

Diff. – *Genisto pilosae-Quercetum petraeae*

Polytrichum piliferum	.....-.....+.....-.++..11.....1.+..+122+..32.....+.....+.....
Hypogymnia physodes	.....+.....+..+.....22..+1+1+....+.....+.....

Table 3. (continued)

Relevé nr.	111111111122222222223333333333	3444444	444455	55555555666666	66667777777777888	888888899
	123456789012345678901234567890123456789012345678	9012345	678901	23456789012345	67890123456789012	345678901
Cladonia rangiformis	.2.....+.....-	.....1.	. ..	+..+.+1.1..+.1	.....	.....+
Cladonia foliacea	.....	.....1.	. ..	.....1++1.++1.	.....	1
Cladonia arbuscula	.....	.....	. ..	.1....+.+....21	.....	.....
Parmelia stenophylla	.....-.....	.....+.	. ..	..+.+.11+.....	.....	.....
Parmelia saxatilis	.....+.	.....	. ..	1...1...+....+	.....	.....
Diff. – *Asplenio cuneifolii-Quercetum petraeae*						
Dicranum polysetum	.....+++.....+.....	.....	. ..	...1..1.....	.....	.11.+.2..
Rhytidium rugosum	.....+..+.....	.....	. ..	.....	.....	1.....+.1
Char., diff. – high-ranked syntaxa and companions						
Hypnum cupressiforme	+.1.++1+211.1111112111.1+++211	.1...22	+ 2.	+.32212+2++221	11++1+1.+.1+++	+2+3.+221
Brachythecium velutinum	+.2+11+...12111.....1+.....+.	.+..+..	. ..	1.....+.1++..	....+.+.....+.	....+....
Ceratodon purpureus	....21..+1...1+...+....2.....+1	.....+1	. ..	1...+2..2..1.1	.....	.1..1....
Polytrichum juniperinum	.....2.+.1..1..12.....+...2.	.+.....	. 1.	2.+.1.21.+...+	.....+.....	.....-...
Dicranum scoparium	2...+.....+1.....+....2+.	....+1.	. ..	1..12.11.....	.....	.+...+1..
Cladonia fimbriata	.....-..-+.+...+.....	.....++	. ..	+.1.....11....	.....	.+..+....
Polytrichum formosum	1...+.....+.1..1...+.....+...	.....	. ..	...+..1..+....	.....+.	.....
Abietinella abietina	....11..+1+..1.2.....	.....	. ..	.....	.....	.....+.
Pohlia nutans	....1.+...+.....++.....	.2.....	. ..	.....	....+.....	....1....
Pleurozium schreberi	+...+.....+.1..1...-.....	.....	. ..	.....	.....	3
Plagiomnium affine	1.....+.....	.....	. +.	.....	.....+..+1	....-....
Cladonia sp.	.....+..+.1.....+-+.	.....	. ..	.....+....	.....	.....
Dicranella heteromalla	.....++.....+.....+....	.....	. ..	+.....1.....	.....+..	.....
Cladonia chlorophaea	.....++	.....	. ..	.+....+1.....	.....	.1.....+.
Cladonia pyxidata	.....+.+.+.....	.....+	. ..	.....+.....+	.....	.....
Parmelia conspersa	.....+.	.....+.	. ..	..+.+...+...+.	.....	.....
Peltigera sp.	....1.....1..++1.....	.....	. ..	.....	.....	.....
Atrichum undulatum	.....+.....1....	.1.....	. ..	.....1....	.....1..	.....
Cladonia furcata	.....+++.....	.....	. ..	...+.....	.....	.....
Parmelia pulla	.....+-	.....	. ..	.....+....1	.....	.....
Cladonia coniocraea	.....	.....+.	. ..	+.....1.	.....	.....+.
Racomitrium canescens	..1.....+.....	.....	. ..	.....+.	.....	.....

Table 3. (continued)

Relevé nr.	1111111111222222222233333333 3444444 444455 55555555666666 66667777777777888 888888899
	1234567890123456789012345678901234567890123456789012345678 9012345 678901 23456789012345 67890123456789012 345678901
Bryum sp.	.....+..... ....+.... .....+...
Bryum capillare	.....1..... ....+.+..... .....
Cladonia rangiferina	....2...1.....+ ....
Cornicularia aculeata	....+.....+.+ ....

Species in one or two relevés:
E_3: *Picea abies* 1:-, 10:2; *Abies alba* 8:1, *Acer pseudoplatanus* 39:-, *Acer campestre* 49:+, *Sorbus aucuparia* 51:-, *Sorbus aria* agg. 57:+, *Quercus rubra* 68:1;
E_x – epiphytes: *Loranthus europaeus* 33:+, 65:+;
E_2: *Picea abies* 8:+, 23:+, *Larix decidua* 20:+, 23:+, *Rosa rubiginosa* 31:+, 83:1, *Acer campestre* 46:1, 68:+; *Pinus strobus* 17:+, *Fagus sylvatica* 18:+, *Crataegus* sp. 39:+, *Crataegus laevigata* 42:+, *Acer platanoides* 47:+, *Ribes uva-crispa* 49:1, *Quercus rubra* 68:1, *Prunus avium* 71:+, *Prunus padus* 71:+, *Viburnum lantana* 79:+, *Quercus robur* 80:+, *Pyrus pyraster* 82:+, *Rubus idaeus* 89:+;

E_1 – seedlings and juveniles: *Acer platanoides* 2:+, 39:+, *Rubus idaeus* 8:+, 89:+, *Rosa canina* 42:+, 44:+, *Betula pendula* 52:+, 58:+, *Sorbus aria* agg. 59:+, 86:+, *Frangula alnus* 66:+, 67:1, *Sambucus nigra* 66:+, 67:+, *Rhamnus catharticus* 77:-, 81:+, *Viburnum lantana* 80:+, 81:+, *Prunus avium* 80:+, 81:-; *Robinia pseudacacia* 2:1, *Cytisus scoparius* 3:+, *Acer pseudoplatanus* 67:-, *Populus tremula* 80:-, *Viburnum opulus* 80:-, *Quercus robur* 81:+,
E_1: *Galium rotundifolium* 1:+, 8:1, *Epilobium montanum* 8:+, 67:+, *Trifolium campestre* 10:+, 12:+, *Asplenium trichomanes* 13:+, 17:1, *Sedum acre* 17:+, 42:-, *Platanthera bifolia* 21:-, 75:-, *Knautia arvensis* agg. 25:-, 68:1, *Dictamnus albus* 28:+, 45:+, *Chaerophyllum temulum* 28:-, 78:+, *Verbascum lychnitis* 30:+, 83:+, *Moehringia trinervia* 34:-, 56:+, *Aurinia saxatilis* 37:-, 63:+, *Fumaria schleicheri* 38:+, 51:-, *Linaria vulgaris* 41:-, 63:+, *Agrostis stricta* 44:+, 48:1, *Veronica dillenii* 44:+, 65:-, *Antennaria dioica* 45:+, 55:+, *Cyclamen purpurascens* 46:+, 86:-, *Corydalis pumila* 48:1, 49:1, *Berteroa incana* 48:+, 49:+, *Carex praecox* 57:1, 90:+, *Thesium linophyllon* 60:-, 69:-, *Echium vulgare* 61:+, 85:-, *Clematis recta* 68:1, 70:+, *Platanthera chlorantha* 70:-, 73:-, *Lathyrus latifolius* 73:+, 82:+, *Filipendula vulgaris* 81:+, 82:-, *Scabiosa ochroleuca* 83:+, 85:+, *Stipa joannis* 84:1, 85:2, *Euphorbia segueriana* 84:1, 85:1, *Melica transsilvanica* 84:1, 85:+, *Bothriochloa ischaemum* 84:1, 91:+, *Seseli hippomarathrum* 85:+, 91:+, *Biscutella laevigata* 88:+, 89:1; *Galeopsis ladanum* 1:+, *Cotoneaster integerrimus* 1:-, *Senecio sylvaticus* 4:+, *Chamaecytisus supinus* 4:-, *Euphorbia amygdaloides* 10:+, *Lotus corniculatus* 12:+, *Trifolium aureum* 13:+, *Vicia hirsuta* 13:+, *Leontodon hispidus* 20:+, *Orobanche* sp. 23:+, *Trifolium montanum* 24:+, *Carlina acaulis* 27:+, *Arabis pauciflora* 36:+, *Anthemis tinctoria* 37:+, *Erysimum diffusum* 37:-, *Myosotis arvensis* 41:1, *Veronica hederifolia* agg. 42:1, *Gagea* sp. 42:+, *Festuca valesiaca* 45:1, *Erophila verna* agg. 45:+, *Thlaspi perfoliatum* 45:+, *Hieracium* sp. 45:-, *Arum alpinum* 49:1, *Chelidonium majus* 49:+, *Corydalis intermedia* 49:+, *Falcaria vulgaris* 49:+, *Urtica dioica* 49:+, *Vicia tenuifolia* 51:3, *Aconitum anthora* 51:+, *Senecio jacobaea* 51:+, *Silene alba* 51:+, *Valerianella oltoria* 51:+, *Achillea nobilis* 57:+, *Pulsatilla grandis* 57:+, *Stipa pulcherrima* 57:+, *Trifolium arvense* 57:+, *Veronica verna* 57:+, *Vaccinium myrtillus* 58:+, *Allium vineale* 63:+, *Asperula tinctoria* 63:+, *Heracleum sphondylium* 67:+, *Maianthemum bifolium* 67:+, *Phyteuma spicatum* 67:+, *Pulmonaria angustifolia* 67:+, *Sanicula europaea* 67:+, *Selinum carvifolia* 67:+, *Ranunculus auricomus* agg. 67:-, *Crepis praemorsa* 68:+, *Hepatica nobilis* 68:+, *Potentilla heptaphylla* 69:-, *Chamaecytisus* sp. 79:+, *Galium schultesii* 79:+, *Angelica sylvestris* 80:+, *Holcus lanatus* 80:+, *Lysimachia nummularia* 80:+, *Succisa pratensis* 80:+, *Circaea lutetiana* 80:-, *Hypericum hirsutum* 80:-, *Bromus benekenii* 81:+, *Buglossoides purpurocaerulea* 81:+, *Centaurea jacea* agg. 81:+, *Peucedanum alsaticum* 81:+, *Melica ciliata* 83:+, *Salvia pratensis* 83:+, *Sedum album* 84:2, *Hieracium echioides* 84:1, *Picris hieracioides* 84:1, *Carduus nutans* 84:+, *Cheilanthes marantae* 84:+, *Silene otites* 84:+, *Convolvulus arvensis* 84:-, *Eryngium campestre* 85:+, *Plantago media* 85:+, *Veronica teucrium* 85:+, *Hieracium cymosum* 86:+, *Viola hirta* × *V. odorata* 86:+, *Sesleria varia* 87:2, *Agropyron repens* 87:+, *Senecio erucifolius* 88:+, *Thlaspi montanum* 88:+, *Stipa capillata* 91:1, *Aster linosyris* 91:+, *Plantago lanceolata* 91:+,
E_0: *Tortula ruralis* 16:+, 84:1, *Anomodon attenuatus* 21:1, 23:1, *Hylocomium splendens* 21:+, 55:+, *Peltigera canina* 23:1, 57:+, *Plagiomnium cuspidatum* 25:+, 74:1, *Aulacomnium androgynum* 31:+, 52:1, *Cladonia mitis* 52:1, 59:+, *Weissia brachycarpa* 57:1, 63:+, *Grimmia* cf. *pulvinata* 64:+, 84:1; *Leucobryum glaucum* 8:+, *Plagiothecium* sp. 8:+, *Thuidium tamariscinum* 10:+, *Plagiochilla asplenioides* 12:+, *Fissidens taxifolius* 13:+, *Hedwigia ciliata* 16:+, *Peltigera* cf. *horizontalis* 16:+, *Peltigera praetextata* 16:+, *Cladonia squamosa* 18:+, *Encalypta vulgaris* 21:+, *Bryoerythrophyllum rubrum* 21:+, *Brachythecium* sp. 33:+, *Cladonia* cf. *caespiticia* 40:+, *Parmelia caperata* 44:+, *Cladonia polycarpoides* 45:+, *Lasallia pustulata* 52:2, *Pohlia* sp. 52:+, *Cetraria islandica* 58:+, *Grimmia* sp. 59:1, *Rhizomnium punctatum* 69:+, *Plagiomnium undulatum* 82:+, *Tortella inclinata* 83:1, *Eurhynchium swartzii* 84:1.

