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Phytosociological overview of the Italian *Alnus incana*-rich riparian woods

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Abstract
On the basis of data both new and coming from the literature, the Italian grey alder riparian woods were studied from the syntaxonomic point of view. The floristic-sociological analysis of 119 relevés coming from northern Italy and the comparison with phytosociological tables from neighboring areas (Slovenia, Croatia, Austria, southern Germany and Switzerland) pointed out the occurrence of two distinct associations belonging to *Alnion incanae* and *Fagetalia*: the colline-submontane *Primulo vulgaris-Alnetum incanae* ass. nova and the montane-high montane *Aceri-Alnetum incanae*. Both these associations are distributed throughout northern Italy and reach their southern limit of distribution in the Tuscan-Emilian Appenines.

Key words: grey alder, northen Italy, altitude, syntaxonomy, *Alnion incanae*

Introduction

This study is part of a comprehensive phytosociological survey on the Italian riparian and swamp woods (Poldini *et al*., 2011; Sburlino *et al*., 2011).

Alnus incana is a circumboreal species that in Italy reaches its southern limit of distribution in the northern Appenines; the grey alder inhabits fresh and damp sites and mainly occurs in the montane and submontane (less frequently colline) belts, while can be found only occasionally in the plains. The *Alnus incana*-rich woods are included in the priority habitat 91E0* of the 92/43/EEC Council Directive and, in Italy, generally present a good conservation status, although the fluvial regime control often disrupted their natural continuity. The grey alder-rich riparian woods usually form a more or less narrow strip along streams and rivers, at a higher level compared to the riverside willow scrubs of *Salicion incanae*; in the montane belt these communities represent a fundamental constituent of the fluvial edaphohygrophilous geosigmeta (Rivas-Martinez, 2005).The soils present a variable amount of skeleton depending on the hydrodynamics of the watercourses and are subjected to flooding mainly during spring; moreover, unlike the black alder swamps belonging to *Alnion glutinosae* (*Alnetea glutinosae*), the soils are characterized by good aeration and by a horizontal water flow and the groundwater level can significantly change during the year (Noirfalise & Dethioux, 1984; Ellenberg, 1988; Higler, 1993; Prieditis, 1997; Landi & Angiolini, 2010; Sburlino *et al*., 2011; Slezák *et al.* 2011). From a syntaxomic point of view, most authors refer the *Alnus incana*-rich communities to *Alnion incanae* (= *Alno-Padion*; = *Alno-Ulmion*), an Eurosibiric alliance generally attributed to *Fagetalia* and *Querco-Fagetea* (Oberdorfer, 1953, 1992; Credaro & Pirola, 1975; Dierschke, 1984; Schwabe, 1985a; Wallnöfer *et al*., 1993; Pott, 1995; Dakskobler *et al*., 2004; Willner, 2007; etc.), although some authors include them in *Fraxinetalia* (Theurillat *et al*., 1995; Aeschimann *et al*., 2004; Ubaldi, 2006) or in *Populetalia albae* (Trinajstić, 1973; Pedrotti & Gafta, 1996; Biondi *et al*., 1997; Rivas-Martinez *et al*., 2002), an order that according to Rivas-Martinez *et al*. (2002) should be attributed to the *Salici purpureae-Populetea nigrae* class.

The *Alnus incana*-dominated riparian woods of central Europe have been studied in detail by several authors (Moor, 1958; Matuszkiewicz & Matuszkiewicz, 1981; Schwabe, 1985a; Willner, 2007; Oberdorfer, 1953, 1992; Douda, 2008; etc.); in regard to the Italian communities, papers have been published exclusively on small areas, which means a general synthesis is lacking.

The aim of this study is to propose a comprehensive and coherent syntaxonomic scheme of the Italian grey alder riparian woods that may be compared with the corresponding communities present in the neighboring European regions.

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Materials and methods

The analysis was carried out on 119 relevés, both published and unpublished, obtained by means of the Braun-Blanquet (1964) methodology. The published data come from northern Tuscany (Arrigoni & Papini, 2003; Foggi *et al*. 2011), Piedmont (Mondino, 2003), Trentino-Alto Adige (Pieczerak, 1988; Gafta, 1992) and Friuli (Lippert *et al*., 1995). The unpublished data (102 relevés) come from Friuli, Veneto, Trentino-Alto Adige and Lombardy. The tables by Credaro & Pirola (1975) and Montacchini *et al*. (1982) have not been used for the analysis due to their synthetic and floristically incomplete form. Only relevés characterized by a cover-abundance value of *Alnus incana* ≥ 3 were considered. Relevés were elaborated on the basis of hierarchical classifications using the package Syn-tax 2000 (Podani 2001); data transformation was based on the method proposed by Van der Maarel (1979). Analytic tables were arranged according to the results of the multivariate classification. The synthetic tables of the Italian communities were then compared with data in the literature from neighboring European areas (northern Croatia, western Slovenia, Austria, Switzerland and southern Germany); the synoptic table was then subjected to hierarchical classification. The concept of differential species is in accordance with Mucina (1993) and Biondi (2011). The taxonomic nomenclature corresponds to Pignatti (1982), Conti *et al.* (2005) and Tutin *et al.* (1964–1980); considering the different degree of taxonomic precision reached by the authors in the phytosociological tables, the informal categories of "aggregate" (aggr.) or "sensu latu" (s.l.) were used for the following taxa: *Aconitum lycoctonum, A. napellus, A. variegatum, Asarum europaeum* (incl. *A. europaeum* ssp. *caucasicum*), *Cornus sanguinea* (incl. *C. sanguinea* ssp. *hungarica*), *Galium mollugo, Helleborus viridis* (incl. *H. odorus*), *Lamium galeobdolon* (incl. *L. galeobdolon* ssp. *flavidum*), *Myosotis scorpioides*, *Rosa canina, Rubus fruticosus, Stellaria nemorum* (incl. *S. nemorum* ssp. *montana*), *Senecio nemorensis* (incl. *S. cacaliaster, S. germanicus* ssp. *glabratus, S. ovatus*). The chorotypes follow Oberdorfer (2001) and, in part, Pignatti (1982) and Aeschimann *et al.* (2004). Data concerning the analytic tables (locations, names of the authors and sources of the relevés) are quoted in the Appendix. The sources of the relevés and the original syntaxa names of the communities in the synoptic European table are cited in the table.

Results

The dendrogram of the Italian relevés highlights the presence of two main clusters (1 and 2 in Fig. 1).

Cluster 1: this group includes 39 stands coming mainly from hilly and submontane areas of Friuli, Veneto, Lombardy, Piedmont and northern Tuscany (average altitude approx. 400 m a.s.l.).

Cluster 2: this group includes 80 stands coming from montane areas of Friuli, Veneto, Trentino-Alto Adige, Lombardy and northern Tuscany (average altitude approx. 1000 m a.s.l.).

Tab. 1 shows the main differential species between the two groups of relevés. Primarily, the first group displays a higher degree of frequency of Submediterranean, Subatlantic-Submediterranean, southern and south-eastern European species belonging to *Rhamno-Prunetea* (*Sambucus nigra, Cornus sanguinea* ssp. *hungarica, Ligustrum vulgare, Hedera helix, Crataegus monogyna*), to *Populetalia* (*Salix alba*) or coming from thermophilous contact forests (*Corylus avellana, Ostrya carpinifolia, Acer campestre, Fraxinus ornus, Primula vulgaris, Vinca minor, Helleborus viridis* aggr.); even species such as *Rubus caesius, Humulus lupulus, Aegopodium podagraria, Brachypodium sylvaticum, Salvia glutinosa, Cirsium oleraceum, Asarum europaeum* s.l., *Anemone ranunculoides* and the non-native *Robinia pseudacacia* are more frequent in these stands. In contrast, European and Eurasiatic species (*Chaerophyllum hirsutum, Geranium robertianum, Petasites albus, P. hybridus, Senecio nemorensis* aggr., *Ranunculus lanuginosus, Pulmonaria officinalis, Polygonatum verticillatum, Salix appendiculata*, *Dactylorhiza maculata* ssp. *fuchsii*), as well as Nordic or more continental entities (*Picea abies, Rubus idaeus, Fragaria vesca, Daphne mezereum, Prunus padus, Solidago virgaurea, Maianthemum bifolium, Salix myrsinifolia, Sorbus aucuparia, Angelica sylvestris, Athyrium filix-femina, Elymus caninus, Viola biflora*) and southern European montane ones (*Veronica urticifolia, Carduus personata, Saxifraga rotundifolia, Cirsium erisithales*) belonging to the mesophilous, meso-hygrophilous and hygrophilous montane and high-montane forest and megaforb communities are more frequent in the relevés of the second cluster.

Two principal clusters (1 and 2 in Fig. 2) can be identified even in the dendrogram of the tables of the southern European communities and cluster 1 can be divided into two subclusters (1a and 1b). Cluster 1 includes the colline-submontane coenoses from northern Italy, W-Slovenia, N-Croatia, Austria and southern Germany while the montane and high-montane ones from northern Italy, Austria, SW-Switzerland and southern Germany are included in cluster 2. A synoptic table illustrating these results was created (Tab. 2). Overall, the colline-submontane communities (synthetic tables 1-7 in Tab. 2) share once again a higher frequency of species referable to the thermphilous mantles (*Crataegus monogyna,*

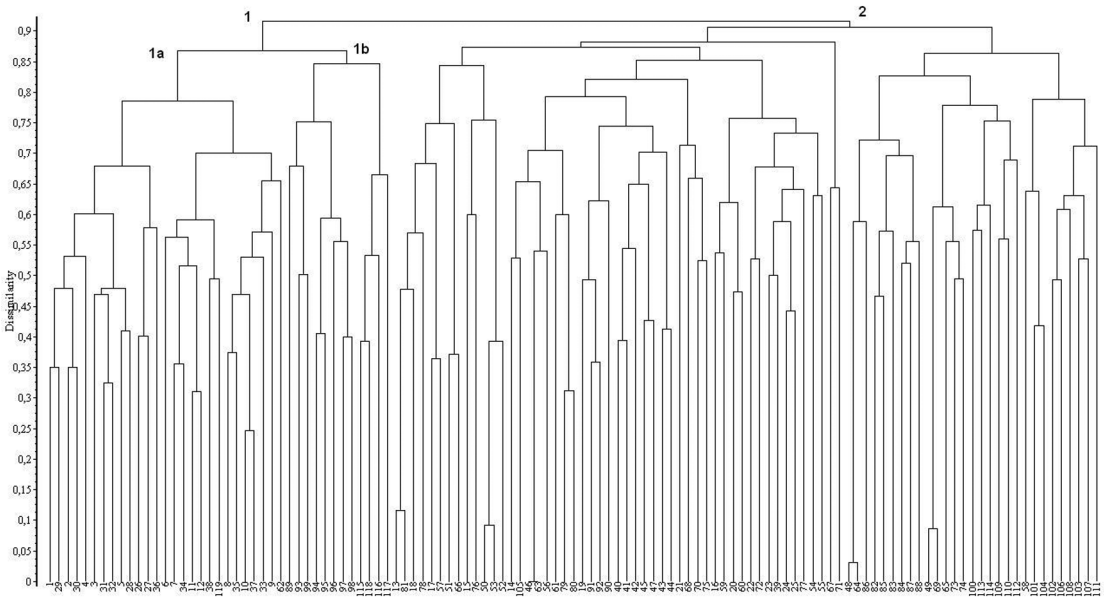

Fig. 1 - Dendrogram of the 119 Italian relevés. Algorithm: complete link, similarity ratio, cover data.

