A NEW MESOPHILOUS TURKEY-OAK WOODLAND ASSOCIATION FROM LAGA MTS. (CENTRAL ITALY)

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Abstract
The present paper aims at describing the *Quercus cerris*-dominated woodlands of the Laga mountains (central Apennines) in both the synecological and syntaxonomical way. Species composition and abundance, together with structural and abiotic parameters were recorded in 33 relevés distributed throughout the Laga massif. A new association of *Quercus cerris* woodlands, named *Listero ovatae-Quercetum cerridis*, is here proposed. The ecology and syn-chorology of this association are outlined. In syntaxonomical terms *Listero-Quercetum cerridis* behaves as an intermediate between *Fagetalia sylvaticae* and *Quercetalia pubescenti-petraeae*, being the dominant layer closer to *Quercetalia* communities and the herb layer to *Fagetalia*. For comparison a survey is provided of the most important *Quercus cerris* community types described throughout the whole Apennine chain using all published relevés (synoptic table).

Izvleček
Pričujoči članek obravnava gozdne združbe s prevladujočim cerom (*Quercus cerris*) z območja hribovja Laga (srednji Apenini) tako v sinekološkem kot tudi sintaksonomskem pogledu. Na 33 popisnih ploskvah z različnih delov obravnavanega območja so bili narejeni fitocenološki popisi in poleg tega zabeleženi tudi nekateri strukturni in abiotski parametri. Med drugim je opisana nova združba cerovij (*Listero ovatae-Quercetum cerridis* ass. nova), orisani sta tudi nejni ekologija in sinhorologija. V sintaksonomskem pogledu leži novoopisana združba nekako med redovoma *Fagetalia sylvaticae* in *Quercetalia pubescenti-petraeae*, z vrstno strukturo drevesne in grmovne plasti bliže redu *Quercetalia* in floristično zgradbo zeliščne plasti z več značilnicami redu *Fagetalia*. V sinoptični tabeli je novoopisana združba primerjana z drugimi opisanimi cerovji s celotnega območja Apeninov.

Key words: Central Apennines, *Fagetalia sylvaticae*, ICPN, phytosociology, syntaxonomy
Ključne besede: srednji Apenini, *Fagetalia sylvaticae*, ICPN, fitocenologija, sintaksonomija

1. INTRODUCTION

As emerged in several syntaxonomical revisions regarding the woodland vegetation of Peninsular Italy (Ubaldi & al. 1990; Scoppola & al. 1995; Ubaldi 1995; Arrigoni 1998; Pignatti 1998; Ubaldi 2003; Blasi & al. 2004), *Quercus cerris* woods are to be considered the most significant and widespread feature in the forestal landscape of the Apennine chain. Most of the turkey oak associations described so far in the Italian peninsula are representative of termophilous woods bearing a typical sub-mediterranean character (Blasi 1985; Arrigoni & Foggi 1988; Arrigoni & al. 1990; Taffetani & Biondi 1995; Scoppola & Filesi 1995). Yet in other cases (especially for the central and southern Apennines) *Quercus cerris* it typically co-dominant with *Quercus frainetto* in thermophilous woodlands developed on substrates where the soil sandy component is prevailing on the clay component (Arrigoni 1974; Abbate & al. 1990; Abbate & Paura 1995; Blasi & Paura 1995; Catorci & Orsomando 1998; Biondi et

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al.2001; Blasi & al. 2002). Relatively few, and almost enterely restricted to southern Apennines, are the available data regarding the mesophilous and microthermic turkey oak woodlands which are developed in the upper submontane and lower montane belt (Ubaldi 1974; Bonin & Gamisans 1976; Aita & al. 1977; Abbate 1990; Catorci & Orsomando 2001; Blasi & al. 2005; Rosati & al. 2005). In most phytosociological studies concerning the central and northern Apennines, in fact, the definition "*Quercus cerris* mesophilous woodlands" was normally applied to those forest communities developed in the bottom of dolins or gullies in a typically edaphomesophilous situation, where the climatophilous situation was often related to Mediterranean deciduous oak woodlands. Such conditions are even more evident in the central Apennines where the prevalence of limestone leads to a marked dominance by *Ostrya carpinifolia* and *Quercus pubescens* in the submontane mixed woods belt in contact with the beech woodlands (Avena & al. 1980; Ballelli & al. 1982; Blasi & al. 1982; Pignatti 1982; Ubaldi & Speranza 1982; Di Pietro & Blasi 1998).

The Laga mountains are the only relevant siliceous range occurring in the central Apennines. Only a few phytosociological papers discussing local forest vegetation exist (Longhitano & Ronsisvalle 1974; Pedrotti 1982), and they have regarded mainly the Adriatic side of Laga massif. On the contrary very little is known about the tyrrhenian side of this massif where turkey oak woods exhibit one of their most significant example on the whole Italian Peninsula scale. In this paper a new *Quercus cerris* woodland association is proposed and described from a synecological and synchorological viewpoint.

2. STUDY AREA

The Laga Mountains ridge, which is nearly 24 km long, lies at the boundary between the Latium, Abruzzo and Marche regions in central Italy (Figure 1). The monocline attitude of this mountain chain determines an evident asymmetry of the slopes, the south-western slope (Latium side) being steeper and less extended, whereas the north-

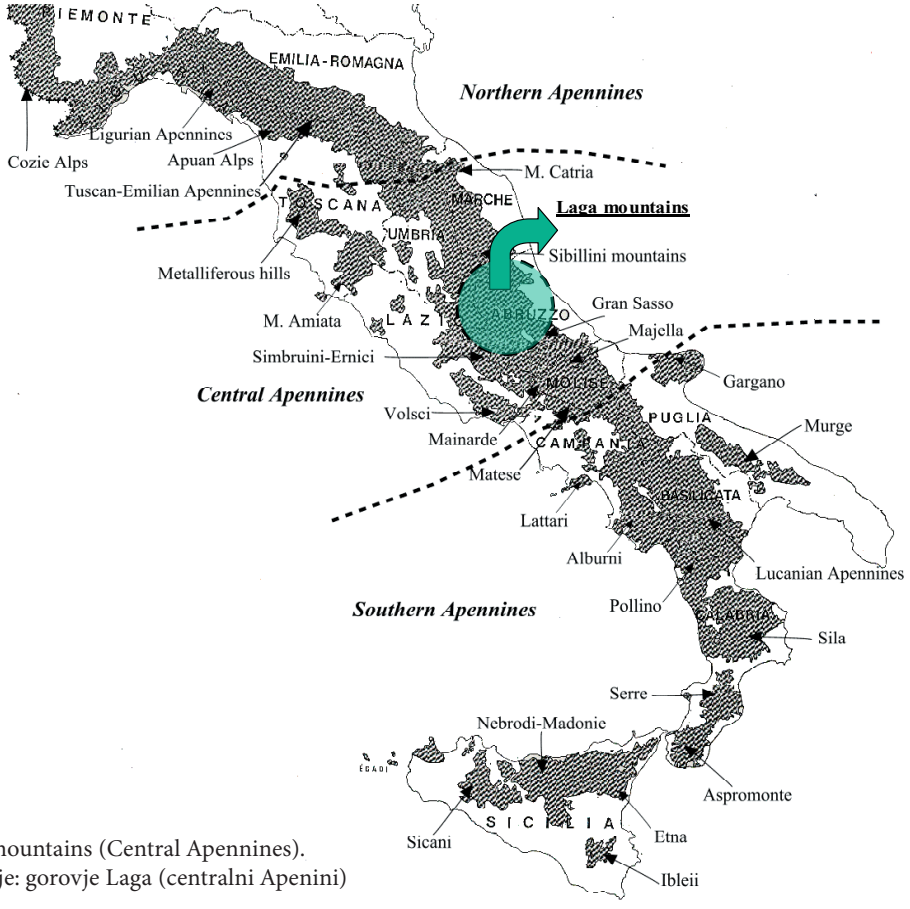

Figure 1: Study Area: Laga mountains (Central Apennines).
Slika 1: Raziskovano območje: gorovje Laga (centralni Apenini)

eastern slope (Abruzzo side) is milder and more extended. The Laga mountains are characterised by a torbiditic succession of Messinian age known as "Laga Flysch" mainly composed of arenaceous and pelithic-arenaceous lithofacies. The low permeability degree which characterises the succession of sandstones and marls limits the percolation of rainfall waters and enables their superficial streaming out (Tondi & Plini 1995).

From a bioclimatic standpoint (Figure 2) the study area belongs to the mesaxeric-axeric subregion (mean annual temperature is 9°C and that of the coldest month –2.1°C). Rainfalls exceed 1400 mm/yr. and in the period between November and May assume snowy features, and frost occurs for more than one month yearly (Blasi 1994; Tondi & Plini 1995).

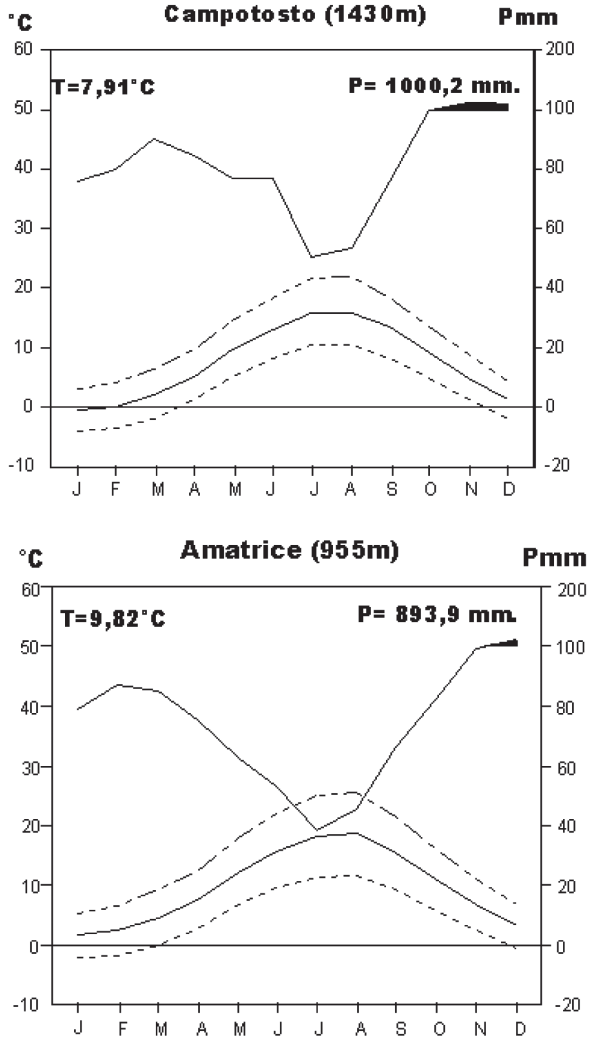

Figure 2: Ombro-thermic diagrams.
Slika 2: Ombroterična diagrama.