Potentillo albae-Quercetum Libbert 1933 (Table 3, Fig. 5)

The *Potentillo-Quercetum* includes oak forest communities dominated by *Quercus petraea*. Locally *Quercus robur* may also be abundant. The stands are taller than in the other *Quercion petraeae* communities, with a more closed canopy of average cover about 80 %. The shrub layer usually has a lower cover, but it is still constantly developed with *Ligustrum vulgare, Quercus petraea, Frangula alnus, Corylus avellana, Cornus sanguinea, Crataegus monogyna* etc. The field layer consists of the thermophilous oak forest species (*Carex montana, Tanacetum corymbosum, Lathyrus niger, Anthericum ramosum, Polygonatum odoratum, Brachypodium pinnatum* etc.), species of mesic forests (*Poa nemoralis, Galium sylvaticum, Melica nutans, Convallaria majalis, Festuca heterophylla, Lathyrus vernus, Stellaria holostea, Pulmonaria officinalis* agg., *Anemone nemorosa* etc.) and the acidophilous oak forest species (*Melampyrum pratense, Festuca ovina, Luzula luzuloides, Veronica officinalis, Vaccinium myrtillus* etc.). An important diagnostic species group of this association includes the species confined to heavy soils which are

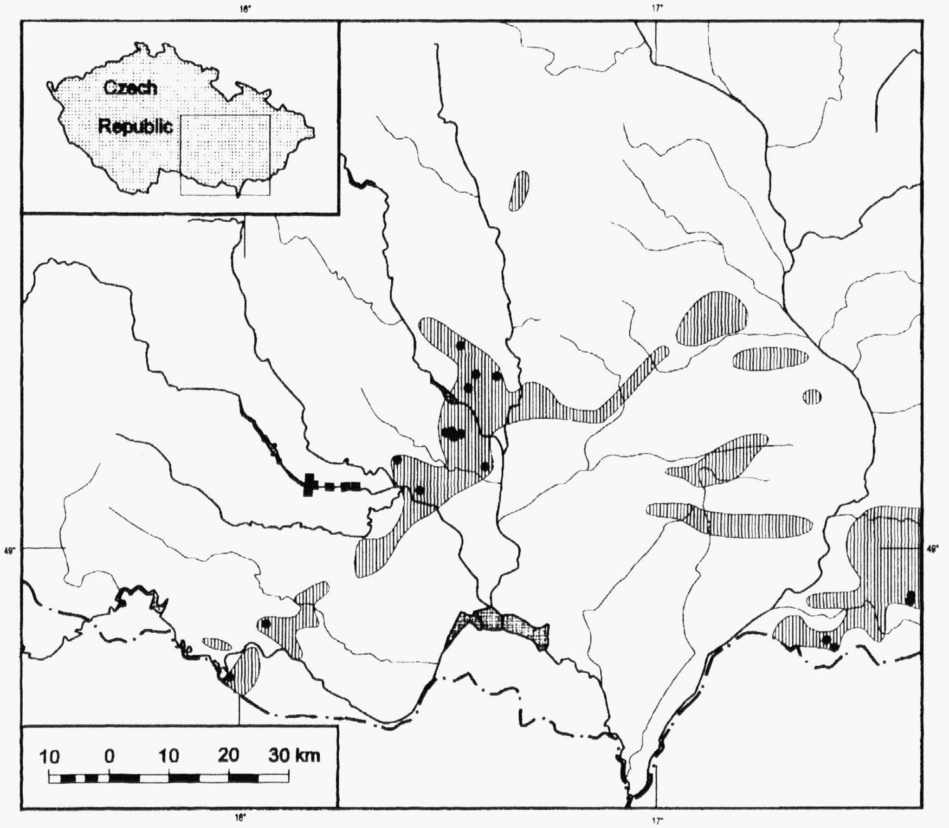

Fig. 5. – The distribution of the *Potentillo albae-Quercetum* (●) and the *Asplenio cuneifolii-Quercetum petraeae* (■) in Moravia according to the relevé data. Hatching – areas with the tentative potential distribution of the *Potentillo albae-Quercetum*.

Obr. 5. – Rozšíření asociací *Potentillo albae-Quercetum* (●) a *Asplenio cuneifolii-Quercetum petraeae* (■) na Moravě podle fytocenologických snímků. Šrafovaně jsou znázorněny oblasti s hypotetickým potenciálním výskytem asociace *Potentillo albae-Quercetum*.

intermittently wet (e.g. *Serratula tinctoria, Betonica officinalis, Potentilla alba, Galium boreale*).

These forests prefer the habitats of gentle south-facing slopes, usually up to 10° (–20°). The soils have developed over loess loams or other parent materials that weather to produce heavy, clay or clay-loamy soils (e.g. claystones). Leaching in these soils with superficial mobilization of clay minerals results in a fine-textured sub-surface horizon which is impermeable to excess rain. Due to the impaired drainage the upper layers of the soil become wet in winter and early spring, whereas in longer periods of summer drought the soils dry out considerably. The soils typically have lowered surface pH as a result of superficial $CaCO_3$ depletion with base-rich conditions maintained below. This community is sparsely distributed in the low-lying areas of the Bohemian Massif, on loess loams overlying the siliceous bedrock, with a conspicuous concentration of the localities in the surroundings of Brno. It is also encountered on the flysch sediments on the south-western foothills of the Bílé Karpaty Mts. In the flysch hilly landscapes of southern Moravia where the loess deposits are common, different soil types related to chernozems are developed and in this area the *Potentillo-Quercetum* is replaced by the *Quercetum pubescenti-roboris*.