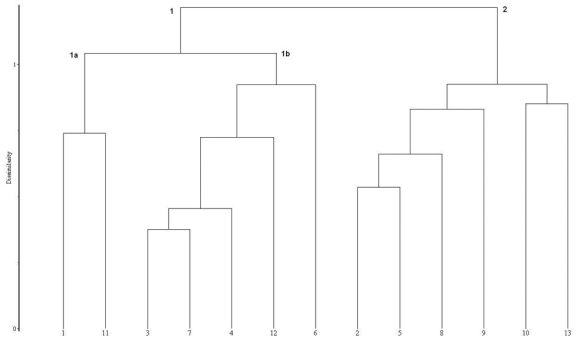

Fig. 2 - Dendrogram of the southern European synoptic table. Algorithm: complete link, chord distance, frequency data.

Clematis vitalba, Euonymus europaeus, Sambucus nigra, *Cornus sanguinea*) or to *Populetalia* (*Humulus lupulus, Symphytum tuberosum, Salix alba, Populus nigra*) and *Rubus caesius, Galium aparine* and *Asarum europaeum* are better represented in these coenoses. The second cluster (synthetic tables 8-13 in Tab. 2) differs from the first cluster insofar as it displays a higher frequency of central European, Eurasiatic and Nordic species, which frequently occur in the montane and high-montane belts (*Rubus idaeus, Oxalis acetosella, Picea abies, Athyrium filix-femina, Chaerophyllum hirsutum, Fragaria vesca, Petasites albus, Senecio nemorensis* aggr.*, Polygonatum verticillatum, Sorbus aucuparia, Viola biflora,* etc.).

In regard to the colline-submontane communities, the northern Italian and western Slovenian coenoses (synthetic tables 1-2 in Tab. 2) are well differentiated from the corresponding ones from Austria, northern Croatia and southern Germany by means of a group of Submediterranean, Subatlantic-Submediterranean, southern and south-eastern European species (*Corylus avellana, Ligustrum vulgare, Hedera helix, Acer campestre, Primula vulgaris, Vinca minor, Helleborus viridis* aggr. and *Ostrya carpinifolia*); within this particular context, the Slovenian stands by Dakskobler *et al.* (2004) differ from the Italian ones for the exclusive occurrence or higher frequency of species such as *Allium ursinum, Tilia cordata, Cardamine enneaphyllos, Veratrum album*, *Cerastium sylvaticum,* etc. and of some entities belonging to the ravine forests of *Tilio-Acerion* (*Ulmus glabra, Lunaria rediviva, Cardamine pentaphyllos, Arum maculatum, Corydalis cava*).

Discussion

The *Alnus incana*-dominated riparian woods have been validly described for the first time by Lüdi (1921) on the basis of a single relevé including both colline-submontane species (*Clematis vitalba, Cornus sanguinea, Ligustrum vulgare*, etc.) and montane ones (*Rubus idaeus, Viola biflora, Picea abies*, etc.).

Although their general character of azonality (Ellenberg, 1988), the grey alder woods show a floristic variability depending on temperature (altitude), historic (biogeographic) and edaphic factors (Müller & Görs, 1958; Moor, 1958; Schwabe, 1985a; Oberdorfer, 1992; Dakskobler *et al.*, 2004). From the phytosociological point of view, this complexity and plurality of determinant factors have been treated in

Tab. 1 - Differential species between the colline-submontane (1) and the montane (2) Italian communities (frequency values)

	1	2		1	2
Approx. average altitude (m a.s.l.)	400	1000	Approx. average altitude (m a.s.l.)	400	1000
N. of relevés	39	80	N. of relevés	39	80
Rubus caesius	92	34	Geranium robertianum	38	59
Aegopodium podagraria	77	46	Fragaria vesca	18	55
Cornus sanguinea ssp. hungarica	77	3	Petasites albus	18	49
Brachypodium sylvaticum	74	39	Elymus caninus	8	45
Corylus avellana	69	28	Senecio nemorensis aggr.	3	45
Salvia glutinosa	67	35	Petasites hybridus	15	39
Sambucus nigra	56	26	Angelica sylvestris	13	38
Hedera helix	54	1	Sorbus aucuparia	3	38
Primula vulgaris	51	4	Athyrium filix-femina	15	34
Cirsium oleraceum	36	10	Pulmonaria officinalis	10	33
Crataegus monogyna	36	3	Viola biflora	13	28
Humulus lupulus	33	10	Ranunculus lanuginosus	3	28
Acer campestre	31	3	Ranunculus repens	3	28
Helleborus viridis aggr.	31	1	Daphne mezereum	5	26
Robinia pseudacacia	28	3	Veronica urticifolia	3	25
Salix alba	28	3	Polygonatum verticillatum	3	24
Fraxinus ornus	21	1	Carduus personata	3	23
Ligustrum vulgare	56	.	Saxifraga rotundifolia	3	21
Vinca minor	51	.	Prunus padus	.	26
Asarum europaeum s.l.	36	.	Solidago virgaurea	.	25
Anemone ranunculoides	23	.	Salix appendiculata	.	25
Ostrya carpinifolia	23	.	Maianthemum bifolium	.	24
Picea abies	44	70	Salix myrsinifolia	.	21
Rubus idaeus	3	69	Cirsium erisithales	.	21
Chaerophyllum hirsutum	23	60	Dactylorhiza maculata ssp. fuchsii	.	21

different ways.

Müller & Görs (1958) only recognized a single association (*Alnetum incanae*), whose variability was explained by means of altitudinal variants, geographic races and subassociations; this kind of approach was later accepted by many authors (Matuszkiewicz & Matuszkiewicz, 1981; Schwabe, 1985a; Oberdorfer, 1992; Wallnöfer *et al.*, 1993; Pott, 1995; Pedrotti & Gafta, 1996; Dakskobler *et al.*, 2004; Douda, 2008; etc.). According to Moor (1958), the floristic differences in relation to altitude are sufficient to recognize two distinct associations: the colline-submontane *Equiseto-Alnetum* and the montane *Calamagrostio-Alnetum*, an opinion shared by both Trinajstić (1973), Ellenberg (1988) and Carli (2008); recently, Willner (2007) confirms the Moor's dualistic approach and considers the altitudinal variants at the association level: *Equiseto-Alnetum* and *Aceri-Alnetum*, the latter being originally described by Beger (1922).

The results of the analysis of the Italian relevés (Tab. 1, 3 and 4) and the comparison with data from neighboring European areas (Tab. 2) seem to confirm the schemes of Moor (1958) and Willner (2007); in fact, the analysis points to the existence of groups of species that may be considered as differential entities belonging to distinct altitude-based communities. Within this general context, the montane and high-montane Italian coenoses (synthetic table 8 in Tab. 2) do not significantly differ from the corresponding communities described in other southern European areas (synthetic tables 9-13 in Tab. 2); in all respects, the accidental occurrence of southern European and south-eastern European species (*Lamium orvala, Anemone trifolia, Knautia drymeia*, etc.; see Tab. 4) is not sufficient to recognize an autonomous association and the Italian stands at most could be considered as a geographic variant of *Aceri-Alnetum*. In contrast, the colline-submontane Italian and Slovenian communities (synthetic tables 1 and 2 in Tab. 2) are biogeographically well differentiated and in our opinion may be attributed to a new association (*Primulo vulgaris-Alnetum incanae*), with a southern European and illyric distribution. In fact, the biogeographic autonomy of the Slovenian coenoses was already highlighted by Dakskobler *et al.* (2004) that however simply considered them as a submontane form of the *Anemone trifolia* geographical variant of *Alnetum incanae*.

Description of the Italian communities

Primulo vulgaris-Alnetum incanae ass. nova (Tab. 3); *holotypus*: rel. 24 in Table 3

Differential species: *Cornus sanguinea* ssp. *hungarica, Primula vulgaris, Hedera helix, Vinca minor*

Syntaxonomy: the connection with the *Alnion incanae* alliance, although less evident if compared with the corresponding montane communities, is

Tab. 2 - Col. 1: *Primulo vulgaris-Alnetum incanae*, N-Italy, Tab. 3 this paper; Col. 2: *Alnetum incanae Anemone trifolia* geogr. var. *Galanthus nivalis* form, W-Slovenia, Dakskobler et al. (2004) Tab. 2 rel. 12-20; Col. 3: *Equiseto-Alnetum incanae* colline Form, Austria, Willner & Grabherr (2007) Tab. 16 col. 10; Col. 4: *Alnetum incanae*, Reine *Cornus sanguinea*-Form, *typicum*, Reine Variante, S-Germany, Oberdorfer (1992) Tab. 303 col. 1 Ad; Col. 5: *Equiseto-Alnetum incanae* submontane Form, Austria, Willner & Grabherr (2007) Tab. 16 col. 11; Col. 6: *Agropyro-Alnetum incanae cornetosum sanguineae*, Switzerland, Braun-Blanquet (1975) Tab. 1; Col. 7: *Equiseto-Alnetum incanae*, N-Croatia, Trinaistić (1973) Tab. 1; Col. 8: *Aceri-Alnetum incanae*, N-Italy, Tab. 4 this paper; Col. 9: *Aceri-Alnetum incanae*, Austria, Willner & Grabherr (2007) Tab. 16 col. 12; Col. 10: *Alnetum incanae*, *Ranunculus aconitifolius*-Form, *Viola biflora*-Gebietsausbildung, *typicum*, S-Germany, Oberdorfer (1992) Tab. 303 col. 1 Bb; Col. 11: *Alnetum incanae*, *Ranunculus aconitifolius*-Form, *Lonicera nigra*-Gebietsausbildung, *typicum*, S-Germany, Oberdorfer (1992) Tab. 303 col. 1Bc; Col. 12: *Calamagrostio-Alnetum incanae*, Switzerland, Clot (2010) Tab. R5.4 rel. 1-12; Col. 13: *Agropyro-Alnetum incanae violetosum biflorae*, Switzerland, Braun-Blanquet (1975) Tab. 2.