3. DATA AND METHODS

Field research was carried out in June and July 2003–2004. Thirty-three phytosociological relevés were performed following standard methods of the Zurich-Montpellier approach (Braun-Blanquet 1964). A synoptic table composed of the frequency columns of all *Quercus cerris* mesophilous woodlands associations described within the Apennine was prepared and subsequently subjected to multivariate analysis of the chord distance algorithm to produce the dissimilarity matrix and the minimum variance linkage as agglomeration criterion (package Syntax 5.2 program, Podani, 1993). In addition, a non metric ordination (multidimensional scaling) was performed.

For species nomenclature, reference was made to Anzalone (1996; 1998) and Conti (1998). For life forms and chorology, reference was made to Pignatti (1982). As to the composition of the chorological spectrum only (Figure 4), the Eurasiatic chorotype was divided into the following components: European, European-Caucasian, Eurasiatic s.s. and SE-European (the latter including the following sub-chorotypes: Pontic, SE-European *s.s.*, South-European-South-Siberian). Chorological and life forms spectra were calculated on the basis of simple presence, frequency and specific cover index. In particular the normal spectrum (norm), which is normally almost never used in this kind of analysis, indicates the % ratio between the total number of species of one chorotype or life form and the total number of species occurring in a given plant community type. This type of spectrum gives essential information about the floristic (and consequently structural and chorological) "base" from which each plant community type draws upon in its physiognomical expression. The frequency spectrum (frq) is probably the most appropriate for coenological information, whereas the cover spectrum (cover), represents the "real" quantitative structural and chorological expression of the various plant communities. The cover spectrum is based on the "specific cover index" of the species in the different plant community types (phytosociological table). This index was obtained by summing up each species' cover-abundance central values (e.g. 5=87,5; 4= 62,5 …) and multiplying this sum by the ratio 100/numbers of relevés. In the phytosociological (Table 1) among the species included in the various syntaxa were identified those having a "transgressive" (t) or a "differential" (d) role according to Braun-Blanquet & Pavillard

(1922), Géhu & Rivas-Martínez (1981), Mucina (1993). The denomination of syntaxa is in accordance with Weber et al. (2000).

4. RESULTS

***Listero ovatae-Quercetum cerridis* ass. nov. hoc loco.**
(Holotypus rel. 9 table 1)

The *Quercus cerris* woodlands of the Laga Mountains are included in the community type which is here codified as a new association named *Listero ovatae-Quercetum cerridis*. Among the Italian turkey oak woodlands this association belong to the group of the mesophilous and microthermic oak woods which normally exhibit an altitudinal range included between 800 and 1400 m a.s.l. In *Listero-Quercetum cerridis* two main aspects are distinguished: a typical form (Table 1, rel. 1–27), and a thermophilous form (Table 1, rel. 28–31) this latter being characterized by an enrichment in *Quercetalia pubescentis* and *Rhamno-Prunetea* species and by an impoverishment in the characteristic specific component.

Altitudinal range/Bioclimate:

According to Blasi (1994), *Listero-Quercetum cerridis* is widespread within the lower montane thermo-type and humid ombrotype, in the temperate region.

Character species:

Listera ovata, Dactylorhiza maculata subsp. *fuchsii, Lonicera xylosteum, Heracleum sphondylium* subsp. *ternatum, Knautia drymeia* subsp. *centrifrons.*

Synecology:

Quercus cerris is the absolute dominant of the upper tree layer. Only in sporadic cases did we record the admixture of *Fagus sylvatica* and *Acer pseudoplatanus*. The dominant tree layer is ranging in height between six and ten metres, and it is mainly composed of *Corylus avellana, Prunus avium* and *Acer campestre*, while rarer are *Acer obtusatum, Salix caprea* and *Ostrya carpinifolia*. On moderate slopes and gullies, where moister soils occur, also *Populus tremula* may assume an important physiognomical role. The shrub layer is well developed and species-rich. In the vertical stratification three main levels were distinguished. The upper level (3–5 mt.) is formed of *Pyrus pyraster, Malus sylvestris* and young individuals of turkey oak; the intermediate level (the richest, floristically), is dominated by *Lonicera xylosteum* and *Rosa arvensis,* which are accompained by *Crataegus laevigata, C. monogyna, Prunus spinosa, Cornus sanguinea, Juniperus communis* and *Cytisus scoparius*. The lower level (< 1 mt.) is almost completely composed of prostrate forms of *Rubus hirtus* with abundant *Lonicera caprifolium*. The herb layer is fairly rich, although there is not a single species assuming the dominance. The most common species are *Pulmonaria apennina, Primula acaulis, Viola odorata, Carex flacca* subsp. *flacca, Bromus ramosum, Brachypodium sylvaticum, Festuca heterophylla* and several nemoral orchids such in particular *Listera ovata, Dactylorhiza maculata* subsp. *fuchsii, Orchis purpurea, Platanthera chlorantha* and *Epipactis helleborine*. Only in moister habitats or on particularly euthrophic conditions (nitrogen-rich soils) *Aegopodium podagaria* may assume a dominant role in the herb layer.

Structure (Life forms):

In the life-form spectrum (Figure 3), Hemycryptophytes emerge as the dominant life-form both in the normal and in the frequency spectrum; they range between a maximum of 54% and a minimum of 29% (cover spectrum). The Nanophanerophytic component is also well represented,

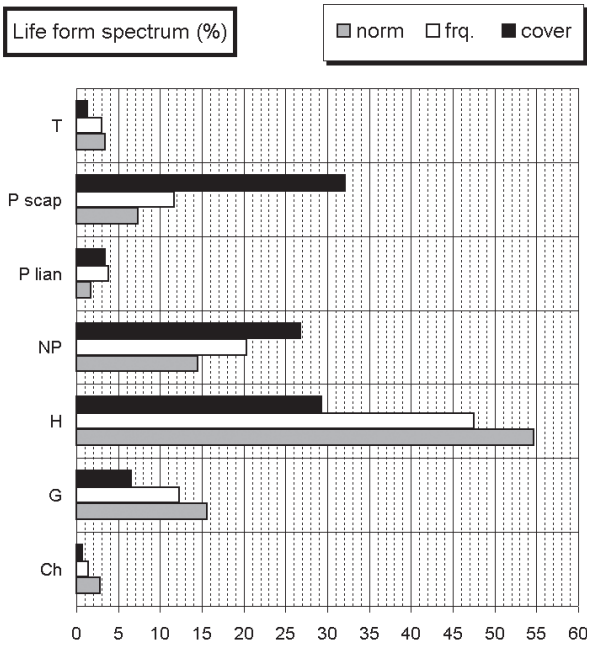

Figure 3: Life form spectrum of *Listero-Quercetum cerridis*.
Slika 3: Spekter življenskih oblik asociacije *Listero-Quercetum cerridis*.

whereas very scarce and sporadic is the presence of both Chamaephytes and Therophytes. As expected, scapose phanerophytes become dominant only in the cover spectrum; nevertheless, even in this case they are closely approached by both N-phanerophytes and Hemicryptophytes which together indicate a strong consistence of the undergrowth. This fact, which is confirmed by the high avarage value of number of species per relevé (46), is probably linked to a soil rich in nutrients and moisture and to a forestry management which favoured coppice up to the recent past.

Chorology:

The chorological spectrum support the mesophylous and microthermic character of *Listero-Quercetum cerridis*. The "cold" chorotypes such as Eurasiatic, European-Caucasian, European and Boreal predominates both in the normal spectrum (presence) and in the frequency one. By contrast, the percentage of the Mediterranean component is rather low, and it is even lower observing the values calculated on the abundance data (the complete absence of *Quercetea ilicis* species is strongly symptomatic of the low degree influence exerted over these woodlands by the Medietrranean climate). The SE-European floristic component is relatively low if compared to those of the other *Quercus cerris* woodlands of central Italy. The sharp increment passing from normal to cover spectrum (up to 31%)is only a consequence of the high cover rate of the guide species. The very scarce contribution of the sub-cosmopolitan chorotype is a common fact for Apennine woodlands and testimony both to the high degree of naturality of these environments and to the strong floristic authonomy of the central Apennines district.

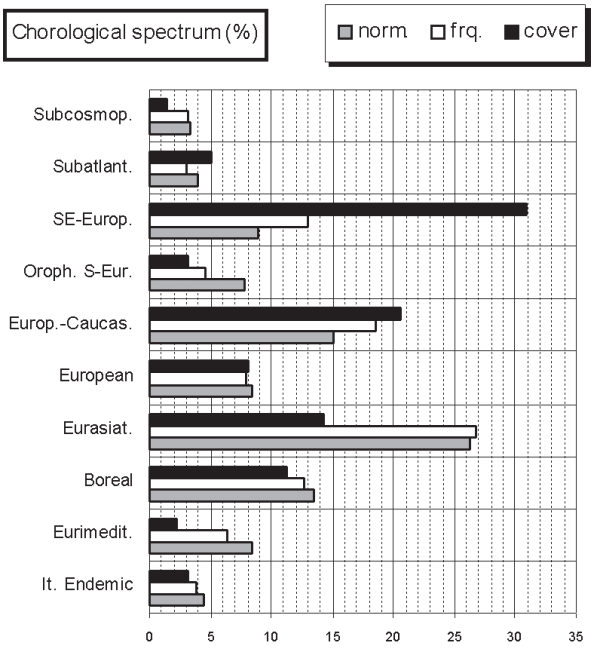

Figure 4: Chorological spectrum of *Listero-Quercetum cerridis*.
Slika 4: Horološki spekter asociacije *Listero-Quercetum cerridis*.

Syndynamics:

In its typical aspect the *Listero ovatae-Quercetum cerridis* exhibits regressive successional stages pertinent to *Berberidion* (*Crataegus laevigata-Prunus spinosa-Rosa canina* community) and mesophilous grasslands belonging both to *Cynosurion cristati* and *Ranunculion velutini*. The edapho-xerophilous aspects of *Listero-Quercetum* are syndynamically substituted by *Juniperus communis* stands, and, in more regressive stages by dry grassalands belonging to the most xeric fringe of *Bromion erecti* (*Brachypodium rupestre-Ononis spinosa* community) and *Phleo-Bromion erecti* (*Bromus erectus-Sesleria nitida* community).

Geographical Distribution:

The distribution area of *Listero-Quercetum cerridis*, currently limited to the montane belt of the Tyrrhenian side of Laga mountains, could however also extend to the Adriatic side of the massif and to other central-Apennines minor siliceous mountains such as Montagna dei Fiori and Montagna di Campli in the Abruzzo Region.

5. SYNTAXONOMICAL DISCUSSION

Due to the high altitude and to their central location in the Apennine chain, the *Listero ovatae-Quercetum cerridis* woodlands appear to be quite different (floristically and coenologically) from the other *Quercus cerris* wood associations described so far for Peninsular Italy. In fact these latter associations are mainly developed within the hilly sub-mediterranean belt and consequently are always subjected to more or less marked periods of summer drought stress.