The *Potentillo-Quercetum* is an association with a wide range in Germany, Poland and Bohemia (e.g. Libbert 1933, Matuszkiewicz 1956, Mráz 1958). Its Moravian distribution extends to the Austrian part of the Bohemian Massif (Chytrý et Vicherek 1995, see also Wagner 1967, Jelem 1976) and scattered stands also occur on the foothills of the Western Carpathians (Chytrý 1994). In these areas the association reaches its southern distribution limits.

***Asplenio cuneifolii-Quercetum petraeae* ass. nova hoc loco** (Table 3, Fig. 5)

Nomeclature type relevé: Table 3, rel. 83 (holotypus)

Open forests dominated by *Quercus petraea* with participation of native *Pinus sylvestris*. At present, *Pinus sylvestris* often dominates as a result of oak felling and pine re-colonization. In the shrub layer, *Prunus mahaleb, Berberis vulgaris* and *Frangula alnus* are typical besides the suppressed *Quercus petraea* individuals. Thermophilous species of shallow, well base-saturated soils are the commonest species of the field layer (*Carex humilis, Potentilla arenaria, Dorycnium germanicum, Achillea collina, Genista pilosa, Koeleria macrantha, Vincetoxicum hirundinaria, Galium verum* etc.). The fern *Asplenium cuneifolium* indicates the ultramafic bedrock.

The *Asplenio-Quercetum* is an endemic association of south- to west-facing slopes on serpentine outcrops in the middle Jihlava Valley between Mohelno and Biskoupky. The slopes are steep, reaching 15–40°. The altitudinal range of the localities is 300–350 m. The soils are usually shallow rankers with high base saturation, with patches of bare rock outcrops. They have a toxic effect on some plants due to a high Mg^{2+} content. Sunny aspects of slopes along with the black colour of the bedrock increase the radiation absorption and consequently the warming and drying out of the soil which prevents development of more closed canopy. This community is associated with the thermophilous rocky steppes of serpentine cliffs (*Sedo albi-Cheilanthetum marantae, Euphorbio-Festucetum pallentis*). On the north-facing slopes, it is replaced by natural pine forests of the *Thlaspio montani-Pinetum sylvestris (Dicrano-Pinion)*.

Most forest stands on serpentines in the Jihlava Valley were felled early and used for sheep and goat grazing: the well-known Mohelno serpentine steppe was created this way. In the middle of the 20th century the grazing ceased and the gradual *Pinus sylvestris* invasion has been taking place since then. The old history of land use masks the natural pattern of trees, nevertheless, Vykoukal (1970) who investigated the forest history in the Mohelno cadaster since 17th century, suggests that *Pinus sylvestris* is native there but *Quercus petraea* probably prevailed except on serpentine cliffs.

Ordination

A correspondence analysis ordination biplot is presented in Fig. 6. It can be inferred from corresponding ordination of species (not shown) that the horizontal axis (eigenvalue 0.502) represents the gradient from the basic soils rich in nutrients (left) to acidic, oligotrophic soils. The vertical axis (eigenvalue 0.352) maximizes the variation from dry habitats to the intermittently moist sites. The *Quercion pubescenti-petraeae* communities are placed in the bottom left part of the biplot, overlapping one another and the *Quercetum pubescenti-roboris*. The right part of the biplot is occupied by the *Quercion petraeae* communities that allow the recognition of the group with the *Potentillo albae-Quercetum* and the group with the other associations. The weakest homogeneity is found in the *Aceri tatarici-Quercion* communities which are distinctly separated from one another. There is an evident convergence between the *Potentillo albae-Quercetum* and the *Aceri-Quercion* communities in Moravia which reflects certain habitat similarities: all these communities are confined to deeper soils. The overlaps between the *Quercetum pubescenti-roboris* and *Sorbo torminalis-Quercetum* are to be explained as a consequence of man-induced impoverishment of the floristic diversity of the former association. Also the *Asplenio cuneifolii-Quercetum petraeae* does not form a well-defined cluster because of anthropogenic shifts in species composition.

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Souhrn

Fytocenologická syntéza vegetace teplomilných doubrav řádu *Quercetalia pubescenti-petraeae* Klika 1933 na Moravě byla provedena na základě 203 nepublikovaných snímků, které byly pořízeny převážně autory článku od první poloviny 50. let do první poloviny 90. let, doplněných o dalších 115 snímků dosud publikovaných v literatuře. Byly rozlišeny 3 svazy a 8 asociací. Svaz *Quercion pubescenti-petraeae* Br.-Bl. 1932 zahrnuje teplomilné doubravy na vápencích nebo jiných vápnitých substrátech, mezi nimiž mohou být rozlišeny 2 asociace: *Pruno mahaleb-Quercetum pubescentis* Jakucs et Fekete 1957 a *Corno-Quercetum* Máthé et Kovács 1962. První asociace zahrnuje extrémně xerotermní typy výslunných svahů nejteplejších oblastí, druhá má poněkud mezofilnější charakter a je rozšířena i v okrajových částech panonského termofytika. Svaz *Aceri tatarici-Quercion* Zólyomi 1957, který je rozšířen pouze na jižní Moravě, zahrnuje

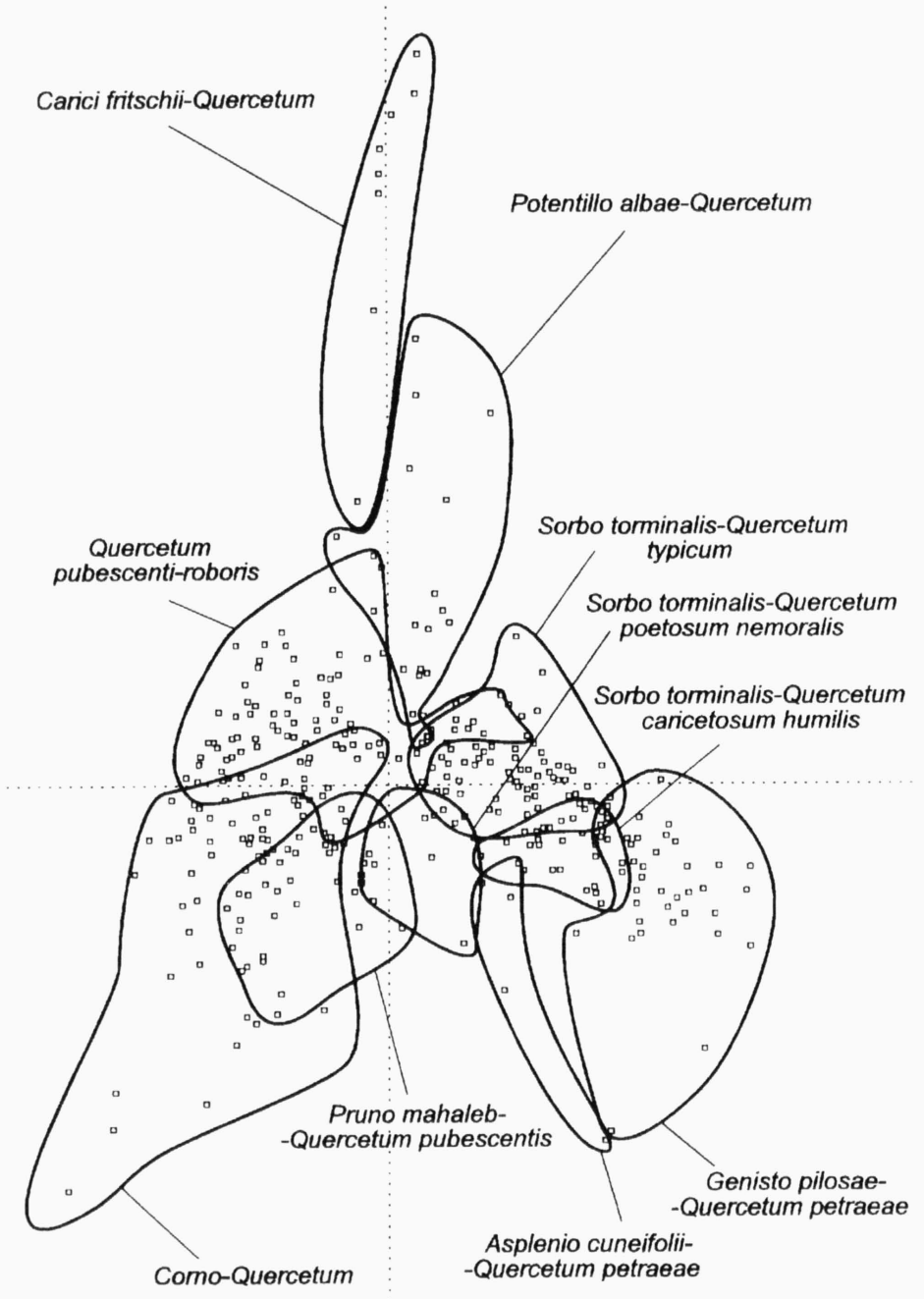

Fig. 6. – Correspondence analysis ordination diagram of the relevés of thermophilous oak forests in Moravia.
Obr. 6. – Ordinační diagram korespondenční analýzy fytocenologických snímků teplomilných doubrav na Moravě.

panonská společenstva rovinatých reliéfů, konkrétně asociace *Quercetum pubescenti-roboris* (Zólyomi 1957) Michalko et Džatko 1965 na černozemích a odvozených půdních typech na spraších a *Carici fritschii-Quercetum roboris* ass. nova na píscích. Svaz *Quercion petraeae* Zólyomi et Jakucs ex Jakucs 1960 má středoevropské rozšíření a na Moravě je zastoupen převážně v okrajových částech Českého masívu. Zahrnuje asociace *Sorbo torminalis-Quercetum* Svoboda ex Blažková 1962 (se subasociacemi *typicum*, *caricetosum humilis* a *poetosum nemoralis*) a *Genisto pilosae-Quercetum petraeae* Zólyomi, Jakucs et Fekete ex Soó 1963 na mělkých půdách oligotrofních silikátových hornin, *Potentillo albae-Quercetum* Libbert 1933 na těžších, hlinitých, střídavě vlhkých půdách a *Asplenio cuneifolii-Quercetum petraeae* ass. nova na serpentinech. Srovnání společenstev bylo provedeno numericky ordinační metodou korespondenční analýzy. Podrobnější informace v češtině jsou obsaženy v článku Chytrý (1995).