No. of order	1	2	3	4	5	6	7	8	9	10	11	12	13
No. of Tables (dendrogram of Fig. 2)	1	11	3	7	4	12	6	2	5	8	9	10	13
Approx. altitude (m x 10 a.s.l.)	40	20	s.d.	45	s.d.	45	13	100	s.d.	90	80	110	120
No. of relevés	39	9	207	397	274	10	10	80	329	54	56	12	25
Crataegus monogyna	36	56	12	18	17	10	30	3	3	6	2	.	4
Rubus caesius	92	100	88	85	76	100	90	34	16	26	.	50	40
Sambucus nigra	56	89	65	64	57	90	30	26	20	26	.	.	16
Humulus lupulus	33	78	46	47	36	70	30	10	3	2	.	.	48
Clematis vitalba	23	44	14	10	23	50	30	10	6	2	2	.	.
Galium aparine	10	22	35	47	22	20	30	5	4	2	.	.	8
Euonymus europaeus	15	78	34	46	33	40	70	3	4	15	.	.	.
Salix alba	28	67	25	27	26	30	50	3	.	.	.	25	8
Cornus sanguinea s.l.	77	100	59	50	46	80	90	3	3	.	.	.	.
Symphytum tuberosum	8	44	14	2	18	.	30	3	6	.	6	.	.
Asarum europaeum s.l.	36	100	16	23	36	.	.	.	6	22	.	8	.
Populus nigra	13	11	22	6	10	30	10	.	.	.	.	.	.
Picea abies	44	22	4	5	16	10	.	70	46	63	30	92	16
Oxalis acetosella	31	56	1	5	19	30	.	51	59	31	73	42	68
Senecio nemorensis aggr.	3	33	3	4	10	10	.	45	53	61	59	8	32
Chaerophyllum hirsutum	23	56	1	9	27	.	.	60	61	80	75	58	44
Acer pseudoplatanus	36	33	9	13	22	.	.	44	37	59	77	75	4
Fragaria vesca	18	.	.	1	14	20	10	55	50	43	5	58	80
Petasites albus	18	.	1	1	5	.	.	49	42	17	9	42	20
Rubus idaeus	3	.	.	4	6	.	.	69	43	33	84	25	64
Athyrium filix-femina	15	.	.	.	4	.	.	34	42	26	43	17	36
Polygonatum verticillatum	3	.	.	.	2	.	.	24	12	24	48	67	36
Crepis paludosa	3	.	.	.	4	.	.	16	26	24	32	58	32
Sorbus aucuparia	3	.	.	1	3	.	.	38	19	26	64	.	44
Viola biflora	13	.	.	1	3	.	.	28	44	15	.	75	88
Corylus avellana	69	100	5	4	30	20	.	28	26	24	4	25	8
Ligustrum vulgare	56	89	11	18	20	40	30	.	1	2	.	.	4
Hedera helix	54	89	2	.	2	.	.	1	.	2	2	.	.
Acer campestre	31	44	1	.	1	10	.	3	.	.	.	.	.
Cardamine impatiens	28	56	.	.	.	.	.	16	.	.	.	.	16
Primula vulgaris	51	67	.	.	.	.	.	4	.	.	.	.	.
Vinca minor	51	44	.	1	.	.	.	.	.	.	.	.	.
Helleborus viridis aggr.	31	67	.	.	.	.	.	1	.	.	.	.	.
Ostrya carpinifolia	23	33	.	.	.	.	.	.	.	.	.	.	.
Robinia pseudacacia	28	22	.	.	.	.	.	3	.	.	.	.	.
Ulmus glabra	.	67	4	10	13	.	.	3	4	20	5	33	.
Allium ursinum	13	100	24	3	13	.	.	.	1	2	.	8	.
Tilia cordata	13	89	1	1	1	.	.	10	1	.	.	.	.
Veratrum album	.	67	.	1	.	.	.	10	.	.	.	8	4
Lunaria rediviva	.	78	.	.	.	.	.	1	.	6	2	.	.
Cardamine enneaphyllos	3	44	.	1	.	.	.	3	.	.	.	.	.
Cerastium sylvaticum	3	89	.	.	.	.	.	1	.	.	.	.	.
Arum maculatum	.	89	.	3	.	.	.	1	.	.	.	.	.
Cardamine pentaphyllos	8	67	.	.	.	.	.	9	.	.	.	.	.
Corydalis cava	5	44	.	1	.	.	.	.	.	.	.	.	.
Alnus incana	100	100	95	94	98	100	100	100	96	100	100	100	100
Lamium galeobdolon s.l.	59	100	32	29	48	50	10	68	43	65	71	75	36
Aegopodium podagraria	77	100	51	59	65	80	70	44	30	44	50	67	64
Urtica dioica	26	11	40	50	56	80	70	54	53	26	71	17	80
Glechoma hederacea	28	78	37	43	29	80	50	35	17	4	5	8	56
Paris quadrifolia	28	100	33	31	33	20	50	29	19	31	7	67	68
Viola reichenbachiana	21	67	3	7	8	50	10	16	14	44	16	50	24
Filipendula ulmaria	10	67	22	23	29	30	10	15	15	46	79	33	20
Ranunculus repens	3	33	7	1	20	30	30	28	36	22	5	8	60
Brachypodium sylvaticum	74	89	52	66	64	100	90	38	23	74	.	33	28
Deschampsia cespitosa	54	89	44	69	53	80	.	49	51	74	84	75	72
Stachys sylvatica	33	.	42	61	53	60	10	45	33	72	36	50	44
Fraxinus excelsior	46	100	33	45	38	70	.	46	31	48	23	67	4

Geum urbanum	23	22	17	24	35	100	30	40	20	31	30	.	92
Angelica sylvestris	13	56	31	47	33	70	30	38	29	61	34	25	.
Elymus caninus	8	.	5	13	26	70	10	45	9	31	9	83	96
Viburnum opulus	10	89	24	31	36	30	10	4	3	7	14	17	.
Geranium robertianum	38	.	3	3	24	100	10	59	36	44	4	8	68
Equisetum arvense	31	11	4	9	16	20	.	34	17	30	4	25	28
Scrophularia nodosa	3	.	15	18	11	30	10	10	8	2	7	8	12
Lonicera xylosteum	44	56	30	52	39	50	.	35	14	22	.	100	56
Salvia glutinosa	67	89	28	23	33	40	.	35	23	35	.	8	12
Prunus padus	.	.	73	58	53	20	70	26	19	30	68	67	68
Stellaria nemorum s.l.	56	78	6	2	25	.	.	44	39	17	43	25	52
Cirsium oleraceum	36	44	25	40	44	30	.	10	35	76	.	92	20
Galium mollugo s.l.	41	.	12	20	22	70	.	31	18	44	2	42	88
Carex sylvatica	23	11	16	12	8	.	.	11	20	54	2	58	8
Aruncus dioicus	26	67	1	1	11	.	.	28	6	4	34	42	4
Daphne mezereum	5	56	7	10	11	.	.	26	14	20	48	75	12
Festuca gigantea	5	.	26	28	31	80	.	14	10	33	7	8	32
Mercurialis perennis	13	56	1	1	22	10	.	15	16	37	18	33	.
Dryopteris filix-mas	28	22	1	1	6	.	.	44	37	9	27	17	12
Chrysosplenium alternifolium	3	33	1	2	18	10	.	10	23	13	20	.	8
Heracleum sphondylium	5	22	3	5	12	.	.	19	12	9	5	75	4
Ajuga reptans	3	11	12	6	22	.	50	.	20	22	16	25	12
Berberis vulgaris	3	11	6	6	22	20	.	8	8	17	.	33	32
Dactylis glomerata	3	.	6	10	12	.	10	13	22	26	11	33	20
Impatiens noli-tangere	38	.	31	55	48	50	.	46	44	41	64	.	24
Primula elatior	.	11	39	33	24	.	.	6	17	57	29	67	32
Anemone nemorosa	.	67	2	10	20	.	10	5	17	7	48	8	.
Carduus personata	3	.	13	41	16	.	.	23	21	9	61	25	16
Thalictrum aquilegiifolium	10	11	4	16	11	.	.	21	10	26	.	67	48
Solanum dulcamara	5	.	9	7	7	60	.	20	10	13	.	17	24
Valeriana officinalis	21	.	12	10	16	20	.	10	7	39	57	58	.
Polygonatum multiflorum	23	44	6	5	13	10	.	6	2	2	.	8	.
Caltha palustris	5	.	5	3	14	.	30	19	28	33	23	17	.
Geum rivale	13	.	1	1	10	.	.	19	13	11	14	33	8
Salix purpurea	3	.	16	9	19	.	10	13	5	7	2	.	12
Galeopsis tetrahit	.	.	1	18	2	100	10	.	14	.	27	25	60
Listera ovata	23	100	.	15	.	10	10	9	.	7	.	33	20
Silene dioica	.	.	21	39	12	.	.	15	19	20	39	17	44
Melica nutans	10	22	.	10	.	40	.	19	.	13	9	58	44
Pulmonaria officinalis	10	33	14	10	18	.	50	33	7	20	.	.	.
Ranunculus ficaria	5	100	28	18	18	.	10	.	2	7	4	.	.
Petasites hybridus	15	22	3	5	10	.	.	39	14	31	.	50	.
Aconitum napellus s.l.	.	.	11	1	3	.	.	3	6	24	79	17	44
Poa nemoralis	3	.	2	1	3	10	.	29	12	.	71	.	56
Viburnum lantana	10	11	.	7	.	10	10	13	.	15	.	67	4
Myosotis scorpioides aggr.	5	.	11	7	9	.	30	3	33	31	16	.	.
Phyteuma spicatum	.	.	1	1	3	.	.	1	11	9	39	50	4
Alliaria petiolata	8	22	5	3	14	20	10	4	.	.	4	.	.
Dactylorhiza maculata	.	11	.	1	3	.	.	21	16	6	2	17	12
Galeopsis speciosa	3	11	1	2	7	.	.	20	9	11	.	.	16
Moehringia trinervia	3	.	1	9	9	10	.	5	4	.	2	.	20
Salix caprea	3	.	.	2	3	10	.	8	6	4	.	8	4
Carex remota	5	.	2	1	3	10	.	4	4	2	4	.	.
Aconitum lycoctonum s.l.	5	44	.	1	.	.	.	15	.	20	75	75	36
Lamium maculatum	.	11	37	48	46	40	.	.	21	26	5	.	.
Knautia dipsacifolia	.	.	1	1	10	.	.	.	16	65	50	42	36
Salix eleagnos	26	78	.	4	.	.	10	15	.	22	.	8	24
Eupatorium cannabinum	13	.	17	23	27	30	.	8	9	39	.	.	.
Ranunculus lanuginosus	3	78	1	2	15	.	.	28	14	19	.	.	.
Mycelis muralis	21	11	.	2	.	.	.	31	.	19	5	25	40
Circaea lutetiana	8	.	30	18	26	50	.	6	6	2	.	.	.
Solidago gigantea	3	78	1	3	5	.	50	1	1	.	.	.	.
Impatiens parviflora	15	.	25	14	22	30	.	8	3	.	4	.	.
Maianthemum bifolium	.	.	1	3	8	.	.	24	10	7	.	33	24
Fagus sylvatica	3	44	.	.	4	.	.	9	6	9	4	25	.
Myosoton aquaticum	3	.	1	3	14	.	30	1	.	6	.	.	12
Valeriana dioica	.	.	1	2	3	.	30	.	6	6	4	8	.
Galium odoratum	10	.	.	.	1	10	.	3	3	15	4	.	4
Equisetum palustre	5	.	3	1	2	.	.	3	9	6	.	.	4
Anthryscus sylvestris	.	.	2	4	8	.	.	5	2	2	4	.	4
Lysimachia vulgaris	3	.	1	13	4	.	.	1	3	.	2	.	4
Adoxa moschatellina	.	100	17	16	14	.	.	.	9	.	39	.	24
Phalaris arundinacea	8	.	37	67	23	.	.	3	3	.	38	.	.