As the synoptic table shows, the main affinities are towards *Aceri obtusati-Quercetum cerris* developed on marly-arenaceous substrates of the northern Apennines. Compared to such association, however, which can be defined as a turkey oak woods rich in hop hornbeam, *Listero-Quercetum* woodlands ex-

hibit a much more limited presence of *Ostrya carpinifolia*. This is due to the siliceous substrates of the Laga Mountains and to the absence or sporadicity of many species of sub-Mediterranean *Quercetalia pubescentis* woodlands such as *Quercus pubescens, Cornus mas, Sorbus torminalis, Fraxinus ornus, Sorbus domestica* (etc.).

Listero-Quercetum also exhibits similarities with *Salvio glutinosae-Quercetum cerridis* as regards which, nevertheless, some nomenclatural problems arise, which need to be considered[1]. In comparison with *Aceri-Quercetum* and *Salvio-Quercetum*, however, *Listero-Quercetum* have several floristic peculiaritis such as the presence of *Knautia drymeia* subsp. *centrifrons*, and *Heracleum sphondylium,* and the abundance of rather common species which normally have a high physiognomical and ecological role such as *Viola odorata, Acer pseudoplatanus, Rubus hirtus, Ranunculus lanuginosus, Poa nemoralis, Geranium robertianum, Brachypodium sylvaticum* and, above all, the absolute domiance of *Lonicera xylosteum* in the shrubby layer.

The abundance of *Lonicera xylosteum* in the woody undergrowth suggests, at least as far as nomenclature is concerned, an affinity towards *Lonicero xylostei-Quercetum cerridis*. This association, however, exhibits typical mediterranean features given the presence of *Phillyrea latifolia, Rosa sempervirens, Viburnum tinus,* which leads us to exclude any possibility of relationship with *Listero-Quercetum cerridis*.

In our view *Lonicera xylosteum,* the species choosen for the nomenclatural epithet, is misleading and in no way indicative of the ecological characteristics of *Lonicero-Quercetum cerridis*. In fact, as other authors have pointed out (Anzalone, 1961; Hegi, 1979; Oberdorfer, 1994) *Lonicera xylosteum* has its synecological optimum in the bioclimatic belt which occurs between the submontane mixed woodlands and the lower beech woodlands. The sporadic presence of this species in the low hills leading down to the Adriatic coasts of the Marche region, where *Lonicero xylostei-Carpinetum orientalis* (=*Lonicero xylostei-Quercetum cerridis*[2]) has been described (Taffetani & Biondi, 1995) is completely anomalous. By contrast, the abundance of an Eurosiberian element such as *Lonicera xylosteum* (Figure 5) in the shrubby layer of *Listero-Quercetum* cerris is perfectly related to the floristic and synecological features of this oak woodland type which is developed in a bioclimatic belt where (as previously mentioned) the Mediterranean influence normally characterizing the Italian peninsula is extremely weak (Figure 4).

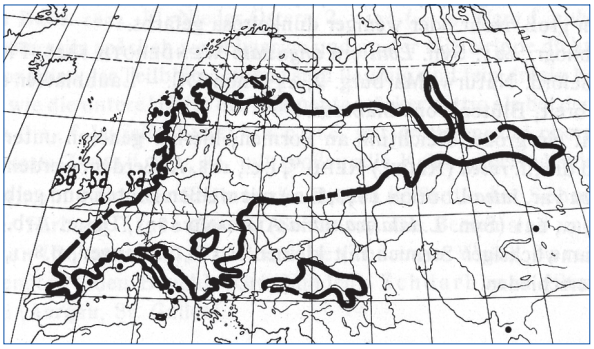

Figure 5: Distribution area of *Lonicera xylosteum* (after Hegi, 1979).
Slika 5: Razširjenost vrste *Lonicera xylosteum* (po Hegi, 1979).

Listero-Quercetum also exhibits some similarities, although less marked, with other types of turkey oak woodlands rich in species of *Fagetalia* such as *Carici-Quercetum cerridis* (Umbria region) and *Centaureo montanae-Carpinetum betuli* (northern Marche). Both these communities show an absence of several characteristic species of *Listero-Quercetum*

[1] The name *Salvio glutinosae-Quercetum cerridis* was used for the first time by Ubaldi in Ubaldi & Speranza (1985). This first proposal is invalid because of the lack of the nomenclatural type (Art. 3). The name *Salvio-Quercetum cerridis* was proposed again in a valid form In Ubaldi (2003), where also a new sub-association is also proposed (*arisaretosum*? *astragaletosum*?). Rel. 14 of table 6, a table referred to *Aceri obtusati-Quercetum cerridis* published in Ubaldi (1988) was chosen as type-relevés. In our opinion the description of a new syntaxon (association) made simply by estrapolating a type relevé from a prior published phytosociological table (often referred to as another association), without providing a real diagnosis (coenological, bioclimatical, biogeographical …) of the new syntaxon which is going to be proposed, should be carefully avoided (although it is allowed by ICPN). In the case of *Salvio-Quercetum*, precisely, the diagnosis of the new association is more or less restricted to reading the species list in the synoptic columns and/or in the type relevé. Furthermore it is absolutely not clear which phytosociological tables (and which relevés of these tables) were used to build the synoptic table published (Ubaldi & Speranza, 1985?, Ubaldi 1988? unpublished relevés? …).

[2] *Lonicero xylostei-Quercetum cerridis* Taffetani & Biondi ex Biondi & Allegrezza 1996 is the name replacing *Lonicero xylostei-Carpinetum orientalis* Taffetani & Biondi 1995. According to Weber et al. (2000: 747 Art. 3, 39) this new name is not validly published.

and the presence of their own exclusive species such as *Centaurea montana, Cardamine heptaphylla, Lamiastrum galeobdolon, Asarum europaeum, Anemone trifolia* (in *Centaureo-Carpinetum*), and *Cardamine kitaibelii, Euonymus latifolius, Aristolochia lutea, helleborus bocconei, Carex sylvatica, Senecio fuchsii* (in *Carici-Quercetum*).

The differences between *Listero-Quercetum* and *Aremonio-Quercetum cerridis* (=*Roso arvensis-Quercetum cerridis* sensu Ubaldi 2003) are essentially biogeographical, in that the latter is found in the southern Apennines and because of this it is characterized by various species belonging to *Geranio versicoloris-Fagion* which are extremely rare or even absent in the central Apennines (*Geranium versicolor, Acer lobelii, Luzula sicula* and others).

As regards the higher rank syntaxa it is evident, on the basis of its phytosociological table, that *Listero-Quercetum* is typically placed in a intermediate position between *Fagetalia sylvaticae* and *Quercetalia pubescenti-petraeae*. In fact, while the woody layer would appear more related to *Quercetalia*, both the shrubby and the herb layers are undoubtedly more pertinent to *Fagetalia*.

Despite the fact that *Quercus cerris* most often occurs in *Quercetalia pubescentis*, communities, its wide ecological amplitude enables it to reach altitudes where it can enter into competition with the lower beech woods. For this reason we consider that *Listero-Quercetum cerridis* should be included in *Fagetalia sylvaticae*.

Cluster analysis of all mesophilous *Quercus cerris* woodlands so far described for the Apennines (Fig. 6), shows that there is quite a marked separation between those woodlands which certainly belong to *Quercetalia pubescenti-petraeae* and those which are to be included in *Fagetalia*. The position of *Aceri obtusati-Quercetum* in the dendrogram is anomalous because this association is traditionally used for the diagnosis of *Laburno-Ostryenion (Carpinion orientalis)*. Moreover the position *Erythronio-Quercetum cerridis* is also anomalous, because in its original proposition (Biondi & al. 2002) it was placed in *Erythronio-Carpinion betuli*. At the rank of alliance, a provisional placing could be either that of *Carpinion betuli* s.s. or that of *Erythronio-Carpinion* (the dominance of *Quercus cerris*, a species which is normally unrelated to the *Carpinion betuli* context and which is accepted in the *Erythronio-Carpinion* context (Horvat & al., 1974) would suggest a preference for this second alliance), while the *Pulmonario-Carpinenion betuli* could be used as suballiance.

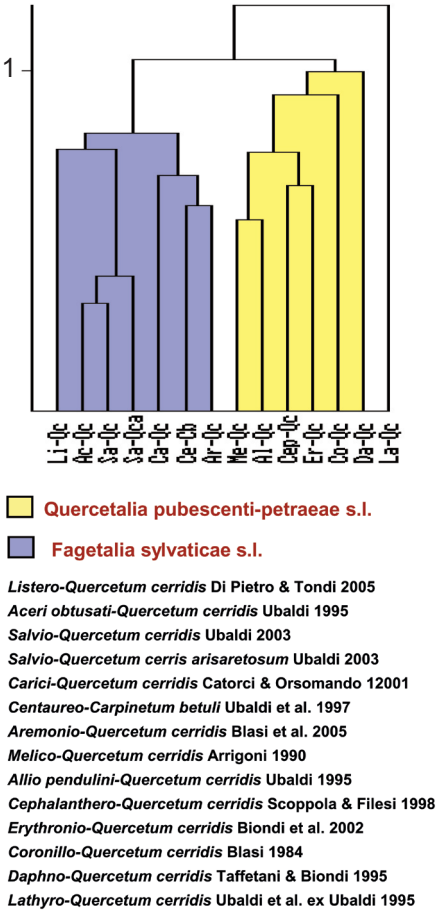

Figure 6: Cluster analysis regarding the synoptic columns of all the microthermic *Quercus cerris* woodlands of the Apennine chain.
Slika 6: Klastrska analiza vseh mikrotermičnih cerovih gozdov Apeninske gorske verige. Uporabljena je bila sintetična tabela.

This possible double reference in alliance terms is a consequence of the well-known transitional character (floristic, coenological, biogeographical) of the Apennine chain, which is territorially connected to central and south-western Europe, but whose paleoclimatic and paleobotanic history is similar to that of the Balkan peninsula.

In fact, even this double reference may not be sufficient, especially from the view point of a central-European phytosociologist, because the diagnoses of both *Carpinion betuli* and *Erythronio-Carpinion* refer to primary and secondary *Carpinus betulus* woods with *Quercus petraea* and *Q. robur* codominant (and these species are lacking from the floristic context of *Listero-Quercetum cerridis*). Furthermore, the extension of the syn-distribution area of *Erythronio-Carpinion betuli*, to include the Apennines, and

in particular the central Apennines (Biondi & al. 2002) causes some problems. Among the major species characterizing this alliance only *Erythronium dens-canis* can be found (what is more it is restricted to the northern Apennines and consequently is lacking in the Laga range) while *Helleborus odorus, Epimedium alpinum, Omphalodes verna* are totally absent. The presence of other species considered to be characteristic of *Erythronio-Carpinion*, such as *Ornitoghalum pyrenaicum, Lonicera caprifolium, Crataegus laevigata, Galanthus nivalis, Primula acaulis* is of lower diagnostic significance, in that these are species which are shared with *Carpinion betuli* s.s.