References

Barkman J.J., Moravec J. et Rauschert S. (1986): Code of phytosociological nomenclature – Code der pflanzensoziologischer Nomenklatur – Code de nomenclature phytosociologique. Ed. 2. – Vegetatio, Dordrecht, 67:145–195.

Blažková D. (1962): Phytozönologische Studien aus den Roblínské lesy (Roblin Wälder). – Acta Univ. Carol.-Biol., Praha, 1962:219–288.

Braun-Blanquet J. (1964): Pflanzensoziologie. Grundzüge der Vegetationskunde. Ed. 3. – Springer, Wien et New York, 865 p.

Chytil P. (1991): Semixerotermní lesní společenstva Hané. – Ms., 202 p. [M.Sc. thesis, depon.: Palacký Univ., Olomouc].

Chytrý M. (1991): Phytosociological notes on the xerophilous oak forests with *Genista pilosa* in south-western Moravia. – Preslia, Praha, 63:193–204.

Chytrý M. (1994): Xerothermic oak forests in the middle Váh Basin and the southern part of the Strážovská hornatina Upland, Slovakia. – Scr. Fac. Sci. Natur. Univ. Masaryk. Brun.-Biol., Brno, 22–23 (1992–1993):121–134.

Chytrý M. (1995): Předběžný přehled společenstev teplomilných doubrav jižní Moravy a západního Slovenska. – Zpr. Čes. Bot. Společ., Praha, 30:61–68.

Chytrý M. et Danihelka J. (1993): Long-term changes in the field layer of oak and oak-hornbeam forests under the impact of deer and mouflon. – Folia Geobot. Phytotax., Praha, 28:225–245.

Chytrý M. et Vicherek J. (1995): Lesní vegetace Národního parku Podyjí/Thayatal. Die Waldvegetation des Nationalparks Podyjí/Thayatal. – Academia, Praha, 166 p.

Duchoslav M. (1990): Příspěvek k poznání tolitových doubrav asociace *Cynancho-Quercetum* Passarge 1957. – Zpr. Kraj. Vlastiv. Muz. Olomouc 263:19–22.

Ehrendorfer F. [red.] (1973): Liste der Gefässpflanzen Mitteleuropas. Ed. 2. – G. Fischer, Stuttgart, 318 p.

Fekete G. (1956): Die Vegetation des Velenceer Gebirges. – Ann. Hist.-Natur. Mus. Nation. Hung., Budapest, 7:343–362.

Fischer M. [red.] (1994): Exkursionsflora von Österreich. – E. Ulmer, Stuttgart et Wien, 1180 p.

Frahm J.P. et Frey W. (1992): Moosflora. Ed. 3. – E. Ulmer, Stuttgart, 528 p.

Grulich V. et Grulichová J. (1986): Kostřava ametystová (*Festuca amethystina* L.) na jižní Moravě. – Zpr. Čs. Bot. Společ., Praha, 21:181–188.

Hill M.O. (1979) TWINSPAN. A Fortran program for arranging multivariate data in an ordered two-way table by classification of the individuals and attributes. – Cornell University, Ithaca.

Horák J. (1960): Poznámky k výskytu a ekologii některých lesních a lesostepních rostlinných druhů na jižní Moravě. – Preslia, Praha, 32:174–184.

Horák J. (1969): Waldtypen der Pavlovské kopce (Pollauer Berge). – Acta Sci. Natur. Acad. Sci. Bohemoslov. Brno 3:1–40.

Horák J. (1972): Lesní geobiocenosy jižní Moravy – teplomilné doubravy a jejich kontaktní geobiocenosy. – Ms., 175 p. [Research report, depon.: Mendel Univ. of Agriculture and Forestry, Brno].

Horák J. (1979): Geobiocenologická studie jihomoravských šípákových doubrav. – Lesnictví, Praha, 25:769–796.

Horák J. (1980): Teplomilné doubravy jihomoravských sprašových tabulí a pleistocenních teras (*Aceri campestris querceta* a *Ligustri querceta*). – Lesnictví, Praha, 26:587–620.

Horák J. (1981): Doubravy moravských okrajů krystalinika České vysočiny. – Lesnictví, Praha, 27:499–524.

Horák J. (1983): Südmährische Feldahorn-Eichenwälder (*Aceri campestris-Querceta*). Waldtypologische Mitteilung. – Acta Univ. Agricult., Brno, ser. C, 52:59–75.

Horánszky A. (1964): Die Wälder des Szentendre-Visegráder Gebirges. – Akadémiai Kiadó, Budapest, 288 p.

Horvát A.O. (1972): Die Vegetation des Mecsekgebirges und seiner Umgebung. – Akadémiai Kiadó, Budapest, 376 p.

Jakucs P. (1961a): Die phytozönologischen Verhältnisse der Flaumeichen-Buschwälder Südostmitteleuropas. – Akadémiai Kiadó, Budapest, 314 p.

Jakucs P. (1961b): Die Flaumeichen-Buschwälder in der Tschechoslowakei. – In: Lüdi W., Die Pflanzenwelt der Tschechoslowakei, Veröff. Geobot. Inst. Rübel Zürich, Bern, 36:91–118.

Jakucs P. et Fekete G. (1957): Der Karstbuschwald des nordöstlichen Ungarischen Mittelgebirges (*Quercus pubescens-Prunus mahaleb* nova ass.). – Acta Bot. Acad. Sci. Hung., Budapest, 3:253–259.

Jelem H. (1976): Die Wälder im Mühl- und Waldviertel. Wuchsraum 1. – Mitt. Forstl. Bund.-Vers.-Anst., Wien, 117:1–164.

Jelem H., Kilian W. et Neumann A. (1965): Standortserkundung im Zerreichengebiet des östlichen Weinviertels. Steinbergwald (Zistersdorf, Niederösterreich). – Forstliche Bundesversuchsanstalt, Wien, 41 p.

Kincl L. (1989): Poznámky k výskytu některých vzácnějších rostlinných společenstev na střední Moravě. – Acta Univ. Palack. Olomuc. Fac. Rer. Natur. – Biol., Olomouc, 29:37–64.

Klika J. (1932): Lesy v xerothermní oblasti Čech. – Sborn. Čs. Akad. Zeměd., Praha, 7A:321–359.

Klika J. (1957): Poznámky k fytocenologii a typologii našich xerothermních doubrav (sv. *Quercion pubescentis*). – Sborn. ČSAZV – Lesnictví, Praha, 3 (=30):569–596.

Koblížek J. (1990): *Fagaceae* Dumort. – bukovité. – In: Hejný S. et Slavík B. [red.], Květena České republiky 2:17–35, Academia, Praha.

Kovács M. (1975): Beziehung zwischen Vegetation und Böden. Die Bodenverhältnisse der Waldgesellschaften des Mátra Gebirges. – Akadémiai Kiadó, Budapest, 365 p.

Libbert W. (1933): Die Vegetationseinheiten der neumärkischen Staubeckenlandschaft unter Berücksichtigung der angrenzenden Landschaften. 2. Teil. – Verh. Bot. Ver. Prov. Brandenburg, Berlin-Dahlem, 75:229–348.

Magyar P. (1933): Erdötipusvizsgálatok a Börzsönyi- és a Bükkhegységben. – Erdész. Kisérl., Sopron, 35:396–450.

Málek J. (1961): Přehled lesních společenstev jihozápadní Moravy. – Vlastiv. Sborn. Vysočiny, Jihlava, sect. natur., 5:67–86.

Matuszkiewicz W. (1956): Materialy do fitosocjologicznej systematyki cieplolubnych dąbrów w Polsce. – Acta Soc. Bot. Polon., Warszawa, 25:27–72.

Michalko J. et Džatko M. (1965): Fytocenologická a ekologická charakteristika rastlinných spoločenstiev lesa Dubník pri Seredi. – Biol. Pr. SAV, Bratislava, 11/5:47–115.

Michalko J. et Plesník P. (1982): Die Vegetation der Tiefebene Záhorská nížina in Bezug auf die natürlichen Verhältnisse (Vegetationskarte). – Acta Bot. Slov. Acad. Sci. Slov., Bratislava, ser. A, 6:225–284.