Prunus avium	13	67	.	1	.	10	70	3	.	.	.	8	.
Leucojum vernum	13	100	1	3	8	.	30	.	1	.	.	.	.
Campanula trachelium	8	11	.	3	.	50	.	21	.	2	.	.	56
Hepatica nobilis	13	56	.	3	.	.	.	16	.	2	.	25	4
Epilobium montanum	.	.	.	1	.	.	.	15	25	6	18	17	20
Frangula alnus	13	56	.	2	.	.	.	5	.	6	7	.	8
Equisetum hyemale	13	.	9	3	4	.	50	8	1	.	.	.	.
Vicia sepium	.	.	.	1	.	30	.	5	.	9	2	8	32
Tussilago farfara	3	.	.	1	.	10	.	9	.	19	.	17	28
Cardamine amara	.	44	4	2	12	.	.	1	15	.	.	.	4
Euphorbia dulcis	10	.	3	.	7	.	.	18	2	.	23	17	.
Cirsium palustre	.	.	1	2	4	.	.	5	17	19	.	.	24
Milium effusum	3	.	.	1	2	.	.	3	6	.	23	.	24
Prenanthes purpurea	3	.	.	.	1	.	.	5	6	6	9	17	.
Alnus glutinosa	15	.	2	1	3	.	10	.	1	.	13	.	.
Lycopus europaeus	8	.	5	1	7	.	10	1	2	.	.	.	.
Rumex obtusifolius	.	.	1	1	1	.	.	1	6	4	.	.	4
Lonicera nigra	.	.	.	.	.	.	.	14	1	4	57	58	12
Ranunculus aconitifolius	.	.	1	.	6	.	.	.	7	26	68	25	.
Geranium sylvaticum	3	.	.	.	.	.	.	11	.	15	13	33	56
Cardamine bulbifera	13	89	.	1	3	.	.	5	1	.	.	.	.
Lysimachia nemorum	.	.	.	4	6	.	.	.	36	46	9	.	4
Carex digitata	31	22	.	1	.	.	.	11	.	2	.	33	.
Solidago virgaurea	.	.	.	.	2	10	.	25	22	.	.	17	24
Actaea spicata	.	22	.	2	.	.	.	11	.	.	2	33	20
Symphytum officinale	.	.	22	39	9	.	10	1	1	.	.	.	.
Poa trivialis	3	.	7	31	15	.	.	9	9	.	.	.	.
Cardamine trifolia	5	33	.	.	7	.	.	1	13	4	.	.	.
Calamagrostis arundinacea	3	.	.	.	1	.	.	8	2	.	45	.	4
Prunella vulgaris	.	.	1	1	11	.	.	.	21	24	4	.	.
Aconitum variegatum s.l.	3	11	.	1	.	.	.	14	.	4	.	.	24
Hieracium murorum	3	.	.	1	.	.	.	11	.	4	.	33	4
Carpinus betulus	15	33	1	2	2	.	.	.	1	.	.	.	.
Stellaria media	10	22	.	5	.	.	10	1	.	.	2	.	.
Rubus fruticosus aggr.	8	11	.	.	1	.	.	9	9	.	.	8	.
Agrostis stolonifera	.	.	3	1	16	.	.	4	14	.	7	.	.
Equisetum sylvaticum	.	.	.	1	3	.	.	1	9	6	21	.	.
Betula pendula	5	.	.	1	.	.	.	6	.	4	7	.	8
Galeopsis pubescens	3	.	.	1	2	.	.	9	7	4	.	.	.
Viola riviniana	3	11	.	3	.	.	.	3	.	2	4	.	.

suggested by the dominance of *Alnus incana* and by the occurrence of *Stachys sylvatica, Impatiens noli-tangere* and *Listera ovata*; also *Stellaria nemorum* ssp. *montana*, which in the colline-submontane belt of southern Europe replaces *Stellaria nemorum* ssp. *nemorum* (Dakskobler *et al.*, 1999), may be considered as a *Alnion incanae*-character entity. In general, the floristic features of these coenoses (frequency of species such as *Salvia glutinosa, Lamium galeobdolon, Fraxinus excelsior, Acer pseudoplatanus, Paris quadrifolia, Carex sylvatica* and *Polygonatum multiflorum*) actually correspond to those of the *Fagetalia* order, the species belonging to *Populetalia* (*Humulus lupulus, Populus nigra, Salix alba*) being less represented. The results of the cluster analysis (Fig. 1) and the analysis of Tab. 3 allow us to recognize different aspects. Subcluster 1a includes 27 relevés coming from colline areas (average altitude approx. 250 m a.s.l.) while those from submontane -(montane) sectors are included in subcluster 1b (average altitude approx. 750 m a.s.l.). The relevés of the first subcluster share the presence of more thermophilous species and/or of entities frequent on silty-clay soils such as *Aegopodium podagraria, Ligustrum vulgare, Deschampsia cespitosa, Cirsium oleraceum, Humulus lupulus, Equisetum arvense* and *Glechoma hederacea*; *Rubus caesius* is constantly present and locally abundant in this group. The second subcluster (rel. 28-39), which includes stands that may be considered as a transitional form towards the montane grey alder woods, is differentiated by a higher frequency of more microtherm species such as *Geranium robertianum, Helleborus viridis* aggr., *Petasites albus, Athyrium filix-femina* and, in the relevés from Lombardy and Piedmont (rel. 28-35), *Anemone ranunculoides, Fragaria vesca, Viola biflora* and *Galium odoratum,* associated with *Cyclamen purpurascens* and *Leucojum vernum*; the last four stands, riched in *Fraxinus ornus* and coming from northern Tuscany, are differentiated by *Cardamine heptaphylla* and *Geranium nodosum* as well as by entities that give evidence of a certain degree of anthropic disturbance (*Galium aparine, Stellaria media, Rubus hirtus*). The second subcluster includes relevés previously attributed by Mondino (2003) and

Tab. 3 - *Primulo vulgaris-Alnetum incanae* ass. nova

No. of order	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	32	33	34	35	36	37	38	39	
No. of relevés (dendrogram of Fig. 1)	1	29	2	30	4	3	31	32	5	28	26	27	36	6	7	34	11	12	38	119	8	35	10	37	33	9	62	89	93	99	94	95	96	97	98	115	118	116	117	
Altitude (m a.s.l.)	186	183	183	184	184	182	182	183	183	182	480	420	290	235	226	232	221	223	380	245	222	291	224	293	230	220	450	690	700	700	875	940	800	650	1000	620	610	620	690	
																																								Pr.
Differential species of *Primulo vulgaris-Alnetum incanae*																																								
Cornus sanguinea ssp. hungarica	+	1	1	.	2	2	1	2	+	1	1	1	1	+	1	1	1	1	3	2	1	1	1	+	1	1	1	+	.	.	.	.	.	.	.	r	1	.	2	30
Hedera helix	1	2	2	2	1	.	+	2	+	+	1	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	2	+	.	1	1	.	1	1	1	+	21
Vinca minor	2	2	3	1	3	.	+	1	+	1	2	1	.	+	.	.	.	.	.	.	.	.	1	+	.	.	+	.	3	2	.	.	1	3	2	.	.	.	.	20
Primula vulgaris	+	.	.	+	.	.	.	+	.	.	+	+	1	.	.	.	.	.	+	.	+	1	+	1	.	+	.	1	+	+	1	1	+	1	+	.	.	.	.	20
Alnion incanae																																								
Alnus incana	3	3	4	3	4	5	4	3	3	4	3	3	3	4	3	4	4	5	4	4	4	4	4	4	3	4	3	5	3	3	3	3	4	3	4	5	5	4	4	39
Stellaria nemorum ssp. montana	.	.	.	+	1	.	+	1	+	1	1	3	1	3	1	1	.	1	+	1	+	.	+	+	.	+	.	.	.	.	.	.	.	.	.	.	+	1	.	+	22
Impatiens noli-tangere	+	+	.	1	1	+	+	+	.	.	.	.	.	+	1	.	.	.	.	.	1	1	2	2	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	15
Stachys sylvatica	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	2	2	+	.	.	.	.	+	+	.	1	.	.	+	.	+	.	.	.	.	.	.	r	1	13
Listera ovata	.	+	.	.	.	+	+	+	.	.	.	.	.	.	.	+	.	.	+	.	.	.	+	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	9
Equisetum hyemale	.	.	+	+	.	.	.	.	.	+	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
Thalictrum aquilegiifolium	+	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	4
Viburnum opulus	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
Mattheuccia struthiopteris	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	3
Circaea lutetiana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	r	.	3
Circaea x intermedia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	3
Elymus caninus	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	3
Carex remota	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	2
Festuca gigantea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Carduus personata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Chrysosplenium alternifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1
Fagetalia																																								
Salvia glutinosa	.	+	+	1	.	1	+	+	1	.	+	.	1	1	1	+	1	+	.	.	1	1	1	1	1	1	.	.	1	.	.	.	2	.	2	1	1	1	.	26
Lamium galeobdolon s.l.	.	.	.	.	.	.	+	.	.	.	1	+	2	+	1	.	+	.	1	.	.	1	1	+	1	1	+	.	1	.	+	r	r	1	+	1	2	.	r	23
Fraxinus excelsior	.	.	.	.	.	.	+	.	.	.	2	2	1	+	+	1	+	+	2	.	+	+	+	1	2	+	1	3	.	.	.	.	.	.	.	.	.	.	.	18
Acer pseudoplatanus	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	+	.	.	+	.	.	+	+	+	+	+	.	2	3	3	.	.	.	2	.	1	.	.	.	14
Asarum europaeum s.l.	2	1	1	1	1	.	.	+	+	+	+	+	3	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1	14
Paris quadrifolia	.	+	.	.	.	+	+	.	1	.	.	.	.	+	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	+	r	.	+	r	.	.	.	.	11
Aruncus dioicus	.	.	.	.	.	.	+	+	.	.	+	.	.	.	.	.	.	+	+	+	+	+	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	10
Carex sylvatica	.	.	.	.	+	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	+	1	.	+	.	.	.	.	9
Polygonatum multiflorum	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	+	.	.	.	+	+	+	.	.	.	.	+	.	.	.	+	.	.	.	.	r	9
Anemone trifolia	.	+	.	.	.	.	.	.	+	.	.	.	1	.	.	.	.	.	+	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6
Lamium orvala	.	.	.	.	.	+	+	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6
Allium ursinum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	2	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	5
Tilia cordata	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	1	2	.	.	.	.	.	.	.	.	.	5
Mercurialis perennis	.	+	.	.	.	.	.	.	.	.	2	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	5
Prunus avium	.	.	.	.	+	.	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	5
Cardamine bulbifera	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	r	.	r	5
Euphorbia dulcis	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	r	.	.	.	.	.	.	.	.	.	.	4
Pulmonaria officinalis	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	1	.	.	.	.	.	.	.	4
Galanthus nivalis	+	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
Knautia drymeia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
Helleborus niger	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	+	.	.	.	.	.	3
Cardamine pentaphyllos	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
Tilia platyphyllos	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
Asperula taurina	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	2
Polystichum aculeatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Corydalis cava	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Daphne mezereum	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Fagus sylvatica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1
Cardamine enneaphyllos	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Cerastium sylvaticum	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Milium effusum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Prenanthes purpurea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1
Ranunculus lanuginosus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1
Scrophularia nodosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1
Trochiscantes nodiflora	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1
Polystichum setiferum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	1