Another possible reference alliance could be *Euonymo-Fagion,* (Ubaldi, 2003) with which *Listero-Quercetum cerridis* partially shares the bioclimatic belt and the general ecology. Nevertheless this alliance is by definition a syntaxon which mainly includes mixed beech woodlands, and its nomenclatural type was indicated in the association *Staphyleo-Fagetum*, a woodland with marked dominance of *Fagus sylvatica* and sporadic presence of oaks. For this reason it is likely that this alliance could fall into syntaxonomical synonymy with previous beech woodland alliances such as *Aremonio-Fagion* or *Fagion sylvaticae* s.s. (In Biondi & al. (2002) *Staphyleo-Fagetum* is included in *Geranio versicoloris-Fagion*). Again in Ubaldi (2003) the alliance *Mespilo-Carpinion betuli* was proposed for the central Apennines. However, the possibility that this alliance can be used as a reference for *Listero-Quercetum cerris* seems slight, both in synecological and nomenclatural terms. In fact *Mespilo-Carpinion* was not only described in an invalid manner (art. 3), but it also has a nomenclatural type (*Coronillo-Quercetum cerris*) which is still strictly linked to *Quercetalia pubescenti-petraeae* (cfr. Blasi & al. 2004).

6. CONCLUSIONS

The description of an association of potential woodlands (*Listero-Quercetum cerridis*) is a step towards filling a gap in the phytosociological knowledge of Apennine woodlands. This association, which is unusual in the largely calciphilous central Apennine forestry context, displays evident affinity towards the northern Apennine woodlands, where arenaceous or Flysch substrates are to be found. Although its placing at level of alliance remains a little bit uncertain, and the use of *Erythronio-Carpinion betuli* is to be considered as provisional (nevertheless a more general revision is currently in progress) the reference to the *Fagetalia sylvaticae* order for *Quercus cerris* woods is of significance, and supports the proposals for northern Apennine oak woodlands made in Biondi et al. (2002) and in Ubaldi (2003).

7. SYNTAXONOMICAL SCHEME

QUERCO-FAGETEA Br.-Bl. & Vlieger in Vlieger 1937
- *FAGETALIA SYLVATICAE* Pawlowsky in Pawlowsky, Sokolowsky & Wallisch 1928
  - *Erythronio dentis canis-Carpinion betuli* (Horvat 1958) Marinček *in* Wallnöfer et al. 1993
    - *Pulmonario apenninae-Carpinenion betuli* Biondi, Casavecchia, Pinzi, Allegrezza & Baldoni 2002
      - *Listero ovatae-Quercetum cerridis* Di Pietro & Tondi 2005 ass. nova

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APPENDIX 1:

List of sporadic species (Table 1)

Rel. 9, Crepis biennis: +; Rel. 10, Alliaria petiolata: +; Rel. 13, Campanula rapunculus: +, Cynoglossum montanum: +, Himantoglossum adriaticum: +; Rel. 15, Aquilegia viscosa: +, Veronica montana: 1; Rel. 16, Matricaria discoidea: +, Prunella vulgaris: +; Rel. 17, Hypericum montanum: +; Rel. 23, Astragalus monspessulanum: +, Dianthus monspessulanum: +; Rel. 24, Asplenium trichomanes: +; Rel. 25, Cruciata laevipes: +, Inula conyza: 1; Rel. 30, Asphodelus albus: +; Rel. 31, Genista sagittalis: +, Polypodium vulgare: +, Sesleria italica: +.

APPENDIX 2:

List of the sporadic species of Synoptic table (Table 2)

Col. 1 – Asphodelus albus: 5, Asplenium trichomanes: 5, Astragalus monspessulanum: 5, Colchicum lusitanicum: 14, Dianthus monspessulanum: 5, Digitalis ferruginea: 5, Genista sagittalis: 5, Lathyrus sylvestris: 9, Saxifraga granulata: 5, Adenostyles australis: 5, Anthriscus sylvestris: 14, Aquilegia viscosa: 5, Arctium minus: 27, Crepis biennis: 5, Cynoglossum montanum: 5, Galium album : 9, Galium laevigatum: 23, Galium sylvaticum: 5, Himantoglossum adriaticum: 5, Hypericum perforatum: 9, Lathyrus pratensis: 9, Leopoldia comosa: 5, Matricaria discoidea: 5, Peucedanum oroselinum: 14, Poa trivialis: 5, Rumex acetosa: 5, Salix caprea: 32, Senecio nemorensis: 5, Silene latifolia: 5, Silene nutans : 9, Silene vulgaris : 9, Stachys sylvatica :18, Thalictrum aquilegifolium: 18, Trifolium ochroleucum: 5, Urtica dioica: 23, Valeriana officinalis: 32, Veronica montana: 5, Vicia incana:

18. **Col. 2 –** Digitalis lutea: 31, Orchis mascula : 31, Peucedanum verticillare: 31. **Col. 3 –** Cardamine graeca: 17, Doronicum columnae: 8, Hieracium gr. piloselloides: 25, Ribes alpinum: 8, Senecio fuchsii: 25. **Col. 4 –** Centaurea montana: 67, Crocus neapolitanus: 29, Heracleum sphondylium: 5, Iris graminea: 14, Melampyrum velebiticum: 5, Senecio gaudinii: 29, Viburnum opulus: 14. **Col. 6 –** Buphtalmum salicifolium subsp. salicifolium: 19, Buphtalmum salicifolium subsp. flexile: 23, Campanula medium: 38, Dorycnium hirsutum: 12, Festuca capillata: 19, Hieracium boreale: 12, Lavandula angustifolia: 8, Luzula pedemontana: 31, Pinus pinaster: 12, Tanacetum corymbosum: 23. **Col. 7 –** Fraxinus oxycarpa: 30, Ranunculus polyanthemos: 38. **Col. 8 –** Alnus glutinosa: 30, Arabis sagittata: 20, Blechnum spicant: 10, Brachypodium ramosum: 20, Frangula alnus: 10, Helianthemum nummularium: 20, Helleborus viridis: 20, Holcus lanatus: 20, Inula salicina: 30, Melampyrum italicum: 20, Thesium divaricatum: 20, Vicia cracca: 40, Vicia ochroleuca: 20. **Col. 9 –** Stellaria media: 25. **Col. 10 –** Convolvulus arvensis: 29, Echinops ritro: 29, Melica ciliata: 57, Pyrus communis: 14, Ranunculus repens: 14, Sambucus nigra: 14. **Col. 11 –** Platanthera bifolia: 20. **Col. 12 –** Ornithogalum sphaerocarpum: 17. **Col. 14 –** Arisarum proboscideum: III.

APPENDIX 3:

List of the syntaxa quoted in the text and in the synoptic table

Aceri obtusati-Quercetum cerridis Ubaldi & Speranza *ex* Ubaldi 1995; *Allio pendulini-Quercetum cerridis* Ubaldi, Zanotti, Puppi, Speranza, Corbetta *ex* Ubaldi 1995; *Aremonio-Fagion sylvaticae* (Horvat 1938) Torok, Podani & Borhidi 1989; *Aremonio-Quercetum cerridis* Blasi, Fortini, Grossi & Presti 2005 (in press); *Berberidion vulgaris* Br.-Bl. 1950; *Bromion erecti* Koch 1926; *Carici sylvaticae-Quercetum cerridis* Catorci & Orsomando 2001; *Carpinion betuli* Issler 1931; *Carpinion orientalis* Horvat 1958; *Centaureo montanae-Carpinetum betuli* Ubaldi, Zanotti, Puppi, Speranza & Corbetta ex Ubaldi 1995; *Cephalanthero-Quercetum cerridis* Scoppola & Filesi 1998; *Coronillo emeri-Quercetum cerridis* Blasi 1985; *Cynosurion cristati* Tüxen 1947; *Daphno laureolae-Quercetum cerridis* Taffetani & Biondi 1995; *Erythronio dentis canis-Carpinion betuli* (Horvat 1958) Marinček in Wallnöfer, Mucina & Grass 1993; *Erythronio dentis canis-Quercetum cerridis* Biondi, Casavecchia, Pinzi, Allegrezza & Baldoni 2002; *Euonymo latifolii-Fagion sylvaticae* Ubaldi 2003; *Fagetalia Sylvaticae* Pawlowski *in* Pawlowski, Sokolowski & Wallisch 1928; *Fagion sylvaticae* Luquet 1926; *Geranio versicoliris-Fagion sylvaticae* Gentile 1969; *Laburno anagyroidis-Ostryenion carpinifoliae* (Ubaldi 1995) Blasi, Di Pietro & Filesi 2004; *Lathyro montani-Quercetum cerridis* Ubaldi, Puppi, Zanotti, Speranza & Corbetta *ex* Ubaldi 1995; *Listero ovatae-Quercetum cerridis* Di Pietro & Tondi ass. nova; *Lonicero xilostei-carpinetum orientalis* Taffetani & Biondi 1995; *Lonicero xilostei-Quercetum cerridis* Taffetani & Biondi *ex* Biondi & Allegrezza 1996; *Melico-Quercetum cerridis* Arrigoni, in Arrigoni *et al.* 1990; *Mespilo-Carpinion betuli* Ubaldi 2003; Phleo ambigui-Bromion erecti Biondi, Ballelli, Allegrezza & Zuccarello 1995; *Pulmonario apenninae-Carpinenion betuli* Biondi, Casavecchia, Pinzi, Allegrezza & Baldoni 2002; *Quercetalia pubescenti petraeae* Klika 1933 corr.; *Quercetea ilicis* Br.-Bl. ex A. & O. Bolòs 1950; *Querco roboris-Fagetea sylvaticae* Br.-Bl. & Vlieger in Vlieger 1937; *Ranunculion velutini* Pedrotti 1976; *Roso arvensis-Quercetum cerridis* Ubaldi 2003; *Salvio glutinosae-Quercetum cerridis* Ubaldi 2003; *Salvio glutinosae-Quercetum cerridis arisaretosum* Ubaldi 2003; *Staphyleo pinnatae-Fagetum sylvaticae* Ubaldi & Speranza ex Ubaldi 1995.

APPENDIX 4:

Place and date of relevés

1: Casellana, 15.VI.2000; **2–3**: Cornillo Nuovo, 6.VI.2002; **4–5**: Castiglioni: 15.VI.2003; **6–12**: Preta; **13:** Sacro Cuore, 16.VI.2003; **14–16**: Castel Trione, 19.VII.2003; **17–20**: Ponte sul Tronto, 19.VII.2003; **21**: Capricchia, 20.VII.2003; **22**: Vicenne Patasche, 21 VII 2003; **23–24**: Cornillo nuovo; **25–26**: Colle d'Arquata (Marche); 06 VI.2004; **27–28–29:** slopes of the left side of the Tronto river close to Bivio per Amatrice, 05 VI.2004; **30**: Bivio Salaria to Amatrice; 05 VI.2004; **31**: Illica towards Poggio d'Api 06 VI.2004.