Mikyška R. et al. (1968–1972): Geobotanická mapa ČSSR. 1. České země. – Academia, Praha.

Mráz K. (1958): Beitrag zur Kenntnis der Stellung des *Potentillo-Quercetum*. – Arch. Forstw., Berlin, 7:703–728.

Neuhäusl R. et Neuhäuslová-Novotná Z. (1977): *Cynancho-Quercetum* Passarge 1957 in den Tschechischen Ländern. – Stud. Phytol., Pécs, 1977:89–93.

Novák V. et Pelíšek J. (1943): Stručná charakteristika půd na přesypových píscích v lesní oblasti Doubrava u Hodonína. – Lesn. Pr., Praha, 22:225–235.

Poelt J. (1969): Bestimmungsschlüssel europäischer Flechten. – J. Cramer, Lehre, 757 p.

Řepka R. (1986): Nejsevernější lokalita *Carex fritschii*. – Zpr. Čs. Bot. Společ., Praha, 21:199–202.

Samek V. (1962): Lesy severovýchodního výběžku Brdských Hřebenů. – Pr. Výzk. Úst. Lesn., Praha, 24:105–168.

Soó R. (1937): A Nyirség erdöi és erdötipusai. – Erdész. Kisérl., Sopron, 39:337–380.

Soó R. (1963): Systematische Übersicht der pannonischen Pflanzengesellschaften VI. Die Gebirgswälder II. – Acta Bot. Acad. Sci. Hung., Budapest, 9:123–150.

Šmarda F. (1960): Mykofloristická charakteristika rostlinných společenstev Čebínky u Brna. – Čes. Mykol., Praha, 14:222–228.

Šmarda F. (1961): Rostlinná společenstva území přesypových písků lesa Doubravy u Hodonína. – Pr. Brněn. Zákl. ČSAV, Praha, 33/1:1–56.

ter Braak C.J.F. (1987): CANOCO – a FORTRAN program for canonical community ordination by [partial] [detrended] [canonical] correspondence analysis, principal component analysis and redundancy analysis (version 2.1). – Agricultural Mathematics Group, Wageningen, 95 p.

ter Braak C.J.F. (1990): Update notes: CANOCO version 3.10. – Agricultural Mathematics Group, Wageningen, 34 p.

Tichý L. (1995): Vegetace údolí Dyje v úseku nad Vranovskou přehradou. – Ms., 79 p. [M.Sc. thesis, depon.: Masaryk Univ., Brno].

Vykoukal J. (1970): Růstové podmínky borovice lesní v reservaci Mohelenská hadcová step. – Ms., 84 p. [Ing. thesis, depon.: Mendel Univ. of Agriculture and Forestry, Brno].

Wagner H. (1967): Die Waldgesellschaften des Manhartsberges in Niederösterreich. – Centralbl. Gesamt. Forstw., Wien, 84:365–382.

Wallnöfer S., Mucina L. et Grass V. (1993): *Querco-Fagetea*. – In: Mucina L., Grabherr G. et Wallnöfer S. [red.], Die Pflanzengesellschaften Österreichs, Teil III, Wälder und Gebüsche, p. 85–236, G. Fischer Verl., Jena.

Westhoff V. et van der Maarel E. (1978): The Braun-Blanquet approach. – In: Whittaker R.H. [red.], Classification of plant communities, p. 289–399, Dr. W. Junk Publ., The Hague.

Zólyomi B. (1957): Der Tatarenahorn-Eichen-Lösswald der zonalen Waldsteppe. – Acta Bot. Acad. Sci. Hung., Budapest, 3:401–424.

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Appendix 1. – Published relevés.

Pruno mahaleb-Quercetum pubescentis: Jakucs et Zólyomi in Jakucs (1961a, Table III, rel. 3) – Pouzdřany; Zlatník in Jakucs (1961a, Table III, rel. 5) – Pavlovské vrchy Hills; Horák (1969, Table 2, rel. 8, 9, 12, 13) – Pavlovské vrchy Hills; Chytrý et Vicherek (1995, p. 145–156, Table 6, rel. 1–5) – Čížov.

Corno-Quercetum: Jakucs et Zólyomi in Jakucs (1961a, Table III, rel. 1) – Moravian Karst; Zlatník in Jakucs (1961a, Table III, rel. 2) – Moravian Karst; Jakucs et Zólyomi in Jakucs (1961a, Table III, rel. 4) – Pavlovské vrchy Hills; Šmarda (1960, p. 224, rel. sine no.) – Čebín; Horák (1969, Table 2, rel. 5–7, 10–11, 14–19, 21–29) – Pavlovské vrchy Hills; Kincl (1989, p. 40–41, Table 1, rel. 3) – Mladeč; Chytrý et Vicherek (1995, p. 145–156, Table 6, rel. 6–8) – Čížov.

Quercetum pubescenti-roboris: Klika (1932, p. 325–326, rel. sine no.) – Pouzdřany; Klika (1957, p. 575, 1st rel. sine no.) – Milovice.

Carici fritschii-Quercetum roboris: Klika (1957, p. 579, rel. sine no.) – Dúbrava Forest near Hodonín; Grulich et Grulichová (1986, p. 184–185, Table 1., rel. 1–5) – Dúbrava Forest near Hodonín.

Sorbo torminalis-Quercetum: *S. t.-Q. typicum*: Řepka (1986, p. 199, rel. sine no.); Kincl (1989, p. 40–41, Table 1, rel. 2–3) – Moravičany; Duchoslav (1990, p. 20–21, 4 relevés sine no.) – Vilémov;

S. t.-Q. caricetosum humilis: Chytrý et Vicherek (1995, p. 145–156, Table 6. rel. 10–12, 14–24, 26–33) – Podyjí National Park;

S. t.-Q. poetosum nemoralis: Málek (1961: 70, 1 rel. sine no.) – Chvalatice; Chytrý et Vicherek (1995, p. 145–156, Table 6., rel. 36–43, 45, 46) – Podyjí National Park.

Genisto pilosae-Quercetum petraeae: Chytrý (1991, p. 194–195, Table 1, sn. 1–20) – Kladeruby n. Osl., Kramolín, Mohelno, Lhánice, Ivančice, Rokytná, Moravský Krumlov, Rešice, Tavíkovice, Vedrovice, Znojmo-Hradiště; Chytrý et Vicherek (1995, p. 145–156, Table 6, rel. 47–51, 53, 54) – Podmolí, Havraníky.

Potentillo albae-Quercetum: Chytrý et Vicherek (1995, p. 145–156, Table 6, rel. 55–58) – Hnanice.

Appendix 2. – Localities of new relevés

Pruno mahaleb-Quercetum pubescentis (Table 1):

1. Šitbořice, forest 1.5 km SSE of the village (H); **2.** Němčičky, forest below Kuntinov Hill 1.6 km NE of the village (H); **3.** Kobylí, forest 1.5 km NW of the village (H); **4–5.** Pouzdřany, SE margin of Kolby Forest 1.5 km NE of the railway station (H); **6.** Milovice, Milovická stráň Nature Reserve 1 km S of the W margin of the village (C); **7–9.** Bulhary, Milovický les Forest 4 km WSW of the village (H).

Corno-Quercetum (Table 1):

10. Blansko–Těchov, S slopes in Pustý žleb Valley below the ruin of Blansek castle 1.5 km ENE of the village (C). **11–16.** Tišnov, SE slopes of Květnice Hill 0.5 km NNW of NW margin of the town (H). **17–20.** Adamov, S slopes above ironworks in Josefovské údolí Valley 1.8–2 km NE of the town (C, H, H, H). **21.** Adamov, Dřínová Nature Reserve 1 km E of the railway station (Chmelař). **22–23.** Kanice, forest on the right side of the road to Babice 1 km NW of the village (H). **24.** Ochoz u Brna, SW slope of Lysá hora Hill (429 m) 0.9 km SSE of the village (C). **25.** Mokrá, S slope on the NE margin of the village near the W margin of the quarry (C). **26–30.** Rokytná, above the right bank of the Rokytná River 0.5 km SE of the village (H). **31.** Moravský Krumlov, Křížová hora Hill above the right bank of the Rokytná River on the NE margin of

the town (C). **32.** Židlochovice, Výhon Hill 1.3 km E of the railway station (Danihelka). **33–35.** Morkůvky, forest 1.5 km NW of the village (H). **36.** Boleradice, forest 1.5 km W of the village (H). **37–38.** Boleradice, Žleby Nature Reserve 1 km W of the village (H). **39.** Kurdějov, forest 1.7 km NE of the village (H). **40.** Radějov, top of Žerotín Hill 1 km W of the village (C). **41–43.** Tvořihráz, slopes above Únanovka Creek 2.3 km SSW of the village (Vorel). **44.** Těšetice, slopes of a ravine in Purkrábka Forest 2.5 km WSW of the village (Grulich). **45–46.** Bulhary, Milovický les Forest 4 km WSW of the village (H). **47–48.** Sedlec, Milovický les Forest 3 km N of the village (H). **49.** Úvaly, isolated forest in Holá pastviska near the state border 2 km NW of the village (C). **50–54.** Valtice, Rajsna Forest 2 km SW of the town (Danihelka).