Querco-Fagetea																																								
Brachypodium sylvaticum	+	+	+	2	+	+	+	+	+	+	1	1	+	+	.	1	1	+	2	2	1	1	+	1	1	.	1	1	1	.	.	.	.	.	.	.	+	+	.	29
Corylus avellana	1	1	.	1	.	.	+	1	.	+	.	+	+	1	.	.	+	+	+	+	+	.	+	+	.	.	.	4	2	2	3	2	2	3	2	1	.	1	2	27
Lonicera xylosteum	+	+	.	+	1	.	+	+	+	+	+	+	+	.	.	.	.	+	+	+	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	17
Acer campestre	.	+	.	.	+	.	.	.	1	1	1	+	.	.	.	+	.	.	+	.	+	+	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	12
Carex digitata	+	+	+	+	+	+	+	+	.	.	.	.	1	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	1	.	.	.	.	.	12
Dryopteris filix-mas	.	+	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	+	.	r	.	.	+	+	1	r	.	.	11
Ostrya carpinifolia	.	+	1	1	.	.	.	.	.	+	+	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	9
Fraxinus ornus	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	r	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	1	1	4	2	8
Mycelis muralis	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	+	+	8
Viola reichenbachiana	.	+	.	+	1	+	.	+	.	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8
Carpinus betulus	+	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	2	6
Euonymus europaeus	.	.	.	.	+	.	.	.	.	+	.	1	.	.	.	+	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6
Convallaria majalis	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	1	1	.	.	.	.	.	5
Hepatica nobilis	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	1	.	.	.	.	5
Viburnum lantana	.	.	.	.	.	.	.	.	+	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	4
Campanula trachelium	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	3
Epimedium alpinum	.	.	.	.	.	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Laburnum anagyroides	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	1
Poa nemoralis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1
Viola riviniana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1
Differential species of groups of relevés																																								
Aegopodium podagraria	2	2	2	2	1	4	3	2	3	4	1	1	2	2	2	1	.	.	2	1	1	2	4	2	4	1	1	+	1	.	.	.	.	+	.	+	+	.	.	30
Ligustrum vulgare	1	1	1	2	1	1	1	1	1	1	1	.	+	+	+	.	+	.	+	1	1	1	.	1	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	22
Deschampsia cespitosa	+	.	+	+	+	.	+	1	+	+	1	+	.	+	.	1	+	+	.	.	1	+	1	+	1	1	+	.	.	.	.	.	.	.	.	.	.	.	.	21
Cirsium oleraceum	.	.	.	+	+	.	+	+	+	.	.	.	.	.	+	.	.	+	+	.	+	+	.	+	+	+	2	.	.	.	.	.	.	.	.	.	.	.	.	14
Humulus lupulus	.	+	.	.	.	+	.	.	.	.	.	+	+	.	1	1	1	+	.	.	.	1	+	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	13
Equisetum arvense	.	.	.	.	.	+	+	.	.	.	+	+	+	+	1	+	+	.	+	.	.	.	.	.	+	.	.	.	r	.	.	.	.	.	.	.	.	.	.	12
Glechoma hederacea	1	1	2	2	+	1	.	.	.	1	.	+	.	.	.	.	.	.	+	1	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	11
Geranium robertianum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	2	.	+	.	.	.	.	.	.	+	+	+	+	+	+	+	1	+	+	+	15
Helleborus viridis aggr. (Order)	.	.	.	.	+	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	1	1	1	.	2	1	+	.	.	r	.	12
Petasites albus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	2	.	+	1	.	1	1	1	7
Athyrium filix-femina (Class)	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	+	+	.	.	.	+	6
Anemone ranunculoides (Order)	2	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	1	+	1	.	3	2	.	.	.	.	9
Fragaria vesca	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	.	.	+	+	.	.	.	r	.	7
Cyclamen purpurascens (Order)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	r	+	+	+	+	.	.	.	.	6
Leucojum vernum (Order)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1	+	2	1	.	.	.	.	5
Viola biflora	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	r	+	.	.	.	.	5
Galium odoratum (Order)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	r	r	r	.	.	.	.	.	.	4
Cardamine heptaphylla	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	4
Galium aparine	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.	1	1	r	4
Geranium nodosum (Order)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	+	+	+	4
Stellaria media	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	1	.	4
Rubus hirtus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	+	.	3	3
Other species																																								
Rubus caesius	1	1	2	2	1	2	2	3	2	2	4	2	2	2	4	4	3	3	2	4	2	2	4	2	1	1	2	3	1	2	+	1	1	+	1	.	.	1	.	36
Sambucus nigra	.	.	.	.	+	.	+	+	+	.	1	+	+	+	+	+	+	+	+	1	+	.	.	+	+	.	.	.	1	.	.	.	.	.	.	2	1	1	2	22
Picea abies	+	+	+	+	.	.	.	+	+	.	.	.	.	.	.	.	+	+	+	.	+	1	+	1	+	.	.	.	.	1	.	.	.	1	1	.	.	.	.	17
Galium mollugo s.l.	.	.	.	.	.	.	+	+	+	+	.	.	.	1	+	+	+	+	.	+	+	1	.	.	+	.	.	.	.	.	.	.	.	.	.	+	+	1	.	16
Crataegus monogyna	+	+	.	.	+	+	.	+	+	+	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	1	1	.	1	14
Oxalis acetosella	+	.	.	.	1	.	.	.	.	.	+	+	1	.	.	.	.	.	+	.	.	+	.	.	.	+	+	.	+	+	.	.	.	+	.	.	.	.	.	12
Salix alba	.	.	.	.	.	.	.	.	.	.	.	+	.	1	3	1	1	+	+	2	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	11
Robinia pseudacacia	1	+	+	+	.	.	.	.	1	1	.	.	r	1	.	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	11
Cardamine impatiens	.	.	.	+	.	.	.	.	.	.	+	.	+	+	.	.	.	.	+	+	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	r	11
Salix eleagnos	.	+	+	+	.	.	.	.	.	.	1	+	.	+	.	+	.	.	+	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	10
Urtica dioica	.	.	+	.	+	.	.	.	.	.	.	.	.	+	+	+	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	r	2	10
Chaerophyllum hirsutum	.	.	.	.	.	.	1	1	1	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	1	+	.	+	+	.	.	.	.	.	.	.	.	.	9
Clematis vitalba	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	1	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	1	2	.	9
Geum urbanum	.	.	.	+	.	.	+	1	.	+	.	.	.	1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	r	.	1	9
Carex alba	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	1	1	+	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8
Valeriana officinalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	+	+	.	+	.	.	.	.	.	.	.	+	1	.	+	.	.	.	.	8
Helianthus tuberosus	.	.	.	.	.	.	.	.	.	.	.	+	.	.	2	2	.	.	.	.	1	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	6
Impatiens parviflora	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	1	+	1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6
Petasites hybridus	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	+	2	.	.	.	.	.	.	.	.	.	1	.	.	6
Alnus glutinosa	.	+	.	.	.	.	.	.	+	.	.	.	.	1	.	+	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	6
Geum rivale	.	.	.	.	.	.	.	.	.	+	1	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	5
Eupatorium cannabinum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	+	1	.	5
Populus nigra	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.	1	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
Cornus mas	1	.	.	.	+	.	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
Frangula alnus	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	+	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	5
Angelica sylvestris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	r	.	5
Rosa canina aggr.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	r	+	5

Foggi *et al.* (2011) respectively to *Alnion incanae* and to *Alnetum incanae*. In our opinion, also the synthetic table of "*Alnetum glutinoso-incanae* Br.-Bl. 1915" by Montacchini *et al.* (1982) may be referred to *Primulo vulgaris-Alnetum* for the significant expression of entities such as *Ligustrum vulgare, Crataegus monogyna* and *Rubus caesius*.

The afore mentioned relevés by Dakskobler *et al.* (2004) from the upper course of the Soča River (western Slovenia) (synthetic table 2 in Tab. 2) may be considered as a particular subassociation (*tilietosum cordatae* subass. nova *holotypus*: rel. 15 in Tab. 2 of Dakskobler *et al.* 2004) of *Primulo-Alnetum* and correspond to a transitional form towards the *Tilio-Acerion* coenoses; *Tilia cordata, Ulmus glabra, Lunaria rediviva, Cardamine pentaphyllos, Arum maculatum* and *Corydalis cava* may be considered as differential species of this subassociation; it is noteworthy that Winteler (1927) and Schwabe (1985b) recognized, in different biogeographic contexts, ecologically similar communities that were described as *Alnetum incanae aceretosum*. In contrast, the floristic features of the coenoses described by Dakskobler (2007, 2010) as *Scopolio carniolicae-Alnetum incanae* and *Lamio orvalae-Alnetum incanae* seem to be closely related to those of *Tilio-Acerion* and in our opinion cannot justify their attribution to *Alnion incanae*.