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Table1 (Tabela 1): *Listero ovatae-Quercetum cerridis* ass. nova

	Altitude m a.s.l.	1050	1155	1140	1135	1130	1175	1010	1005	990	1200	1230	1250	1230	1080	1070	1085	1180	1150	1200	1250	1160	1000	1175	1160	1200	1155	920	915	930	950	980	
	Exp.	ne	nne	nnw	wsw	nnw	n	e	ese	ese	ne	ene	ne	w	ne	wnw	nw	ne	nw	.	nw	ssw	ne	nnw	nw	n	w	e	ene	e	ne	wnw	
	Slope °	10	5	7	25	5	5	5	.	.	3	.	5	5	20	5	2	30	2	.	20	5	40	5	10	5	10	15	10	.	5	25	
	rel. number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	pr.
	Listero ovatae-Quercetum cerridis									T																							
	Lonicera xylosteum	2	3	2	2	1	3	2	3	2	2	3	3	1	2	3	3	2	2	2	2	1	2	2	2	1	2	2	2	3	2	2	31
	Dactylorhiza maculata subsp. fuchsii	.	1	1	+	.	1	+	+	1	1	+	1	+	1	+	.	.	.	1	1	+	1	+	1	1	+	.	.	.	.	.	21
	Listera ovata	.	1	1	+	1	2	1	2	2	1	1	1	2	.	+	.	+	+	.	.	+	+	1	1	1	1	.	.	.	.	.	21
	Knautia drymeia subsp. centrifrons	1	.	+	+	1	1	+	+	1	2	1	2	.	1	.	.	.	1	+	1	.	1	.	1	.	.	.	.	.	.	.	17
	Heracleum sphondylium subsp. ternatum	.	+	+	.	1	+	.	.	+	.	.	.	+	+	1	+	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	11
	Pulmonario-Carpinenion																																
	Pulmonaria apennina	1	2	3	2	2	1	1	1	2	2	2	2	.	2	2	.	.	2	2	2	.	+	+	.	.	1	.	.	.	.	.	20
	Carpinion betuli/Erythronio-Carpinion																																
	Rosa arvensis	2	3	2	3	2	2	2	2	1	1	+	2	+	2	2	2	3	2	1	2	1	2	2	+	+	2	1	1	2	2	2	31
	Primula acaulis	1	1	1	1	+	1	1	1	+	1	.	1	+	1	1	1	1	1	1	1	1	1	+	1	2	1	.	+	.	.	1	27
	Prunus avium	2	2	2	3	2	1	2	2	2	1	+	1	1	2	3	2	2	1	.	+	1	+	.	2	+	.	1	1	2	2	.	27
d	Bromus ramosus	2	2	1	2	2	1	1	2	+	1	1	1	.	2	.	1	2	2	1	1	.	1	1	.	1	1	.	.	.	.	+	23
	Lonicera caprifolium	1	1	1	1	1	2	1	.	1	1	2	1	.	2	1	1	2	1	1	1	.	2	2	2	1	1	1	1	1	+	1	28
	Crataegus laevigata	1	2	1	2	1	2	3	2	2	2	1	2	.	1	1	.	1	.	.	.	.	.	1	1	.	1	.	+	.	1	.	20
	Viola odorata	.	1	1	1	1	1	1	1	1	+	1	1	1	1	1	+	.	.	+	+	+	+	.	.	.	.	.	.	.	.	.	19
t	Salvia glutinosa	+	1	2	.	.	.	+	+	1	2	2	2	.	+	.	.	.	1	1	1	.	1	.	.	+	.	.	.	.	.	.	15
t	Populus tremula	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	2	1	2	3	2	2	.	.	.	.	.	.	.	7
	Platanthera chlorantha	.	+	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	+	.	.	.	6
	Galium laevigatum	.	.	.	.	.	+	+	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
d	Aegopodium podagaria	.	.	.	.	.	.	.	.	.	3	3	2	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.	5
t	Stachys sylvatica	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	4
t	Thalictrum aquilegifolium	.	1	+	.	.	1	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
t	Ulmus glabra	.	.	.	.	.	.	.	.	.	.	1	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Carex sylvatica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1	.	.	.	.	.	2
	Galium sylvaticum	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Galanthus nivalis	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Lilium martagon	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Carpinus betulus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1
	Ornitoghalum pyrenaicum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1
	Fagetalia sylvaticae																																
	Viola reichembachiana	+	+	+	.	+	+	.	2	1	2	1	+	.	+	1	1	1	+	1	2	1	1	+	+	1	.	.	.	.	.	+	23
	Geranium robertianum	1	2	1	+	+	+	+	+	+	1	+	1	+	.	2	.	.	+	.	+	2	.	+	+	.	.	.	.	.	.	.	19
	Neottia nidus avis	+	+	1	.	+	.	+	.	.	.	.	.	+	.	+	.	+	1	1	1	+	.	+	+	+	+	.	+	.	+	.	18
	Sanicula europaea	.	1	+	+	.	1	.	.	2	2	.	1	.	1	1	.	.	2	.	1	.	+	2	1	+	2	.	.	.	.	1	17
	Poa nemoralis	1	2	2	1	2	.	.	.	1	1	.	.	2	+	2	1	2	1	1	+	.	+	.	.	.	.	.	.	.	.	.	16
	Mycelis muralis	+	.	.	.	+	.	.	+	.	1	1	.	+	+	+	.	2	.	+	.	2	+	+	+	.	+	.	.	.	.	.	+	16
	Acer pseudoplatanus	.	+	+	1	.	+	+	+	+	.	.	.	+	.	.	+	.	+	+	1	.	.	.	.	.	.	.	.	.	.	.	.	12
t	Campanula trachelium	.	.	+	+	+	.	.	.	.	.	.	.	.	.	+	+	+	+	.	.	.	+	.	+	.	.	.	.	.	.	.	.	9
	Moheringia trinervia	+	+	+	1	.	.	.	.	.	.	.	.	.	+	+	1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	8
	Fagus sylvatica	.	+	+	.	.	.	.	.	.	1	.	.	+	.	.	.	.	.	.	.	+	.	.	1	.	.	.	.	.	.	.	.	6
	Cephalantera damasonium	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	1	1	.	+	6
	Euphorbia dulcis	.	.	.	.	.	.	.	1	+	2	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
	Euphorbia amygdaloides	.	.	.	.	.	.	.	+	.	+	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
	Geranium nodosum	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	.	.	.	2	.	.	+	.	.	.	.	.	.	.	.	4
	Ranunculus nemorosus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	1	.	.	.	.	1	4

	Altitude m a.s.l.	1050	1155	1140	1135	1130	1175	1010	1005	990	1200	1230	1250	1230	1080	1070	1085	1180	1150	1200	1250	1160	1000	1175	1160	1200	1155	920	915	930	950	980	
	Exp.	ne	nne	nnw	wsw	nnw	n	e	ese	ese	ne	ene	ne	w	ne	wnw	nw	ne	nw	.	nw	ssw	ne	nnw	nw	n	w	e	ene	e	ne	wnw	
	Slope °	10	5	7	25	5	5	5	.	.	3	.	5	5	20	5	2	30	2	.	20	5	40	5	10	5	10	15	10	.	5	25	
	rel. number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	pr.
d	Lapsana communis	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Senecio nemorensis subsp. stabianus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	.	.	.	.	.	.	.	3
t	Hepatica nobilis	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	2
	Solidago virgaurea	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	2
d	Vicia sepium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	2
t	Aruncus dioicus	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Adenostyles australis	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cephalanthera rubra	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
d	Silene latifolia	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Galium odoratum	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Dryopteris filix- mas	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1
d	Saxifraga granulata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	1
	Quercetalia pubescenti-petraeae																																
	Luzula forsteri	+	+	+	.	.	+	1	.	+	.	.	.	.	.	.	+	.	+	.	.	.	.	1	.	+	1	.	.	.	1	1	13
d	Viola alba subsp. denhardtii	+	.	.	.	.	.	.	.	.	.	+	.	.	+	1	.	1	1	.	+	.	.	.	+	2	.	1	1	1	1	.	13
	Acer obtusatum	.	+	.	.	.	.	+	+	1	.	.	.	+	.	.	.	.	.	.	.	.	.	+	+	1	.	.	.	.	.	+	9
	Ostrya carpinifolia	.	.	+	.	.	.	.	+	.	1	.	.	.	.	+	.	2	.	.	.	.	1	.	.	.	.	.	+	2	.	.	8
	Chamaecytysus hirsutus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	+	1	+	.	.	.	2	6
	Orchis purpurea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	1	+	.	+	6
	Digitalis micrantha	.	.	.	.	.	.	.	+	+	.	.	.	.	.	+	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	5
	Brachypodium rupestre	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	+	.	.	3
	Campanula persicifolia	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Lilium bulbiferum subsp. croceum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	2
	Quercus pubescens	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	+	.	.	2
	Silene viridiflora	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Laburnum anagyroides	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Digitalis ferruginea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1
	Serratula tinctoria	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1
	Sorbus domestica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1
	Buglossoides purpurocaerulea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1
	Querco-Fagetea																																
	Acer campestre	1	+	2	1	2	3	+	2	1	2	1	2	1	2	2	2	2	2	1	1	.	+	+	2	+	2	2	2	2	1	1	30
	Quercus cerris	.	4	4	5	4	5	5	4	4	4	4	4	5	4	4	5	4	4	4	5	4	4	5	4	5	5	5	5	3	5	5	30
	Aremonia agrimonioides	1	1	1	1	1	+	1	2	+	1	.	1	2	+	1	1	2	1	1	1	.	.	1	1	2	1	.	.	+	+	2	26
	Rubus hirtus	1	1	3	2	2	2	2	1	1	1	1	3	.	2	1	3	1	3	2	3	2	2	1	.	.	.	+	+	.	+	.	25
d	Fragaria vesca	1	1	2	2	1	2	2	2	2	2	+	1	.	1	1	2	1	1	2	1	.	1	2	1	2	2	.	.	.	.	1	25
	Clematis vitalba	.	+	1	2	2	1	1	1	1	+	1	1	.	1	1	+	2	1	+	+	.	1	1	1	.	.	.	2	.	2	1	24
	Brachypodium sylvaticum	.	.	.	1	1	1	2	2	2	2	1	1	2	2	+	.	1	1	2	1	2	1	2	1	2	2	.	.	.	2	1	24
	Festuca heterophylla	2	2	2	2	1	1	1	+	2	1	1	1	.	1	1	1	1	+	2	2	1	.	2	.	.	+	.	.	.	+	.	23
	Geum urbanum	1	2	1	1	2	.	1	+	.	1	1	.	2	1	2	2	2	1	1	1	2	.	+	+	1	.	.	.	.	.	+	22
	Cruciata glabra	.	1	1	+	.	+	.	+	+	.	.	+	+	.	+	+	+	1	+	+	.	.	1	1	+	+	+	+	+	.	1	22
	Veronica chamaedrys	1	+	1	1	.	+	+	+	+	.	.	+	1	.	+	2	1	.	.	.	.	.	1	1	1	1	.	.	.	.	1	18
	Corylus avellana	.	1	2	2	2	.	.	.	.	.	.	.	.	3	.	+	1	3	2	2	1	2	2	.	.	2	.	2	2	1	2	18
	Epipactis helleborine	+	.	.	.	.	.	1	.	+	+	+	.	+	.	.	.	.	+	+	+	2	.	+	+	+	.	+	.	+	+	+	17
	Lathyrus venetus	.	1	+	+	.	.	.	+	.	2	1	.	.	+	1	1	1	.	1	.	.	1	2	.	.	1	.	.	.	.	.	.	14
	Potentilla micrantha	+	+	+	+	.	.	.	.	.	.	.	+	1	1	+	+	1	.	.	+	+	.	1	.	.	.	.	.	.	.	+	14