Quercetum pubescenti-roboris (Table 2):

1. Medlov, woodland fragment 2.5 km SE of village (H); **2.** Smolín, woodland fragment 2.5 km SE of the village (H); **3–4.** Klobouky, Hložek Nature Reserve 1.8 km SW of the town (H); **5.** Klobouky, woodland fragment 2.5 km SSW of the village (H); **6.** Boleradice, forest 1.5 km W of the village (H); **7.** Kurdějov, forest 0.5 km NE of the village (H); **8.** Boleradice, forest 0.8 km SSW of the village (H); **9.** Němčičky, forest 0.5 km W of the top of Kuntinov Hill NE of the village (H); **10–11.** Němčičky, forest 1.4 km NE of the E margin of the village (H); **12.** Kobylí, forest 1.7 km NW of the NW margin of the village (H); **13–19.** Vranovice, Vranovický hájek Forest 1.5 km SW of the village (H); **20–22.** Pouzdřany, Kolby Forest 1.5 km NE of the railway station (H); **23–25.** Starý Poddvorov, Horní Kápansko Forest N of the village (H); **26.** Klentnice, Milovický les Forest 1.2 km ENE of the village (H); **27–28.** Milovice, Milovický les Forest 2 km WSW of the village (H); **29.** Milovice, Milovický les Forest 1 km SE of the village (H); **30.** Milovice, Milovický les Forest 1 km S of the village (H); **31.** Milovice, Milovický les Forest 1.8 km SW of the village (H); **32.** Milovice, Milovický les Forest above the left side of the road Mikulov–Milovice 1.3 km S of the W margin of the village (C); **33.** Milovice, Milovický les Forest on the right side of the road Mikulov–Milovice 2.1 km SSW of the village (H); **34.** Milovice, Milovický les Forest 2 km SW of the village (H); **35.** Milovice, Milovický les Forest 2 km S of the village (H); **36.** Bulhary, Milovický les Forest 2.1 km WNW of the village (H); **37–40.** Bulhary, Milovický les Forest 2.4 km WSW of the village (H); **41–44.** Bulhary, Milovický les Forest 2.3–3.5 km SW of the village (H); **45.** Sedlec, Milovický les Forest 3.5 km N of the village (H); **46–47.** Sedlec, forest near Vysoký Roh Hill 2.3 km N of the village (H).

Carici fritschii-Quercetum roboris (Table 2):

48. Dubňany, Dúbrava Forest 0.5 km S of the Osvobození mine (C); **49.** Hodonín, Dúbrava Forest 0.5 km SE of Zbrod gamekeeper's lodge (C); **50.** Hodonín, Dúbrava Forest 0.5 km W of St. Jan chapel 3 km NW of the town (C); **51.** Hodonín, Dúbrava Forest 0.6 km SSW of St. Jan chapel 3 km NW of the town (C); **52.** Hodonín, Dúbrava Forest 0.9 km NW of the petrol station on the N margin of the town (C); **53–54.** Charvátská Nová Ves, Boří les Forest 0.2–0.5 km W of the railway station (Danihelka); **55–58.** Valtice, Boří les Forest around Rendezvous country-house 2.5 km ENE of the town (Danihelka).

Sorbo torminalis-Quercetum (Table 3):

S. t.-Q. typicum: **1.** Náměšť na Hané, slopes of Terezínské údolí Valley above Šumice Creek 2 km SW of the village (Chytil 1991, p. 47–50, rel. 5); **2.** Služín, SW slopes of Velký Kosíř Hill in the tract Nad hraběcí cestou (Chytil 1991, p. 100–101, rel. 2); **3.** Lutonín, near the railway above the Romže River 1.4 km NW of the village (Chytil 1991, p. 149–151, rel. 4); **4.** Hamerská stráň Nature Reserve between the villages Hamry and Žárovice above the left bank of the Okluka River (Chytil 1991, p. 129–130, rel. 3); **5.** Pustiměř, forest 1.2 km NE of the village (Chytil 1991, p. 173–174, rel. 4); **6.** Kuřim, S slopes above Prefa factory on N margin of the town (C); **7.** Čebín, Zlobice Nature Reserve 2 km E of the village (C); **8.** Vranov u Brna, forest 0.8 km NE of the village (H); **9.** Vranov u Brna, forest 1.2 km SW of the village (H); **10.** Útěchov, forest 0.5 km WSW of the village (H); **11.** Útěchov, slopes of Babí doly Valley 1.5 km WNW of the village (H); **12.** Útěchov, Coufavá Nature Reserve 0.7 km NNE of the village (H); **13.** Útěchov, Coufavá Nature Reserve 0.8 km NE of the village (H); **14.** Brno-Ivanovice, SE slopes of Sychrov Hill (458 m) 0.7 km NW of the village (C); **15.** Brno-Medlánky, S slopes of Malá Baba Hill (396 m) 1.5 km NW of the village (C); **16.** Bílovice n. Svit., slopes above the right bank of the Svitava River in southern part of Maluzín Nature Reserve 2 km NNW of the village (C); **17.** Bílovice n. Svit., Kněžnice Nature Reserve above the left bank of the Svitava River 1.3 km N of the village (Vorel); **18.** Bílovice n. Svit., forest above ENE margin of the village (Vorel); **19.** Bílovice n. Svit., slopes above Těsnohlídkovo údolí Valley 1.3 km SE of the village (Vorel); **20.** Řícmanice, Zadní Hády Nature Reserve 1.5 km SSE of the village (Vorel); **21.** Bílovice n. Svit., above the left bank of the Svitava River 1 km S of the S margin of the village (Vorel); **22.** Bílovice n. Svit., forest 1.7 km SSW of the village (Vorel); **23.** Brno-Líšeň, Hádecká planinka Nature Reserve 1.4 km NNW of Velká Klajdovka restaurant (Vorel); **24.** Brno-Líšeň, slopes above the right bank of Říčka Creek near Mucha's cottage 1 km NE of the N margin of the village (C); **25.** Nebovidy, upper part of the SSW slope above the

right side of the road to Střelice 1.3 km WNW of the village (C); **26.** Střelice, SE slopes above the left bank of the Bobrava River 1 km SSW of the railway station (C); **27.** Radostice, slopes above the left bank of the Bobrava River 1.3 km ENE of the village (C); **28.** Střelice, slope above the left bank of the Bobrava River 2 km SE of the village (C); **29.** Želešice, S margin of the plateau on the top of Kozí hora Hill 1.5 km NW of the village (C); **30.** Oslavany, SW slopes above the left bank of the Oslava River 1.2 km SW of the town (C); **31.** Ivančice, SW slopes of Bukovina Hill (385 m) 1.5 km ENE of the railway station Ivančice-letovisko (C); **32.** Budkovice, Krumlovský les Forest near Stavení gamekeeper's lodge 2.8 km SSE of the village (C); **33.** Rakšice, Krumlovský les Forest 1.5 km N of the railway station (C); **34.** Rakšice, Krumlovský les Forest 0.5 km NE of the railway station (C); **35.** Lančov, SSW slopes above the right bank of Vranov reservoir 3 km NNW of the village (Tichý 1995, Table 4, sn. 3); **36.** Oslnovice, W slopes above the left bank of Vranov reservoir 1.5 km ESE of the village (Tichý 1995, Table 4, sn. 2); **37.** Podhradí n. D., slopes above the right bank of the Dyje River in Bau Nature Reserve 1 km NE of the village (Tichý 1995, Table 4, sn. 4); **38.** Stálky, SW slopes above the right bank of the Dyje River 3.8 km WNW of the village (Tichý 1995, Table 4, sn. 1);

S. t.-Q. caricetosum humilis: **39.** Stařechovice, W margin of the quarry Na ulmance 1 km NE of the village (Chytil 1991, p. 84–85, rel. 1); **40.** Čučice, SW slopes above the left bank of the Oslava River 1 km SSE of Na úzkých Hill (368 m), 1.7 km SE of the village (C); **41.** Lhánice, slopes above the left bank of the Jihlava River 1.7 km ESE of the village (H); **42.** Lhánice, slopes above the left bank of the Jihlava River 1.4 km SE of the village (H); **43.** Slavětice, right bank of the Jihlava River around Hřebec Hill 2.8 km E of the village (H); **44.** Únanov, slopes above the left bank of Únanovka Creek 2.2 km E of the village (C); **45.** Tvořihráz, slopes above Únanovka Creek 2.2 km SSW of the village (Vorel);

S. t.-Q. poetosum nemoralis: **46.** Březník, slopes above the right bank of the Oslava River near the ruin of Sedlec castle 1.7 km WSW of the village (H); **47.** Čučice, S slopes above the left bank of the Oslava River on the bluff slope of the meander 1 km NW of the NW margin of the village (C); **48–49.** Kramolín, Dřínová hora Hill above the left bank of the Jihlava River 1.5 km WNW of the village (H); **50.** Ivančice, SSW slope near the 2nd tunnel NE of Budkovice railway station, 2.4 km SSE of the town (C); **51.** Lančov, S slopes of Spálený kopec Hill above Vranov reservoir 3 km N of the village (Tichý 1995, Table 4, sn. 5).