Synecology and synchorology: the association occurs in the colline-submontane belt where it develops on generally finer-textured soils with respect to the corresponding montane communities of *Aceri-Alnetum*. Its distribution includes the southern Alps from Slovenia to Piedmont and the Tuscan-Emilian Appennines.

Aceri-Alnetum incanae (Tab. 4)

Aceri-Alnetum is the most widespread grey alder wood in the montane and high-montane areas of northern Italy, where it develops on coarse alluvial deposits (gravels and pebbles). As previously mentioned, these relevés differ from those of *Primulo-Alnetum* for the higher frequency of *Rubus idaeus, Oxalis acetosella, Picea abies, Chaerophyllum hirsutum, Geranium robertianum* and *Fragaria vesca* as well as for the lower expression of thermophilous and southern European entities. The significant frequency of species such as *Stellaria nemorum* s.l., *Elymus caninus, Stachys sylvatica, Impatiens nolitangere, Lamium galeobdolon* s.l.*, Fraxinus excelsior, Acer pseudoplatanus, Salvia glutinosa*, etc. clearly supports the attribution of these stands to *Alnion incanae* and *Fagetalia*. Once again, the results of the cluster analysis (Fig. 1) and the analysis of Tab. 4 allow us to recognize different aspects. Relevés 1–49 represent the more common feature of the association, more eutrophic and that occurs on soils with higher clay content; *Deschampsia cespitosa, Aegopodium podagraria, Geum urbanum,Glechoma hederacea, Sambucus nigra, Prunus padus, Salix myrsinifolia* and megaforbs such as *Petasites hybridus* and *Aconitum lycoctonum* s.l. are more frequent in these stands; within this context, relevés 1-13 only represent a floristically-poor form; this group includes stands previously attributed by Pieczerak (1988) and Gafta (1992) to *Agropyro-Alnetum incanae*. Stands 50-51 were instead made on less developed, coarse-skeletal soils, as shown by the co-occurrence of *Petasites paradoxus, Calamagrostis varia* and *Tussilago farfara*. Relevés 52-71 are differentiated by the higher frequency and abundance of *Petasites albus* and *Senecio nemorensis* aggr., which indicate a greater degree of soil moisture; this group includes stands from northern Tuscany that were attributed by Arrigoni & Papini (2003) to *Petasiti albi-Alnetum incanae*. Acidophilous species (*Luzula nivea, Phegopteris connectilis, Avenella flexuosa, Hieracium murorum*), associated with the microtherm *Viola biflora*, are more frequent in the remaining stands (72-80); on the whole, these last relevés seem to reflect the catenal contacts with the montane and high-montane spruce woods. *Picea abies* is actually almost constantly present in the tree layer of these grey alder woods; in this regard, we may affirm that the expansion of spruce on coarse substrata of continental areas can increase by means of fluvial regime controls resulting in groundwater lowering; on sandy soils, both in the endalpic and esalpic areas, the spruce is replaced by *Pinus sylvestris* that may however be considered even as a natural component of the *Alnus incana* coenoses (Moor, 1958; Montacchini *et al.*, 1982).

The Italian distribution of *Aceri-Alnetum* at present includes Friuli, Veneto, Trentino-Alto Adige and Lombardy and reaches its southern limit in the Tuscan-Emilian Appennines; further investigations in the western sector of northern Italy might extend its areal even to Piedmont.

Syntaxonomic scheme

Querco-Fagetea Br.-Bl. et Vlieger in Vlieger 1937
Fagetalia sylvaticae Pawłowski in Pawłowski, Sokołowski et Wallisch 1928
Alnion incanae Pawłowski in Pawłowski, Sokołowski et Wallisch 1928
Primulo vulgaris-Alnetum incanae ass. nova
Primulo vulgaris-Alnetum incanae tilietosum cordatae Dakskobler ex Sburlino, Poldini, Andreis,

Giovagnoli et Tasinazzo subass. nova (corresponding name: *Alnetum incanae Anemone trifolia* geogr. var. *Galanthus nivalis* form Dakskobler, Šilc et Čušin 2004)

Aceri-Alnetum incanae Beger 1922

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Appendix

LIST OF THE SYNTAXA NOT QUOTED IN THE SYNTAXONOMIC SCHEME

Agropyro-Alnetum incanae Br.-Bl. 1975; *Agropyro-Alnetum incanae cornetosum sanguineae* Br.-Bl. 1975; *Agropyro-Alnetum incanae violetosum biflorae* Br.-Bl. 1975; *Alnetea glutinosae* Br.-Bl. et Tüxen ex Westhoff, Dijk et Passchier 1946; *Alnetum incanae* Lüdi 1921; *Alnetum incanae aceretosum* Winteler 1927; *Alnion glutinosae* Malcuit 1929;

Alno-Padion Knapp 1942; *Alno-Ulmion* Br.-Bl. et Tüxen ex Tchou 1948 em. Müller et Görs 1958; *Calamagrostio-Alnetum incanae* Moor 1958; *Equiseto-Alnetum incanae* Moor 1958; *Fraxinetalia* Scamoni et Passarge 1959; *Lamio orvalae-Alnetum incanae* Dakskobler 2010; *Petasiti albi-Alnetum incanae* Passarge 1981; *Populetalia albae* Br.-Bl. ex Tchou 1948; *Rhamno-Prunetea* Rivas Goday et Borja ex Tüxen 1962; *Salicion incanae* Aichinger 1933; *Salici purpureae-Populetea nigrae* (Rivas-Martinez et Cantó ex Rivas-Martinez, Báscones, T.E. Diaz, Fernández-González et Loidi 1991) Rivas-Martinez, T.E. Diaz, Fernández-González, Izco, Lousã et Penas 2002; *Scopolio carniolicae-Alnetum incanae* Dakskobler 2007 nom. prov.; *Tilio-Acerion* Klika 1955

Accidental species

Tab. 3

Abies alba 1, 2 (r), 35 (1); *Acer obtusatum* 39; *Achillea millefolium* 33 (r); *Aconitum lycoctonum* s.l. 22, 26; *Aconitum variegatum* ssp. *paniculatum* 24; *Ajuga reptans* 28; *Alliaria petiolata* 9, 19, 37 (r); *Allium carinatum* 2; *Amorpha fruticosa* 15, 16, 18, 23; *Aquilegia vulgaris* 38 (r); *Arctium lappa* 37, 38 (1); *Avenella flexuosa* 32, 34 (r); *Berberis vulgaris* 2; *Betula pendula* 11, 31 (1); *Brachypodium caespitosum* 28; *Bromus ramosus* 38; *Buxus sempervirens* 28; *Calamagrostis arundinacea* 36; *Caltha palustris* 15, 26; *Calystegia sepium* 20; *Cardamine trifolia* 1, 7; *Cardaminopsis halleri* 33, 35; *Carex elata* 5, 7, 26; *Carex pendula* 37; *Castanea sativa* 39 (2); *Chaerophyllum temulum* 36, 39 (r); *Colchicum autumnale* 28 (2), 29; *Crepis paludosa* 7; *Cruciata glabra* 4, 13 (1), 19; *Dactylis glomerata* 36; *Dactylorhiza majalis* 2; *Equisetum palustre* 16, 26; *Equisetum variegatum* 4 (1), 5 (1), 8 (1); *Erigeron annuus* 19; *Euonymus latifolius* 2 (1); *Filipendula ulmaria* 16, 22, 26, 28; *Galeopsis pubescens* 14; *Galeopsis speciosa* 27; *Galium aristatum* 29 (r); *Gentiana asclepiadea* 29; *Geranium sylvaticum* 30; *Helleborus foetidus* 39 (1); *Heracleum sphondylium* 11, 25; *Hieracium murorum* 38 (r); *Hypericum androsaemum* 39; *Hypericum perforatum* 38 (r); *Impatiens glandulifera* 14, 19; *Knautia arvensis* 30; *Laserpitium prutenicum* 19; *Lonicera caprifolium* 2, 22 (1), 24, 25; *Lycopus europaeus* 2, 3, 9; *Lysimachia vulgaris* 20; *Medicago lupulina* 38 (r); *Melica nutans* 1, 2, 13, 24; *Melica uniflora* 36 (3), 37 (2), 38 (4), 39 (1); *Melittis melissophyllum* 11, 12; *Mentha aquatica* 37; *Moehringia trinervia* 14; *Myosotis scorpioides* 16, 26; *Myosotis sylvatica* 9; *Myosoton aquaticum* 27; *Myrrhis odorata* 28; *Ornithogalum umbellatum* 28; *Oxalis stricta* 16; *Parietaria officinalis* 11, 12, 15, 19; *Phalaris arundinacea* 15, 16, 27; *Phegopteris connectilis* 34 (r), 35; *Philadelphus coronarius* 11; *Pinus sylvestris* 4, 19 (r); *Plantago major* 33 (r); *Platanus hybrida* 21; *Poa trivialis* 20 (1); *Polygonatum odoratum* 7; *Polygonatum verticillatum* 7; *Populus alba* 9, 12, 28; *Prunus spinosa* 37 (1); *Pulmonaria apennina* 37; *Ranunculus acris* 15, 30 (r); *Ranunculus ficaria* 2, 25; *Ranunculus repens* 20; *Ribes uva-crispa* 33 (1); *Rubus idaeus* 39 (r); *Rumex alpestris* 30; *Rumex conglomeratus* 30; *Salix caprea* 27 (1); *Salix daphnoides* 13, 18, 21; *Salix purpurea* 27; *Saponaria officinalis* 37 (1); *Saxifraga rotundifolia* 28; *Scirpus sylvaticus* 16, 23; *Senecio nemorensis* aggr. 14; *Silene alba* 37 (r); *Solanum dulcamara* 19, 38 (1); *Solidago gigantea* 27 (1); *Sorbus aucuparia* 29 (1); *Stachys officinalis* 33 (r); *Stachys palustris* 16, 18; *Symphytum tuberosum* 13, 25 (1), 28 (2); *Tamus communis* 2, 29 (r), 33 (r); *Taxus baccata* 34 (1); *Trifolium pratense* 38 (r); *Tussilago farfara* 12 (1); *Valeriana montana* 34; *Veronica urticifolia* 28; *Vincetoxicum hirundinaria* 11, 12, 13 (1).