	Altitude m a.s.l.	1050	1155	1140	1135	1130	1175	1010	1005	990	1200	1230	1250	1230	1080	1070	1085	1180	1150	1200	1250	1160	1000	1175	1160	1200	1155	920	915	930	950	980	
	Exp.	ne	nne	nnw	wsw	nnw	n	e	ese	ese	ne	ene	ne	w	ne	wnw	nw	ne	nw	.	nw	ssw	ne	nnw	nw	n	w	e	ene	e	ne	wnw	
	Slope °	10	5	7	25	5	5	5	.	.	3	.	5	5	20	5	2	30	2	.	20	5	40	5	10	5	10	15	10	.	5	25	
	rel. number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	pr.
	Ranunculus lanuginosus	1	1	+	.	1	2	1	1	1	1	.	1	+	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	13
	Malus sylvestris	1	1	.	.	+	+	+	.	.	.	.	1	1	+	+	+	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	+	12
	Calamintha sylvatica	+	.	.	.	.	.	.	.	+	.	.	.	+	1	+	+	+	.	.	.	.	.	.	.	.	+	1	.	.	.	.	+	10
d	Valeriana officinalis	.	1	+	+	1	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	1	.	.	1	+	.	.	.	.	.	.	.	9
	Salix caprea	.	.	1	.	2	+	.	.	+	1	.	1	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	8
	Castanea sativa	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	1	1	1	.	.	.	+	.	.	.	.	.	.	.	6
	Poa sylvicola	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	1	.	.	.	.	+	6
	Melica uniflora	.	.	1	+	.	1	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	5
d	Lychnis flos-cuculi	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	.	.	.	.	5
	Ajuga reptans	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	1	.	.	.	.	+	5
d	Anthriscus sylvestris	.	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Symphytum tuberosum	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	+	3
	Daphne laureola	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Sorbus aria	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	2
	Silene nutans	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Cyclamen hederifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	2
	Hedera helix	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1	.	.	.	2
	Stachys officinalis	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cephalanthera longifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1
	Hieracium sylvaticum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
	Rhamno-Prunetea																																
	Crataegus monogyna	+	+	1	.	+	+	.	+	+	+	+	+	2	1	1	2	+	1	+	+	+	.	1	1	2	1	2	1	.	2	1	27
	Juniperus communis	.	+	+	+	.	+	+	1	+	+	.	+	+	+	.	+	+	+	1	+	+	.	2	1	+	1	1	1	1	1	2	26
	Prunus spinosa	1	.	1	2	1	1	1	2	+	1	1	1	1	+	1	1	.	+	+	.	.	.	1	+	1	1	1	1	.	2	1	25
	Pyrus piraster	1	1	1	1	1	+	1	1	1	.	2	1	2	1	1	1	+	1	.	1	.	.	1	2	1	.	1	1	.	1	.	24
	Cornus sanguinea	2	+	+	.	.	.	.	.	.	.	.	.	.	+	+	+	1	+	+	.	.	1	1	2	+	1	2	2	2	.	+	18
	Cytysus scoparius	1	.	+	.	.	1	1	.	.	.	.	.	1	+	+	+	+	.	+	.	.	.	1	.	+	.	.	.	.	.	1	13
	Ligustrum vulgare	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	2	1	2	2	1	7
	Rosa corymbifera	1	+	.	.	.	.	1	.	+	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6
	Cytisus sessilifolius	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	2	+	.	1	6
	Coronilla emerus subsp. emerus	.	.	.	.	.	.	.	.	1	.	.	.	.	.	+	.	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	4
	Viburnum lantana	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1	.	.	4
	Rubus canescens	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	2
	Rosa viscosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	2
	Ribes uva-crispa	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Rubus ulmifolius	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1
	Ulmus minor	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1
	other species																																
	Astragalus glyciphyllos	+	1	1	1	1	+	+	+	+	+	+	.	1	+	1	1	1	.	1	.	.	.	1	+	+	1	.	.	.	.	1	22
	Dactylis glomerata	.	.	+	+	+	1	+	+	+	1	.	+	+	.	1	.	+	+	1	+	1	.	1	.	+	+	.	.	.	+	+	21
	Pteridium aquilinum	.	.	1	.	1	.	.	.	.	1	.	+	1	1	.	.	.	+	.	.	.	+	+	.	1	1	.	+	.	+	+	14
	Carex flacca subsp. flacca	+	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	1	1	1	1	2	1	2	2	2	13
	Clinopodium vulgare	.	+	+	1	.	.	.	.	.	.	.	.	.	+	2	1	2	1	1	.	.	.	+	.	.	.	.	.	.	.	+	11
	Galium aparine	2	1	1	+	.	.	.	.	.	.	.	+	+	.	+	.	.	.	.	.	.	.	+	.	+	.	.	.	.	1	.	10
	Vicia incana	.	+	+	.	+	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	2	+	+	1	.	.	.	1	1	10
	Cherophyllum temulum	.	+	.	+	+	.	.	.	.	1	+	+	.	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	9
	Arctium minus	.	.	.	.	.	+	.	.	.	.	.	+	+	.	.	+	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	6
	Agrimonia eupathoria	.	.	.	.	.	+	+	+	.	+	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	+	.	6

Altitude m a.s.l.	1050	1155	1140	1135	1130	1175	1010	1005	990	1200	1230	1250	1230	1080	1070	1085	1180	1150	1200	1250	1160	1000	1175	1160	1200	1155	920	915	930	950	980	
Exp.	ne	nne	nnw	wsw	nnw	n	e	ese	ese	ne	ene	ne	w	ne	wnw	nw	ne	nw	.	nw	ssw	ne	nnw	nw	n	w	e	ene	e	ne	wnw	
Slope °	10	5	7	25	5	5	5	.	.	3	.	5	5	20	5	2	30	2	.	20	5	40	5	10	5	10	15	10	.	5	25	
rel. number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	pr.
Genista tinctoria subsp. ovata	.	.	.	.	.	+	+	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	+	.	+	.	+	.	.	.	.	6
Urtica dioica	.	+	.	.	+	.	.	+	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
Lathyrus pratensis	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	1	.	.	.	.	.	.	5
Trfolium medium	.	.	.	.	.	+	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
Galium album	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	.	.	.	.	.	4
Viola canina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	.	.	.	1	4
Poa trivialis	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	.	.	.	.	.	.	3
Leopoldia comosa	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	3
Hieracium racemosus	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	3
Peucedanum oreoselinum	.	.	.	.	.	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
Trifolium ochroleucum	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	3
Sedum caepea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
Epilobium montanum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	3
Silene italica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	1	3
Colchicum lusitanicum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	+	.	3
Ranunculus bulbosus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.	+	.	3
Teucrium chamaedrys	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	1	3
Rumex acetosa	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	2
Hypericum perforatum	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Silene vulgaris	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Hypericum hirsutum	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	2
Hieracium lachenalii	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	2
Rumex sanguineus	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Chaerophyllum aureum	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Aquilegia vulgaris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	2
Cerastium arvense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	2
Laserpitium latifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	+	.	.	.	.	2
Lathyrus sylvestris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	2
number of species per relevée	44	57	58	44	45	50	47	50	56	47	40	47	49	50	57	45	47	46	45	38	35	32	69	50	64	45	26	33	25	34	54	