Genisto pilosae-Quercetum petraeae (Table 3):

52–53. Kramolín, Dřínová hora Hill above the left bank of the Jihlava River 1.5 km WNW of the village (H); **54.** Čučice, SW slopes above the left bank of the Oslava River 0.6 km S of Na úzkých Hill (368 m), 1.3 km SE of the village (C); **55.** Slavětice, right bank of the Jihlava River on Hřebec Hill 2.8 km E of the village (H); **56.** Mohelno, W slopes above the right bank of the right-side tributary creek of Mohelno reservoir 1.5 km SSW of the village (C); **57.** Lhánice, slopes above the left bank of the Jihlava River 1 km SSW of the village (H); **58–59.** Lhánice, right bank of the Jihlava River on Havran Hill 1.4 km S of the village (H); **60–63.** Lhánice, slopes above the left bank of the Jihlava River 1.7 km ESE of the village (H); **64.** Ivančice, S slopes below the top of Réna Hill (319 m) 2 km SE of the town (C); **65.** Šemíkovice, upper part of south-facing slopes above the left bank of the Rokytná River 0.5 km W of Benda's mill, 1.5 km SE of the village (C).

Potentillo albae-Quercetum (Table 3):

66. Kuřim, forest 1.5 km N of the swimming pool in N end of the town (C); **67.** Čebín, Zlobice Nature Reserve 2 km E of the village (C); **68.** Mokrá Hora, forest 0.5 km SE of the village (H); **69.** Brno-Ivanovice, plateau on the top of the ridge between Velká Baba (446 m) and Malá Baba (396 m) Hills 1 km SW of the village (C); **70.** Brno-Kníničky, forested ridge 1.5 km NNE of the village (C); **71.** Brno-Kohoutovice, S margin of the forest 0.5 km NW of Kamenný vrch Hill (325 m) (C); **72.** Brno-Kohoutovice, forest on the S margin of the village (C); **73.** Brno-Kohoutovice, W margin of the forest 1.8 km W of the village (C); **74.** Brno-Veselka, Hájek Nature Reserve 1 km NNW of the village (C); **75.** Padochov, forest 0.9 km NE of the NE margin of the village (C); **76.** Modřice, forest 2.2 km W of the village (C); **77.** Moravské Bránice, forest on the SE slopes below Bukovina Hill (385 m) 1.7 km ENE of Ivančice-letovisko railway station (C); **78.** Suchohrdly u Znojma, Purkrábka Forest 2 km NE of the village (C); **79.** Boršice u Blatnice, Slavkovský háj Forest 1.5 km SE of the village (C); **80.** Suchov, SW gentle slopes of Lipinka Hill (504 m) 2.4 km E of the village (C); **81.** Tvarožná Lhota, SW slopes of Šumárník Hill above Lučina recreation ground (C); **82.** Tvarožná Lhota, forest above the right bank of Járkovec Creek in Čertoryje Nature Reserve 1 km SW of Lučina reservoir (C).

Asplenio cuneifolii-Quercetum petraeae (Table 3):

83. Mohelno, S slopes above the dam of Mohelno reservoir 1.2 km SSW of the village (C); **84.** Mohelno, slopes above the left bank of the Jihlava River in Mohelenská hadcová step Nature Reserve 0.7 km SSW of the village (H); **85.** Mohelno, Mohelenská hadcová step Nature Reserve above the twisting road to Dukovany above the left bank of the Jihlava River, 1 km S of the village (C); **86.** Mohelno, E slope of Čertův ocas

meander above the right bank of the Jihlava River 1 km SSW of the village; **87.** Mohelno, Dukovanský mlýn Nature Reserve, SW slopes above the right bank of intermittent right-side tributary creek of Mohelno reservoir 2 km SSE of the village (C); **88.** Dukovany, SSE slope above the left side of the road and the bridge to Mohelno, 1.2 km NNE of the N margin of the village. **89.** Lhánice, S slopes above the left bank of the Jihlava River 0.3 km SE of the Mohelnička mouth 1.3 km SSW of the village (C); **90.** Biskoupky, slopes above the left bank of the Jihlava River N of the bridge below the ruin of Templštejn castle, 2.4 km WSW of the village (C); **91.** Biskoupky, slopes above the right bank of the Jihlava River 0.8 km W of the village (C).

Appendix 3. – Header data of relevés in Tables 1–3. * – ground layer was not analysed.

Relevé Nr.	Area (m^2)	Aspect	Slope (%)	Cover (%) E_3	E_2	E_1	E_0	Altitude (m)	Date
Pruno mahaleb-Quercetum pubescentis (Table 1)									
1	225	S	10	40	30	50	1	300	?
2	100	S	15	40	2	90	*	310	?
3	400	SSW	20	60	20	100	*	280	28.7.1955
4	150	ESE	10	30	10	90	*	290	16.6.1954
5	200	SSW	10	60	1	95	*	290	?
6	200	SW	30	80	50	60	*	200	8.5.1991
7	100	S	20	70	10	75	*	280	10.6.1954
8	200	S	15	75	40	80	10	300	4.10.1961
9	100	S	20	70	30	25	*	300	18.5.1954
Corno-Quercetum (Table 1)									
10	200	S	30	60	70	70	15	460	7.5.1991
11	400	SE	25	30	15	70	20	400	27.5.1969
12	400	W	25	70	20	80	*	420	28.5.1969
13	900	S	30	50	40	?	*	420	28.5.1969
14	300	S	5	70	40	?	*	420	28.5.1969
15	450	SE	10	70	50	?	*	420	28.5.1969
16	400	SSW	5	70	50	?	*	420	28.5.1969
17	200	S	20	30	60	50	5	450	12.7.1992
18	500	S	25	30	10	100	5	450	30.6.1958
19	500	SE	20	70	20	70	0	460	3.9.1954
20	450	S	25	60	10	70	5	460	4.9.1959
21	400	SW	25	60	5	100	0	480	7.10.1958
22	200	SSW	40	30	15	95	5	420	9.1958
23	500	SSW	15	60	25	70	10	420	9.1958
24	150	SW	20	90	20	60	10	400	29.8.1990
25	200	S	20	90	70	90	40	400	29.8.1990
26	100	W	30	40	20	95	10	280	8.5.1968
27	100	S	30	70	5	90	5	280	8.5.1968
28	70	WSW	20	50	30	?	0	280	11.9.1968
29	50	WSW	15	70	5	?	1	280	11.9.1968
30	250	SW	15	50	30	?	1	280	3.5.1969
31	100	SW	15	80	60	90	1	280	26.5.1994
32	400	W	3	80	10	40	0	330	18.6.1994
33	400	W	15	70	3	30	5	280	2.5.1968
34	600	SW	15	60	30	70	1	280	2.5.1968
35	300	SW	10	50	30	80	1	280	3.9.1968

Relevé Nr.	Area (m^2)	Aspect	Slope (%)	Cover (%) E_3	E_2	E_1	E_0	Altitude (m)	Date
36	225	SSE	15	50	15	90	0	300	10.6.1955
37	200	WSW	15	60	40	90	5	300	1.8.1956
38	500	S	15	60	3	50	10	300	25.6.1959
39	120	S	10	30	50	80	0	390	2.7.1970
40	200	ESE	10	70	60	70	3	320	13.8.1994
41	350	SSW	15	60	15	90	0	280	15.5.1958
42	500	SSE	3	80	5	60	1	280	19.5.1958
43	500	-	0	80	5	75	0	280	?
44	200	W	15	80	1	80	*	320	21.5.1994
45	315	SW	25	80	70	10	*	260	10.6.1954
46	100	S	2	80	10	40	*	260	10.6.1954
47	150	WSW	10	70	2	95	*	290	1.6.1954
48	250	W	25	60	10	80	*	300	1.6.1954
49	200	E	10	90	60	80	1	270	2.5.1992
50	200	W	15	80	20	50	*	280	1.7.1992
51	225	-	0	40	20	80	*	280	1.7.1992
52	400	-	0	90	30	70	*	280	2.7.1992
53	400	-	0	80	20	70	*	280	2.7.1992
54	400	-	0	60	60	80	*	280	2.7.1992
Quercetum pubescenti-roboris (Table 2)									
1	500	-	0	60	2	90	10	200	8.9.1954
2	500	-	0	50	1	95	10	200	10.9.1954
3	100	ESE	5	60	20	80	0	280	1.8.1958
4	400	E	5	70	15	70	0	280	1.8.1958
5	150	W	5	70	5	60	0	260	3.9.1968
6	400	SSE	15	40	50	40	0	300	10.6.1955
7	500	SW	5	50	15	95	0	300	25.6.1955
8	500	E	2	60	30	50	5	300	23.6.1954
9	500	S	1	70	60	60	5	310	27.5.1955
10	400	-	0	40	2	90	0	300	?
11	500	W	2	50	60	70	5	300	6.8.1955
12	500	S	3	70	5	90	0	260	21.7.1955
13	300	SSE	2	50	10	95	3	200	17.8.1954
14	500	-	0	80	30	20	10	200	17.8.1954
15	600	-	0	70	5	80	10	200	21.5.1968
16	500	-	0	80	2	90	20	200	26.6.1959
17	500	-	0	80	2	80	10	200	17.8.1954
18	500	-	0	60	5	90	3	200	21.5.1968
19	400	S	5	60	10	95	0	200	16.5.1958
20	500	-	0	60	10	100	1	300	23.6.1954
21	500	-	0	60	5	80	1	300	23.6.1954
22	500	N	5	70	5	95	0	300	17.8.1954
23	200	SSW	10	60	60	90	0	220	8.8.1969
24	600	S	1	70	30	70	3	220	12.8.1969
25	300	SSE	3	60	70	80	1	220	8.8.1969
26	400	SW	10	70	20	70	1	280	?
27	250	E	10	40	25	95	0	280	11.9.1953
28	100	S	3	60	70	80	5	280	13.7.1967
29	500	-	0	80	1	80	10	260	?
30	500	SW	5	60	15	70	0	280	20.5.1954
31	500	WSW	15	60	5	95	3	300	20.5.1954
32	200	SSE	15	90	20	80	0	280	8.5.1991