Tab. 4

Achillea millefolium 33, 71; *Achillea ptarmica* 32, 44; *Achnatherum calamagrostis* 50; *Aconitum napellus* s.l. 68, 75 (r); *Adenostyles glabra* 41 (1), 42 (1), 65; *Agrostis stolonifera* 12, 13, 61; *Agrostis tenuis* 32, 41, 43 (1); *Alchemilla fissa* 15, 67 (r), 70, 71, 74, 77; *Alliaria petiolata* 2, 19, 56; *Alnus viridis* 70 (1), 78 (1); *Anthryscus sylvestris* 29, 30 (1), 38, 39; *Aquilegia atrata* 33, 42, 61, 62; *Aquilegia vulgaris* 55; *Arabis alpina* 52, 53, 61; *Arctium lappa* 54 (r); *Arctium minus* 52, 53; *Astrantia major* 27, 67 (r), 71, 73 (r), 79 (r); *Astrantia minor* 74 (r), 75, 80; *Athyrium distentifolium* 78 (1); *Berberis vulgaris* 18, 27, 34 (1), 39, 51, 72; *Betula pendula* 15 (1), 22, 66 (1), 72 (1), 73 (2); *Botrychium virginianum* 14; *Bromus inermis* 25; *Bromus ramosus* 60; *Calamagrostis arundinacea* 31, 32 (1), 52 (1), 53 (1); *Calystegia sepium* 2, 13; *Campanula latifolia* 20 (1); *Cardamine amara* 45; *Cardamine chelidonia* 59; *Cardamine heptaphylla* 68; *Cardamine pratensis* 55 (r), 56 (r), 57 (r); *Cardamine trifolia* 31; *Cardaminopsis halleri* 73, 74; *Carduus carduelis* 43; *Carduus nutans* 71; *Carex alba* 14, 16, 17, 18 (2), 27, 34 (1), 38; *Carex flacca* 49; *Castanea sativa* 23; *Centaurea nigrescens* 7 (1), 8 (1), 25, 32, 49, 50; *Cephalanthera damasonium* 17; *Chelidonium majus* 5; *Cirsium heterophyllum* 22 (1); *Cirsium montanum* 67 (2), 68 (1), 71, 75 (r), 78 (3), 79, 80 (1); *Cirsium palustre* 7, 12, 41, 50; *Clinopodium vulgare* 7, 52, 53; *Colchicum autumnale* 33; *Cornus sanguinea* ssp. *hungarica* 1, 2; *Crataegus monogyna* 14, 22 (1); *Cruciata glabra* 7, 9, 14, 25, 31, 32; *Cruciata laevipes* 33, 44; *Cystopteris fragilis* 66 (1), 71, 76 (r); *Cystopteris montana* 77; *Epilobium angustifolium* 9, 42, 44, 60, 76, 77 (2); *Epilobium collinum* 52, 53; *Epilobium hirsutum* 13, 54; *Equisetum palustre* 47 (1), 59; *Equisetum sylvaticum* 44 (1); *Euonymus latifolius* 34, 61, 62; *Eupatorium cannabinum* 11, 12, 13, 35, 50 (1), 54; *Euphorbia carniolica* 9; *Festuca arundinacea* 8, 12; *Festuca heterophylla* 48, 60; *Festuca pratensis* ssp. *apennina* 54; *Fragaria moschata* 7 (1), 38 (1); *Frangula alnus* 5, 6, 7 (1), 72; *Galeopsis bifida* 4; *Galeopsis pubescens* 15, 27, 28, 32, 75 (r), 76, 79; *Galium aparine* 39, 40, 56, 72 (1); *Galium elongatum* 57; *Galium laevigatum* 47; *Gentiana asclepiadea* 71 (r); *Gymnocarpium robertianum* 26, 44; *Hedera helix* 28; *Impatiens parviflora* 6 (2), 19, 20, 40, 60, 72; *Juncus effusus* 12, 61; *Knautia arvensis* 15 (1), 68, 71; *Knautia longifolia* 49; *Laburnum alpinum* 56 (1), 57 (r); *Larix decidua* 42, 50, 66 (1), 68 (1),

73 (1), 78 (1), 79; *Lathyrus laevigatus* 33; *Lathyrus pratensis* 41, 42, 49; *Leontodon hispidus* 51; *Lilium bulbiferum* 33; *Lilium martagon* 15 (r), 68 (r); *Lunaria annua* 36 (1); *Luzula luzuloides* 31, 32, 64; *Luzula sieberi* 49; *Lycopus europaeus* 13 (1); *Lysimachia vulgaris* 72; *Melampyrum sylvaticum* 18, 48 (1); *Mentha longifolia* 2, 33, 41, 49; *Moehringia muscosa* 65; *Moehringia trinervia* 5, 22, 39, 60; *Molinia arundinacea* 41, 42, 71; *Myosotis scorpioides* 39, 59; *Myosoton aquaticum* 44; *Nasturtium officinale* 58 (2); *Peucedanum ostruthium* 25, 69, 75, 78; *Phalaris arundinacea* 1, 2; *Phleum pratense* 25; *Phragmites australis* 6, 13 (2); *Phyteuma ovatum* ssp. *ovatum* 9, 42; *Phyteuma ovatum* ssp. *pseudospicatum* 59; *Pimpinella major* 34, 49; *Pinus sylvestris* 50 (1); *Plantago major* 51, 76 (r), 78 (r); *Poa palustris* 6, 41, 42, 70, 77; *Poa pratensis* 43, 74, 76, 77, 79, 80; *Poa supina* 51; *Poa trivialis* 6, 12, 48, 56 (r), 60, 61, 77; *Polemonium caeruleum* 39; *Polypodium interjectum* 56, 60 (r); *Polypodium vulgare* 15 (r), 66 (r), 69, 74 (r), 75 (1), 76, 78 (1); *Primula elatior* 15, 67 (r), 68, 74 (r), 80; *Primula veris* 18, 48; *Primula vulgaris* 7, 68 (r), 71; *Prunella vulgaris* 49; *Pteridium aquilinum* 71 (1); *Pyrola chlorantha* 48, 49 (1); *Ranunculus acris* 67 (r); *Ranunculus montanus* 66, 77 (r); *Ranunculus nemorosus* 51, 74, 76; *Ranunculus platanifolius* 43, 80; *Reynoutria japonica* 36 (1); *Rhamnus cathartica* 14; *Ribes nigrum* 9, 22; *Ribes rubrum* 54; *Ribes uva-crispa* 39; *Robinia pseudacacia* 19 (1), 23; *Rosa canina* aggr. 48, 60, 67, 68 (1); *Rubus canescens* 62 (1); *Rubus hirtus* 7 (1), 8 (1), 19 (2), 31 (1), 32 (3), 35 (1), 61 (1); *Rubus saxatilis* 11, 14, 27, 37, 38 (1), 65; *Rumex acetosa* 24; *Rumex alpestris* 33, 43, 44; *Rumex conglomeratus* 15, 73, 74; *Rumex obtusifolius* 30; *Salix alba* 13, 54 (2); *Salix caprea* 2, 4, 11, 12, 49, 59 (2); *Salix daphnoides* 11 (1), 12 (1), 13 (1), 37 (2), 40; *Salix pentandra* 37, 48 (2), 49 (2); *Sambucus racemosa* 44; *Saponaria officinalis* 54; *Saxifraga crustata* 68, 76 (r); *Saxifraga cuneifolia* 61 (1), 68 (r), 69, 71, 73 (r), 74, 75 (1); *Scabiosa columbaria* 48, 49; *Scirpus sylvaticus* 11 (3), 12 (3), 13 (2), 22; *Selinum carvifolia* 33, 36; *Senecio alpinus* 3, 9; *Sesleria albicans* 48; *Silene alba* 2; *Silene vulgaris* 33 (1), 49 ; *Solidago gigantea* 29; *Stachys alpina* 18, 37; *Stachys palustris* 29; *Stellaria media* 14; *Streptopus amplexifolius* 31 (1), 44, 58, 70, 75 (r), 80 (1); *Symphytum officinale* 40; *Symphytum tuberosum* 61, 62 (1); *Tamus communis* 76 (r); *Taraxacum officinale* 25, 48, 49, 60; *Taxus baccata* 75 (1); *Thalictrum lucidum* 9; *Trifolium pratense* 51; *Trollius europaeus* 9, 15, 33, 79, 80; *Vaccinium myrtillus* 75, 80 (2); *Valeriana collina* 38, 40; *Valeriana montana* 42, 66; *Valeriana tripteris* 38, 62, 65; *Veronica beccabunga* 58 (1), 60 (r); *Veronica chamaedrys* 43, 45; *Veronica montana* 59; *Vicia cracca* 55 (r), 56 (r); *Vicia dumetorum* 18; *Vicia sepium* 8, 42, 44, 45; *Vincetoxicum hirundinaria* 68, 76.

Locations and sources of the relevés

Tab. 3

Rel. 1-10, 14: Valbrenta near Cismon (Vicenza), L. Giovagnoli; 11-12: Val Posina near Castana (Arsiero, Vicenza), L. Giovagnoli; 13, 15-18, 21-26: Val del Piave near Cellarda (Feltre, Belluno), L. Giovagnoli; 19: Val Cordevole near La Muda (La Valle Agordina, Belluno), L. Poldini; 20: Lippert *et al*. (Tab. 3 rel. 39); 27: Val Bût north of Arta Terme (Udine), L. Poldini and G. Sburlino; 28: Mondino (2003), single relevé in the text; 29: Vertova (Bergamo), C. Andreis; 30: Moio de Calvi (Bergamo), C. Andreis and A. Lazzarini; 31: Laino (Como), C. Andreis and A. Lazzarini; 32: Val Rezzo (Como), C. Andreis and A. Lazzarini; 33: Corrido (Como), C. Andreis and A. Lazzarini; 34: Roncobello (Bergamo), C. Andreis and A. Lazzarini; 35: Valbondione (Bergamo), C. Andreis and A. Lazzarini; 36, 37, 38, 39: Foggi et al. (2011), Tab. 6 rel. 1, 5, 3, 4.