Table 2: Synoptic table of the mesophilous *Quercus cerris* woodlands within the Apennines.
Tabela 2: Sinoptična tabela mezofilnih cerovih gozdov na Apeninih.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Number of relevés per column	31	16	12	21	26	26	8	10	8	7	5	6	?	?
Listero ovatae-Quercetum cerridis														
Dactylorhiza maculata s.l.	77	94	41	81	7	.	.	.	.	.	.	.	V	V
Knautia drymeia subsp. centrifrons	73	.	.	.	.	.	.	.	.	.	.	.	.	.
Listera ovata	77	81	.	29	4	.	.	.	.	.	.	.	IV	.
Lonicera xylosteum	100	75	.	43	.	.	13	.	.	.	.	50	.	IV
Heracleum sphondylium subsp. ternatum	45	.	.	.	.	.	.	.	.	.	.	.	.	.
Pulmonario-Carpinenion betuli														
Pulmonaria apennina	64	38	75	100	74	19	.	.	.	29	.	17	III	III
Anemone trifolia	.	81	.	100	.	42	.	.	.	.	.	83	II	.
Carpinion betuli														
Primula acaulis	95	94	92	76	70	.	13	60	63	14	40	67	IV	V
Carpinus betulus	5	38	83	100	78	19	38	.	50	57	20	100	II	V
Corylus avellana	55	25	50	100	56	54	.	10	.	57	100	17	II	V
Lonicera caprifolium	86	100	42	81	96	.	.	60	100	43	100	83	V	V
Prunus avium	95	75	42	14	4	.	38	20	25	.	.	17	IV	IV
Crataegus laevigata	68	81	75	95	41	.	63	.	38	57	.	83	IV	V
Rosa arvensis	100	100	100	100	96	.	.	.	88	.	.	67	V	V
Lilium martagon	5	.	67	71	7	.	.	.	.	.	.	33	.	.
Populus tremula	23	.	17	.	.	.	.	10	.	.	20	.	.	.
Bromus ramosus	86	88	.	48	4	.	.	.	.	.	.	.	III	III
Stellaria holostea	.	.	33	.	22	.	.	.	.	29	.	33	.	.
Galanthus nivalis	5	.	67	5	.	.	.	.	.	.	.	.	.	.
Aegopodium podagraria	14	.	.	95	.	.	.	.	.	.	.	17	.	III
Ornithogalum pyrenaicum	5	.	17	19	19	.	.	.	.	.	.	.	.	.
Allium pendulinum	.	.	.	.	11	.	.	30	75	.	.	.	.	.
Physospermum cornubiense	.	.	.	.	.	62	13	60	.	.	.	.	.	.
Viola odorata	86	.	.	.	19	.	.	.	.	.	.	.	.	.
Asarum europaeum	.	.	.	100	.	.	.	.	.	14	.	.	.	III
Melampyrum nemorosum	.	.	.	.	.	.	.	.	.	.	40	.	.	.
Ranunculus nemorosus	18	19	.	.	.	.	.	.	.	.	.	.	.	.
Vinca minor	.	.	.	.	.	.	.	.	.	.	.	33	.	.
Erythronium dens canis	.	.	.	.	.	.	.	.	.	.	.	83	.	.
Geranio-Fagion														
Cyclamen hederifolium	9	.	75	43	15	15	.	40	75	.	20	83	.	.
Ranunculus lanuginosus	59	.	.	24	26	.	.	50	50	.	.	.	.	.
Anemone apennina	.	.	58	.	15	.	.	.	25	.	.	.	.	.
Geranium versicolor	.	.	.	.	74	.	.	.	.	.	.	.	.	.
Luzula sicula	.	.		.	7	.	.	.	.	.	.	.	.	.
Acer lobelii	.	.	.	.	11	.	.	.	.	.	.	.	.	.
Fagion sylvaticae														
Acer pseudoplatanus	55	.	17	10	4	.	13	.	.	29	.	.	.	.
Galium odoratum	5	.	33	57	26	.	.	.	.	.	40	.	.	III
Lathyrus vernus	.	.	.	10	19	15	.	.	.	.	20	17	.	.
Cardamine kitaibelii	.	.	58	.	4	.	.	.	.	.	.	.	.	.
Lamiastrum galeobdolon	.	.	.	52	11	.	.	.	.	.	.	.	.	.
Asperula taurina	.	.	.	38	11	.	.	.	.	.	.	.	.	.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Number of relevés per column	31	16	12	21	26	26	8	10	8	7	5	6	?	?
Paris quadrifolia	.	.	.	19	.	.	.	.	.	.	.	.	.	.
Fagetalia sylvaticae s.l.														
Viola riviniana+reichenbachiana	86	88	83	67	44	19	63	20	88	14	40	50	V	V
Euphorbia dulcis	23	50	50	52	.	19	.	10	25	.	20	67	.	III
Fagus sylvatica	23	25	67	81	63	12	.	30	.	14	.	.	II	IV
Euphorbia amygdaloides	18	.	50	10	59	.	38	10	13	71	.	.	.	.
Campanula trachelium	36	44	50	5	4	.	.	20	13	43	.	.	II	III
Neottia nidus-avis	55	.	25	14	41	.	.	.	13	.	20	.	.	.
Sanicula europaea	55	81	58	19	48	.	.	.	.	14	.	.	V	V
Geranium nodosum	14	13	.	100	.	27	.	20	.	.	.	17	III	V
Poa nemoralis	73	.	.	.	11	27	.	60	13	14	.	.	.	.
Ilex aquifolium	.	.	17	43	26	19	.	20	.	.	40	.	.	.
Aremonia agrimonoides	86	25	25	48	93	.	.	.	.	.	.	.	II	III
Anemone nemorosa	.	.	.	.	.	15	25	80	63	.	.	33	.	.
Mercurialis perennis	.	.	17	38	22	.	.	10	.	.	.	.	.	.
Vicia sepium	9	19	.	5	30	.	.	10	.	.	.	.	.	III
Salvia glutinosa	64	13	.	.	.	23	.	.	.	.	.	.	IV	III
Mycelis muralis	55	.	33	.	30	.	.	.	.	.	.	.	.	.
Dryopteris filix-mas	5	.	.	5	.	23	.	.	.	.	.	.	.	.
Epilobium montanum	9	.	8	.	.	4	.	.	.	.	.	.	.	.
Cephalanthera rubra	5	.	8	.	.	31	.	.	.	.	.	.	.	.
Geranium robertianum	77	.	.	.	26	15	.	.	.	.	.	.	.	.
Cephalantera damasonium	9	31	.	.	7	.	.	.	.	.	.	.	II	II
Polygonatum multiflorum	.	.	8	71	30	.	.	.	.	.	.	.	.	II
Euonymus latifolius	.	.	25	61	26	.	.	.	.	.	.	.	.	.
Scilla bifolia	.	.	42	5	.	.	.	.	.	.	.	17	.	.
Anemone ranucnuloides	.	.	8	.	4	.	.	.	.	.	.	17	.	.
Arum maculatum	.	.	.	71	.	.	13	30	.	.	.	.	.	V
Moehringia trinervia	36	.	.	.	.	.	.	.	25	.	.	.	.	.
Lapsana communis	9	.	.	.	.	.	.	.	.	29	.	.	.	.
Adoxa moschatellina	.	.	17	10	.	.	.	.	.	.	.	.	.	.
Polystichum setiferum	.	.	33	.	11	.	.	.	.	.	.	.	.	.
Ruscus hypoglossum	.	.	17	.	4	.	.	.	.	.	.	.	.	.
Milium effusum	.	.	.	48	19	.	.	.	.	.	.	.	.	.
Cardamine heptaphylla	.	.	.	29	11	.	.	.	.	.	.	.	.	.
Aruncus dioicus	5	.	.	.	.	.	.	.	.	.	.	.	.	.
Allium ursinum	.	.	.	14	.	.	.	.	.	.	.	.	.	.
Hordelymus europaeus	.	.	.	14	.	.	.	.	.	.	.	.	.	.
Abies alba	.	.	.	.	7	.	.	.	.	.	.	.	.	.
Athyrium filix-foemina	.	.	.	.	.	.	.	10	.	.	.	.	.	.
Quercetalia pubescenti-petraeae s.l.														
Cornus mas	.	100	58	10	19	15	88	40	100	57	60	67	IV	III
Sorbus torminalis	.	19	25	33	15	4	25	30	88	86	.	67	II	.
Fraxinus ornus	.	100	33	.	26	69	63	60	38	43	100	100	III	.
Ostrya carpinifolia	27	100	17	.	.	46	25	10	.	43	60	17	IV	III
Luzula forsteri	36	50	91	.	.	.	50	80	100	57	20	83	V	III

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Number of relevés per column	31	16	12	21	26	26	8	10	8	7	5	6	?	?
Viola alba Besser subsp. dehnhardtii	32	81	.	.	30	.	75	80	75	57	60	100	III	II
Quercus pubescens	9	44	33	.	.	38	63	70	25	14	100	33	.	.
Sorbus domestica	5	50	42	.	.	4	50	60	88	86	60	17	.	.
Lilium bulbiferum subsp. croceum	5	88	41	14	26	.	.	.	.	.	40	67	IV	III
Buglossoides purpurocaerulea	5	19	.	.	4	35	63	20	.	43	60	.	.	.
Lathyrus niger	.	.	.	10	.	.	25	50	50	.	.	83	.	II
Silene viridiflora	5	.	33	.	.	.	.	.	38	14	.	.	.	.
Aristolochia lutea	.	.	50	.	.	38	.	40	.	29	.	.	.	.
Brachypodium rupestre	14	94	.	.	.	69	38	50	.	.	.	.	III	II
Serratula tinctoria	5	.	.	.	.	.	13	30	25	.	.	83	.	.
Orchis purpurea	27	94	.	.	.	.	.	.	.	.	.	.	II	.
Veronica chamaedrys	59	.	.	10	.	.	.	.	.	.	.	.	II	.
Acer monspessulanum	.	.	.	.	4	12	38	.	.	.	.	.	.	.
Carpinus orientalis	.	.	.	.	4	.	.	80	.	.	100	.	.	.
Mespilus germanica	.	.	.	.	.	.	13	.	13	29	.	.	.	.
Cytisus villosus	.	.	.	.	.	15	.	10	.	.	.	.	.	.
Aristolochia rotunda	.	.	.	.	.	.	38	20	.	.	.	.	.	.
Erica scoparia	.	.	.	.	.	.	25	60	.	.	.	.	.	.
Helleborus bocconei subsp. siculus	.	.	25	.	.	.	.	.	.	.	.	.	.	.
Polygonatum odoratum	.	.	.	.	.	12	.	.	.	.	.	.	.	.
Sesleria autumnalis	.	.	.	.	.	38	.	.	.	.	.	.	.	.
Crepis leontodontoides	.	.	.	.	.	.	50	.	.	.	.	.	.	.
Pulicaria odora	.	.	.	.	.	.	25	.	.	.	.	.	.	.
Quercus frainetto	.	.	.	.	.	.	25	.	.	.	.	.	.	.
Asparagus tenuifolius	.	.	.	.	.	.	.	10	.	.	.	.	.	.
Echinops siculus	.	.	.	.	.	.	.	.	13	.	.	.	.	.
Teucrium siculum	.	.	.	.	.	.	.	.	75	.	.	.	.	.
Malus florentina	.	.	.	.	.	.	.	.	.	.	.	50	.	.
Quercetalia robori-petraeae s.l.														
Cytisus scoparius	45	.	.	.	.	31	25	40	75	29	.	.	.	.
Teucrium scorodonia	.	.	.	.	.	42	25	20	.	.	.	.	.	.
Genista germanica	.	.	.	.	.	27	.	30	25	.	.	.	.	.
Luzula pilosa	.	.	.	19	.	.	.	10	.	.	.	.	.	.
Lathyrus montanus	.	.	.	.	.	50	.	50	.	.	.	.	.	.
Hieracium racemosum	5	.	.	.	.	.	.	.	.	.	.	.	.	.
Hieracium lachenalii	5	.	.	.	.	.	.	.	.	.	.	.	.	.
Deschampsia flexuosa	.	.	.	24	.	.	.	.	.	.	.	.	.	.
Viola canina	18	.	.	.	.	54	.	.	.	.	.	.	.	.
Genista pilosa	.	.	.	.	.	42	.	.	.	.	.	.	.	.
Ulex europaeus	.	.	.	.	.	15	.	.	.	.	.	.	.	.
Holcus mollis	.	.	.	.	.	.	.	.	50	.	.	.	.	.
Lychnis coronaria	.	.	.	.	.	.	.	.	.	29	.	.	.	.
Querco-Fagetea s.l.														
Quercus cerris	95	100	100	100	100	100	100	90	100	86	100	100	V	V
Festuca heterophylla	91	50	100	33	19	23	75	80	100	43	100	67	II	III
Cruciata glabra	64	75	75	19	15	38	63	90	100	71	60	67	V	IV
Acer campestre	95	75	50	100	100	69	75	70	38	43	.	50	V	V
Melica uniflora	18	50	92	100	78	31	88	50	63	.	60	17	IV	V