Relevé Nr.	Area (m^2)	Aspect	Slope (%)	Cover (%) E_3	E_2	E_1	E_0	Altitude (m)	Date
33	500	SSE	10	70	20	90	3	290	18.9.1953
34	500	-	0	70	40	95	0	300	21.5.1954
35	500	NE	3	70	5	80	0	280	11.6.1954
36	500	-	0	60	10	95	0	230	11.6.1954
37	500	SE	10	70	5	80	0	260	9.6.1954
38	500	SN	10	70	10	80	0	260	9.6.1954
39	500	-	0	70	2	60	0	260	10.6.1954
40	500	W	30	70	2	40	0	260	10.6.1959
41	400	SE	1	60	15	95	0	260	9.6.1954
42	500	W	20	70	5	80	0	260	9.6.1954
43	500	S	3	70	30	90	0	280	27.5.1954
44	450	S	2	80	10	70	0	280	30.4.1968
45	500	W	15	70	5	60	0	260	8.6.1954
46	500	-	0	60	1	100	0	300	27.5.1954
47	300	WNW	10	70	5	100	0	300	26.5.1954
Carici fritschii-Quercetum roboris (Table 2)									
48	200	-	0	80	5	95	20	220	1.9.1988
49	200	-	0	70	5	90	3	170	31.5.1989
50	200	-	0	70	0	90	5	170	31.5.1989
51	200	-	0	70	5	90	5	170	31.5.1989
52	200	-	0	70	5	80	0	180	31.5.1989
53	400	-	0	75	10	50	*	180	21.6.1994
54	400	-	0	85	2	55	*	180	21.6.1994
55	400	-	0	80	10	80	*	190	1.6.1994
56	400	-	0	80	15	90	*	200	1.6.1994
57	400	-	0	80	40	70	*	200	1.6.1994
58	400	-	0	85	0	60	*	200	1.6.1994
Sorbo torminalis-Quercetum typicum (Table 3)									
1	400	SE	25	75	3	80	25*	340	15.6.1990
2	370	SW	25	90	0	95	0*	370	24.6.1990
3	400	SW	40	70	0	50	1*	320	22.6.1990
4	340	SW	40	75	3	65	5*	340	20.6.1990
5	400	SSW	20	85	0	40	1*	350	11.6.1990
6	200	SSE	15	80	0	50	*	360	31.7.1988
7	200	WSW	20	80	50	50	*	360	31.7.1988
8	400	WSW	15	70	10	100	10	400	4.9.1959
9	200	SW	5	80	3	80	10	400	1.9.1959
10	100	WSW	15	50	40	80	15	430	1.9.1959
11	400	SW	15	70	25	100	1	400	9.9.1959
12	225	ESE	20	60	5	80	20	440	25.8.1959
13	225	SE	25	60	5	90	10	440	26.7.1959
14	200	SE	20	90	0	60	5	430	17.7.1990
15	200	S	20	90	0	80	2	360	17.7.1990
16	100	S	20	80	0	70	40	300	8.9.1990
17	150	SW	20	50	20	70	10	320	20.9.1958
18	500	S	25	90	3	80	10	280	30.7.1959
19	400	S	20	90	3	40	10	310	4.8.1959
20	375	SSE	25	80	3	80	10	420	1.8.1959
21	500	WSW	20	70	0	95	10	340	23.7.1959
22	450	SW	25	90	5	30	5	280	?
23	330	ESE	25	80	2	80	20	360	29.7.1959

Relevé Nr.	Area (m^2)	Aspect	Slope (%)	Cover (%) E_3	E_2	E_1	E_0	Altitude (m)	Date
24	200	SSE	45	90	0	70	10	300	29.8.1990
25	200	SSW	10	90	0	70	5	310	25.7.1990
26	200	SE	40	90	5	50	15	330	25.7.1990
27	200	WSW	30	90	0	60	20	300	25.7.1990
28	200	SSE	20	90	0	70	2	300	25.7.1990
29	200	SSW	2	90	0	70	5	340	25.7.1990
30	200	S	25	90	10	70	3	270	21.7.1990
31	200	SW	30	80	5	70	20	370	22.7.1990
32	200	S	5	90	0	70	2	400	28.8.1990
33	200	SE	15	80	0	70	5	340	28.8.1990
34	200	SW	15	90	0	70	5	340	28.8.1990
35	200	S	35	60	0	70	2	400	?
36	150	ESE	45	70	30	70	30	360	12.6.1993
37	200	WSW	30	40	5	70	20	390	?
38	100	SSW	30	60	0	70	5	400	11.6.1993
Sorbo torminalis-Quercetum caricetosum humilis (Table 3)									
39	340	SW	45	45	15	60	0	340	14.6.1990
40	200	SSE	20	80	5	70	15	270	21.7.1990
41	150	SW	15	50	10	90	0	340	?
42	300	E	15	50	20	30	0	350	?
43	300	S	5	70	1	60	1	300	?
44	200	SW	25	60	0	70	40	310	24.8.1993
45	500	SSW	25	60	5	50	20	280	19.5.1958
Sorbo torminalis-Quercetum poetosum nemoralis (Table 3)									
46	400	S	25	40	15	95	*	380	?
47	200	S	20	70	50	70	2	360	24.7.1994
48	200	SSE	10	60	15	90	*	410	?
49	450	SSW	25	50	40	60	*	420	?
50	200	SSW	25	80	10	90	10	280	28.8.1990
51	300	S	35	40	5	100	0	400	9.5.1994
Genisto pilosae-Quercetum petraeae (Table 3)									
52	400	SSW	25	40	3	70	30	420	?
53	200	SSW	30	30	10	30	20	420	?
54	100	SW	45	70	0	70	70	320	21.7.1990
55	150	NE	15	50	5	80	20	320	?
56	200	W	30	70	5	70	40	360	24.5.1992
57	350	SW	15	60	5	60	30	330	?
58	450	W	15	60	5	70	60	360	?
59	625	W	35	40	5	80	30	360	?
60	200	S	30	60	5	60	60	340	20.7.1990
61	150	WSW	30	50	10	60	20	330	?
62	500	ESE	20	60	1	60	5	320	?
63	300	S	25	60	3	60	10	330	?
64	100	S	30	60	10	70	70	310	28.8.1990
65	200	SW	15	40	0	50	50	310	15.7.1994
Potentillo albae-Quercetum (Table 3)									
66	200	SSW	15	80	10	80	*	400	31.7.1988
67	200	SSE	10	90	15	80	*	360	31.7.1988
68	150	SSW	5	50	10	95	*	300	24.7.1959

Relevé Nr.	Area (m^2)	Aspect	Slope (%)	Cover (%) E_3	E_2	E_1	E_0	Altitude (m)	Date
69	200	SE	5	90	0	80	5	400	17.7.1990
70	200	S	5	80	5	90	3	340	17.7.1990
71	200	SSW	5	90	20	80	2	380	16.7.1990
72	200	WSW	15	90	10	80	2	360	16.7.1990
73	200	SW	10	90	5	80	5	350	16.7.1990
74	200	SE	5	90	10	90	5	340	16.7.1990
75	200	SW	5	90	10	80	5	340	22.7.1990
76	200	ENE	5	80	0	80	0	300	25.7.1990
77	200	SE	5	90	5	90	2	370	22.7.1990
78	200	S	2	70	0	80	1	330	24.8.1993
79	200	WSW	5	70	10	90	3	400	14.8.1994
80	200	SSE	5	80	20	70	5	480	14.8.1994
81	200	SSW	20	80	40	50	3	360	13.8.1994
82	200	SW	10	70	40	70	5	350	13.8.1994
Asplenio cuneifolii-Quercetum petraeae (Table 3)									
83	100	S	40	60	50	50	5	330	24.5.1992
84	600	SW	40	30	10	60	30	330	?
85	200	SSW	20	50	5	90	5	330	28.6.1992
86	200	W	30	60	40	60	30	280	24.5.1992
87	200	SW	20	70	15	70	10	360	30.8.1994
88	200	SSE	20	70	40	60	5	310	28.6.1992
89	200	SW	30	70	5	80	40	300	15.8.1993
90	200	SW	20	60	10	80	10	300	8.9.1993
91	200	S	15	50	10	80	40	280	8.9.1993