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Number of relevés per column	31	16	12	21	26	26	8	10	8	7	5	6	?	?
Brachypodium sylvaticum	82	.	67	19	56	35	88	60	50	29	40	17	.	.
Melittis melissophyllum	.	63	42	19	7	31	25	50	38	14	60	83	.	.
Hedera helix	9	94	67	81	96	31	88	50	50	71	60	67	IV	V
Fragaria vesca	91	100	92	14	37	.	63	50	75	71	60	67	IV	IV
Acer obtusatum	23	100	75	76	48	.	13	.	13	29	40	33	III	IV
Tamus communis	.	88	.	76	48	69	75	60	75	57	20	67	V	IV
Lathyrus venetus	55	94	25	71	26	15	13	20	25	71	.	.	III	V
Daphne laureola	9	25	100	86	93	15	38	20	13	.	60	.	.	III
Malus sylvestris	50	19	33	62	11	.	13	20	38	.	.	50	.	III
Pyrus pyraster	82	38	25	62	30	.	88	70	75	.	.	67	III	.
Hepatica nobilis	5	100	100	81	11	27	.	.	.	.	60	100	II	IV
Clematis vitalba	86	50	.	10	22	38	63	30	.	43	.	.	IV	III
Symphytum tuberosum	5	.	42	86	.	8	50	70	63	.	20	.	.	III
Ajuga reptans	9	63	.	38	15	.	38	.	.	.	20	50	IV	V
Potentilla micrantha	55	19	8	.	15	58	.	.	75	.	.	67	.	III
Carex sylvatica	9	13	75	57	4	.	.	30	25	.	20	.	IV	IV
Sorbus aria	5	31	42	.	4	42	.	.	.	.	20	.	.	.
Castanea sativa	23	.	.	.	.	42	.	20	25	86	60	.	.	.
Solidago virgaurea	5	100	25	43	.	.	.	70	.	.	.	83	II	V
Ulmus minor	5	13	.	.	.	12	50	30	.	.	.	33	.	.
Quercus petraea	.	.	.	.	.	38	38	30	88	.	.	67	.	.
Geum urbanum	82	.	33	14	44	.	.	.	.	.	.	.	II	II
Rubus hirtus	95	.	.	100	96	.	.	.	100	.	.	.	II	.
Platanthera clorantha	23	19	100	.	.	.	.	20	.	.	.	.	.	.
Cardamine bulbifera	.	.	58	90	41	.	.	.	.	.	.	33	.	III
Cephalanthera longifolia	5	31	17	.	.	23	.	.	75	.	.	.	.	.
Carex digitata	.	69	.	14	.	.	.	.	.	.	60	17	.	II
Laburnum anagyroides	5	.	25	.	.	19	.	.	.	.	.	.	.	.
Epipactis helleborine	45	.	.	.	22	.	.	10	.	.	.	.	.	.
Poa sylvicola	14	.	.	.	.	.	50	40	.	.	.	.	.	.
Lychnis flos-cuculi	9	.	.	.	.	.	.	30	25	.	.	.	.	.
Scutellaria columnae	.	.	.	.	15	.	.	.	63	43	.	.	.	.
Helleborus bocconei subsp. bocconei	.	63	.	.	.	.	25	.	.	.	.	33	IV	IV
Hieracium sylvaticum	5	.	.	.	.	.	.	.	100	.	40	33	.	.
Hieracium gr. murorum	.	63	25	.	.	.	.	50	.	.	.	.	.	.
Ulmus glabra	14	.	.	.	4	.	.	.	.	.	.	.	.	.
Campanula persicifolia	9	.	.	.	.	4	.	.	.	.	.	.	.	.
Aquilegia vulgaris	9	.	.	.	.	.	.	10	.	.	.	.	.	.
Chaerophyllum temulum	41	.	.	.	.	.	.	.	.	29	.	.	.	.
Calamintha sylvatica	32	13	.	.	.	.	.	.	.	.	.	.	.	.
Saxifraga rotundifolia	.	.	8	.	4	.	.	.	.	.	.	.	.	.
Fraxinus excelsior	.	.	.	10	4	.	.	.	.	.	.	.	.	.
Luzula sylvatica	.	.	17	.	.	.	.	.	.	.	.	.	.	.
Acer opalus subsp. opalus	.	.	.	.	.	54	.	.	.	.	.	.	.	.
Tilia platyphyllos	.	.	.	.	4	.	.	.	.	.	.	.	.	.
Quercetea ilicis s.l.													.	.
Cyclamen repandum	.	31	.	.	.	.	.	50	13	.	100	.	.	.
Asplenium onopteris	.	.	8	.	.	.	13	20	.	.	.	.	.	.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Number of relevés per column	31	16	12	21	26	26	8	10	8	7	5	6	?	?
Erica arborea	.	.	.	.	.	27	25	.	38	.	.	.	.	.
Quercus ilex	.	.	.	.	.	12	.	30	.	.	60	.	.	.
Lonicera etrusca	.	.	8	.	.	.	50	.	.	.	.	.	.	.
Rosa sempervirens	.	.	.	.	.	.	50	30	.	.	.	.	.	.
Arbutus unedo	.	.	.	.	.	.	.	10	.	.	.	.	.	.
Rubia peregrina	.	.	.	.	.	.	.	.	.	.	20	.	.	.
Asparagus acutifolius	.	.	.	.	.	.	.	.	.	.	60	.	.	.
Osyris alba	.	.	.	.	.	.	.	.	.	.	20	.	.	.
Rhamno-Prunetea s.l.														
Crataegus monogyna	86	94	58	5	74	38	88	90	88	29	40	83	V	V
Euonymus europaeus	.	31	67	76	52	.	88	50	38	14	40	33	II	III
Ligustrum vulgare	9	13	25	29	85	.	13	60	25	.	100	50	II	.
Cornus sanguinea	45	100	8	14	41	46	.	70	.	29	.	17	V	V
Prunus spinosa	77	44	17	33	.	.	100	80	50	29	.	50	IV	V
Juniperus communis	77	81	8	.	.	19	50	70	88	.	20	50	II	II
Coronilla emerus s.l.	18	88	.	.	.	54	.	.	.	100	60	83	.	II
Viburnum lantana	5	.	.	5	.	35	.	.	.	.	.	50	.	.
Rubus canescens	5	.	.	.	.	27	38	.	.	.	40	.	.	.
Rosa canina	.	31	.	.	.	.	50	40	.	86	.	.	III	III
Rubus ulmifolius Schott	5	50	.	.	.	.	50	60	.	86	.	.	III	IV
Pyracantha coccinea M.J. Roemer	.	31	.	.	.	.	13	20	.	.	60	.	.	.
Cytisus sessilifolius	27	.	8	.	4	31	.	.	.	.	.	.	.	.
Ribes uva-crispa	5	.	.	.	11	.	.	.	.	.	.	.	.	.
Rubus caesius	.	.	8	.	.	.	.	.	.	.	.	33	.	.
Rosa gallica	.	.	.	.	.	.	50	30	.	.	.	.	.	.
Rosa corymbifera	27	.	.	.	.	.	.	.	.	.	.	.	.	.
Juniperus oxycedrus subsp. oxycedrus	.	.	.	.	.	.	.	.	.	.	40	.	.	.
other species														
Pteridium aquilinum	36	25	33	71	19	58	13	40	.	57	20	.	III	V
Stachys officinalis	5	38	.	.	.	.	63	80	100	29	20	83	.	.
Ruscus aculeatus	.	.	17	.	.	19	63	40	75	86	40	33	.	.
Clinopodium vulgare	41	13	17	.	.	.	38	50	25	43	.	.	.	.
Dactylis glomerata	73	50	.	5	.	.	75	30	63	57	.	.	II	.
Carex flacca s.l.	18	88	.	.	.	.	25	60	50	.	.	100	II	II
Digitalis micrantha	23	.	.	.	.	.	38	20	38	14	.	.	.	.
Astragalus glycyphyllos	77	31	.	.	19	12	.	10	.	.	.	.	.	IV
Hypericum montanum	5	.	25	.	.	81	.	.	50	.	.	.	.	.
Oenanthe pimpinelloides	.	.	17	.	.	.	75	30	50	.	.	.	.	.
Silene italica subsp. italica	14	.	8	.	.	.	13	20	50	.	.	.	.	.
Genista tinctoria subsp. tinctoria	14	.	.	.	.	.	.	20	.	.	20	.	.	.
Sedum cepaea	14	.	.	.	.	.	.	.	25	43	.	.	.	.
Veronica officinalis	.	.	33	.	.	27	.	10	.	.	.	.	.	.
Teucrium chamaedrys	14	.	.	.	.	8	25	10	.	.	.	.	.	.
Polypodium gr. vulgare	5	31	.	.	.	.	.	.	.	.	20	.		
Sesleria italica	5	38	.	.	.	.	.	.	.	.	.	.	.	.
Cruciata laevipes	5	.	50	.	.	.	.	.	.	.	.	.	.	.
Chaerophyllum aureum	9	.	.	5	.	.	.	.	.	.	.	.	.	.
Galium aparine	32	.	.	.	48	.	.	.	.	.	.	.	.	.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Number of relevés per column	31	16	12	21	26	26	8	10	8	7	5	6	?	?
Alliaria petiolata	5	.	.	.	11	.	.	.	.	.	.	.	.	.
Rumex sanguineus	9	.	.	.	11	.	.	.	.	.	.	.	.	.
Chaerophyllum hirsutum	27	.	.	.	11	.	.	.	.	.	.	.	.	.
Agrimonia eupatoria	23	.	.	.	.	.	38	.	.	.	.	.	.	.
Campanula rapunculus	5	.	.	.	.	.	50	.	.	.	.	.	.	.
Prunella vulgaris	5	.	.	.	.	.	38	.	.	.	.	.	.	.
Trifolium medium	18	.	.	.	.	.	.	10	.	.	.	.	.	.
Hypericum hirsutum	9	.	.	.	.	.	.	20	.	.	.	.	.	.
Cerastium arvense	9	.	.	.	.	.	.	20	.	.	.	.	.	.
Inula conyza	5	.	.	.	.	.	.	30	.	.	.	.	.	.
Arum italicum Miller	.	.	17	.	11	.	.	.	.	.	.	.	.	.
Helleborus foetidus	.	.	.	.	30	.	50	.	.	.	.	.	.	.
Bunium bulbocastanum	.	19	.	14	.	.	.	.	.	.	.	.	II	II
Symphytum bulbosum	.	.	.	.	.	19	.	.	.	.	.	17	.	.
Geranium sanguineum	.	.	.	.	.	.	25	30	.	.	.	.	.	.
Filipendula vulgaris	.	.	.	.	.	.	25	20	.	.	.	.	.	.
Anthoxanthum odoratum	.	.	.	.	.	.	.	20	25	.	.	.	.	.

Table 2: Synoptic table. columns:1: *Listero ovatae-Quercetum cerridis;* 2: *Aceri obtusati-Quercetum cerridis;* 3: *Carici sylvaticae-Quercetum cerridis;* 4: *Centaureo montanae-Carpinetum betuli;* 5: *Aremonio agrimonioidis-Quercetum cerridis;* 6: *Lathyro montani-Quercetum cerridis;* 7: *Melico uniflorae-Quercetum cerridis;* 8: *Allio pendulini-Quercetum cerridis;* 9: *Cephalanthero longifoliae-Quercetum cerridis;* 10: *Coronillo emeri-Quercetum cerridis;* 11: *Daphno laureolae-Quercetum cerridis;* 12: *Erythronio dentis canis-Quercetum cerridis;* 13: *Salvio glutinosae-Quercetum cerridis;* 14: *Salvio-Quercetum cerridis arisaretosum.*