Tab. 4

Rel. 1: Val di Fiemme near Masi di Cavalese (Cavalese, Trento), L. Giovagnoli; 2: Gafta (1992), Tab. 10 rel. 26; 3: near Caminata (Campo Tures, Bolzano), L. Giovagnoli and S. Tasinazzo; 4: north of Comeglians, (Udine), G. Sburlino; 5-6: near Villa Ottone/Uttenheim (Gais, Bolzano), L. Giovagnoli and S. Tasinazzo; 6: near Villa Ottone/ Uttenheim (Gais, Bolzano), L. Poldini and G. Sburlino; 7, 8: Val Bût near Cleulis (Paluzza, Udine), L. Poldini; 9: Val Cereda (Trento), L. Giovagnoli and S. Tasinazzo;; 10: Camporosso (Tarvisio, Udine), L. Poldini; 11-13: Timau (Paluzza, Udine), L. Poldini; 14: Valle di S. Lucano (Taibon Agordino, Belluno), L. Giovagnoli and S. Tasinazzo; 15: Val Masino (Sondrio), C. Andreis and A. Lazzarini; 16-17: Piani di Luzza (Forni Avoltri, Udine), L. Poldini and G. Sburlino; 18: Val di Fassa near Forno di Moena (Trento), L. Poldini; 19: Val Bût near Cleulis (Paluzza, Udine), L. Poldini; 20: Val Gares (Canale d'Agordo, Belluno), G. Fruscalzo, G. Sburlino and K. Zanatta; 21: Valle di San Lucano (Taibon Agordino, Belluno), G. Fruscalzo, G. Sburlino and K. Zanatta; 22: near Bagni di Salomone (Rasun Anterselva, Bolzano), L. Giovagnoli and S. Tasinazzo; 23, 24, 25: Pieczerak (1988), Tab 2 rel. 15, 17, 12; 26: Val Garès near Campion (Canale d'Agordo, Belluno), L. Poldini; 27: Val Orsolina (San Vito di Cadore, Belluno), L. Poldini; 28: Val Malene (Pieve Tesino, Trento), L. Poldini; 29-30: Sappada (Belluno), L. Poldini and G. Sburlino; 31, 32: Val Malene (Pieve Tesino, Trento), L. Poldini; 33: near Chianeit (Forni di Sopra, Udine), L. Poldini; 34: Ugovizza (Malborghetto-Valbruna, Udine), L. Poldini; 35: Val Degano below Mione (Ovaro, Udine), L. Poldini; 36: near Forni Avoltri (Udine), L. Poldini; 37: S. Martino in Badia (Bolzano), Giovagnoli and S. Tasinazzo; 38: Val Badia (Bolzano), L. Poldini and G. Sburlino; 39: Villabassa (Bolzano), L. Giovagnoli and S. Tasinazzo; 40: Monguelfo (Bolzano), L. Poldini and G. Sburlino; 41: Comelico: Val Visdende (Belluno), L. Poldini and G. Sburlino; 42:, Piova stream (Laggio di Cadore, Belluno), L. Poldini; 43, 45, 46: Comelico: Val Visdende (Belluno), L. Poldini and G. Sburlino; 44: Val Gares (Canale d'Agordo, Belluno), L. Poldini; 47: Piani di Luzza (Forni Avoltri, Udine), L. Poldini and G. Sburlino; 48-49: Val Badia (Corvara, Bolzano), L. Poldini; 50: Miozza (Ovaro, Udine),

L. Poldini; 51: Val Cimoliana (Pordenone), L. Poldini; 52-53: small lakes near Timau (Paluzza, Udine), L. Poldini; 54, 55, 56, 57, 58, 59, 60: Arrigoni, Papini (2003), Tab. 3 rel. 48, 50, 71, 70, 53, 75, 72; 61-62: Val Bartolo (Tarvisio, Udine), L. Poldini; 63: Arvenis stream (Ovaro, Udine), L. Poldini; 64-65: near Luincis (Ovaro, Udine), L. Poldini; 66: Paspardo (Brescia), C. Andreis and A. Lazzarini; 67, 68: Breno (Brescia), C. Andreis and A. Lazzarini; 69: Berbenno (Sondrio), C. Andreis and A. Lazzarini; 70: Fusine (Sondrio), C. Andreis and A. Lazzarini; 71: Borno (Brescia), C. Andreis and A. Lazzarini; 72: Val Aurina near Villa Ottone/Uttenheim (Gais, Bolzano), L. Poldini and G. Sburlino; 73, 74, 78: Teglio (Sondrio), C. Andreis and A. Lazzarini; 75: Gerola Alta (Sondrio), C. Andreis and A. Lazzarini; 76: Val Masino (Sondrio), C. Andreis and A. Lazzarini; 77: Ponte Valtellina (Sondrio), C. Andreis and A. Lazzarini; 79: Poschiavo (CH), C. Andreis and A. Lazzarini; 80: Introbio (Lecco), C. Andreis and A. Lazzarini.

Tab. 4 - *Aceri-Alnetum incanae*

No. of order	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	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	
No. of relevés (dendrogram of Fig. 1)	13	81	18	78	17	57	51	66	15	76	50	53	52	14	105	46	63	56	61	79	80	19	91	92	90	40	41	42	45	47	43	44	21	68	70	75	16	59	20	60	22	72	23	39	24	25	77	54	55	67	71	48	64	86	82	85	83	84	87	88	49	69	65	73	74	100	113	114	109	110	112	58	101	104	102	106	108	103	107	111	
Altitude (m a.s.l.)	870	872	850	550	820	810	815	820	1220	1700	820	820	815	740	943	1000	1000	1300	700	910	830	1090	860	875	865	1020	940	970	1160	1160	1000	1270	1050	770	640	800	1180	1200	1150	1160	960	1400	1180	1200	1200	1200	980	1500	1560	740	1160	960	960	810	1100	1050	1050	1280	1317	1100	880	880	1080	900	1000	954	925	1550	1175	1158	1217	830	1000	795	1100	1000	1150	1340	1000	1440	
																																																																																		Pr.
Differential species against *Primulo vulgaris-Alnetum incanae*																																																																																			
Picea abies	.	.	.	.	1	1	+	.	1	1	.	.	.	+	+	1	1	2	+	1	+	1	+	.	.	1	2	1	1	+	2	1	.	2	2	1	2	1	+	1	2	3	1	1	2	3	1	1	+	1	1	.	+	.	.	.	.	.	.	.	1	1	1	1	1	.	1	.	2	1	3	.	.	+	3	2	2	+	+	.	56
Rubus idaeus	.	+	+	.	1	.	1	1	2	.	.	.	.	+	3	+	+	2	+	.	.	3	3	1	+	1	1	.	+	+	+	+	.	.	.	.	1	2	2	1	3	2	2	3	1	2	3	3	.	.	.	2	2	.	3	+	.	r	+	1	2	2	1	1	2	.	.	+	1	+	1	.	.	.	.	+	1	1	1	+	55
Chaerophyllum hirsutum	+	+	.	.	.	.	.	.	1	2	+	+	1	.	1	+	+	1	.	1	+	1	.	.	2	.	+	.	1	+	2	2	.	.	1	2	1	1	+	+	.	+	1	2	3	3	2	.	3	.	.	.	.	.	.	.	.	1	r	+	.	.	.	.	.	.	1	.	1	+	+	.	+	1	+	+	1	1	+	+	48
Geranium robertianum	+	+	.	+	.	.	.	+	.	.	+	+	.	+	.	+	+	.	+	.	.	.	+	.	+	+	+	+	+	+	+	+	+	.	+	.	.	1	.	+	+	+	.	.	.	+	.	.	+	+	.	2	2	.	.	r	.	.	r	r	1	1	1	+	.	3	+	.	+	.	+	.	+	+	r	1	1	.	1	.	47
Fragaria vesca	+	+	.	.	.	.	.	1	+	.	.	.	.	1	1	.	.	+	+	.	.	+	.	+	.	+	+	+	1	+	+	+	+	.	+	+	+	.	+	.	+	+	.	+	+	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	+	+	+	.	+	+	+	+	+	+	1	.	.	+	+	+	+	+	+	.	44
Oxalis acetosella	.	.	+	+	.	.	+	.	.	.	.	.	.	+	1	+	+	+	.	.	.	1	.	+	.	1	+	1	+	.	3	1	.	.	.	.	+	+	.	.	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	+	1	3	+	1	+	1	+	+	2	+	1	3	2	1	1	1	1	41
Alnion incanae																																																																																		
Alnus incana	5	5	5	4	5	4	3	3	4	3	5	5	4	3	3	3	3	4	3	4	3	4	5	4	4	4	4	3	3	3	3	3	3	4	4	4	3	3	4	3	4	3	4	4	3	4	4	4	3	5	4	5	5	5	5	3	3	3	4	3	4	4	5	3	4	4	5	4	3	3	3	4	4	5	3	4	4	3	5	3	80
Impatiens noli-tangere	+	+	+	1	.	1	.	.	+	1	1	1	2	.	+	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	+	.	.	+	+	+	.	.	.	.	.	+	1	.	.	+	+	2	+	.	.	.	+	1	2	2	1	.	.	.	.	1	2	2	1	3	.	+	1	.	37
Stachys sylvatica	2	2	.	.	.	.	+	1	1	1	3	3	2	.	.	+	+	.	1	1	1	.	.	+	1	1	+	+	+	+	.	1	1	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	+	+	+	.	.	.	.	+	+	+	+	.	1	.	.	1	.	.	1	.	.	.	.	.	r	.	.	.	.	36
Elymus caninus	+	+	+	.	.	.	.	.	+	.	.	.	.	.	+	.	.	+	.	.	.	1	.	1	.	+	+	.	1	1	.	+	1	1	.	.	+	1	+	+	+	1	1	1	.	+	.	1	1	.	.	.	.	+	.	r	.	.	.	+	1	1	.	.	.	+	+	+	.	.	.	.	.	.	.	+	.	+	.	.	36
Stellaria nemorum s.l.		+	.	1	.	.	.	.	1	2	2	2	.		.	1	1	+	.	+	1	2	+	1	1	.	.	1	+	+	+	+	.	.	.	.	.	.	1	+	2	.	3	2	2	2	.	.	.	.	.		.	+	.	+	r	+	+	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	35
Carduus personata	1	1	.	.	.	+	.	.	1	+	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	+	+	+	+	.	.	.	.	.	.	+	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	18
Thalictrum aquilegiifolium	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	.	.	.	+	.	.	.	+	.	+	+	.	+	+	.	.	.	+	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	r	.	.	r	.	.	.	.	.	.	.	+	+	.	.	.	.	+	.	.	.	.	.	.	.	17
Festuca gigantea	.	.	+	+	.	.	+	.	.	1	1	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	11
Chrysosplenium alternifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8
Mattheuccia struthiopteris	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	2	+	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	7
Listera ovata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	+	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7
Equisetum hyemale	.	.	.	.	2	4	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6
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Fagetalia																																																																																		
Lamium galeobdolon s.l.	1	1	3	1	+	+	1	.	+	.	.	.	.	2	2	1	1	1	2	1	1	1	+	+	+	.	1	+	+	+	1	+	1	1	1	1	.	+	.	.	.	+	1	+	+	.	+	.	.	.	.	1	+	.	1	1	+	.	.	+	1	1	3	1	1	2	1	1	.	.	1	.	.	.	.	1	r	.	.	+	54
Fraxinus excelsior		1	1	1	+	+	1	1	1	.	.	.	+		2	1	1	1	2	2	3	.	.	.	.	1	2	.	+	.	.	.	3	2	+	2	1	+	.	1	.	.	.	1	.	1	1	+	.	.	.		1	.	1	r	.	.	.	r	.	.	.	+	.	.	2	.	.	.	.	.	.	.	.	1	.	.	.	.	37
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Salvia glutinosa	.	.	.	.	.	.	1	1	+	.	+	+	.	.	.	+	+	+	.	.	.	.	.	.	+	1	1	+	+	.	.	.	.	2	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	+	r	.	.	r	.	.	.	+	+	.	1	+	.	.	.	.	1	2	.	.	.	r	+	.	.	.	.	28
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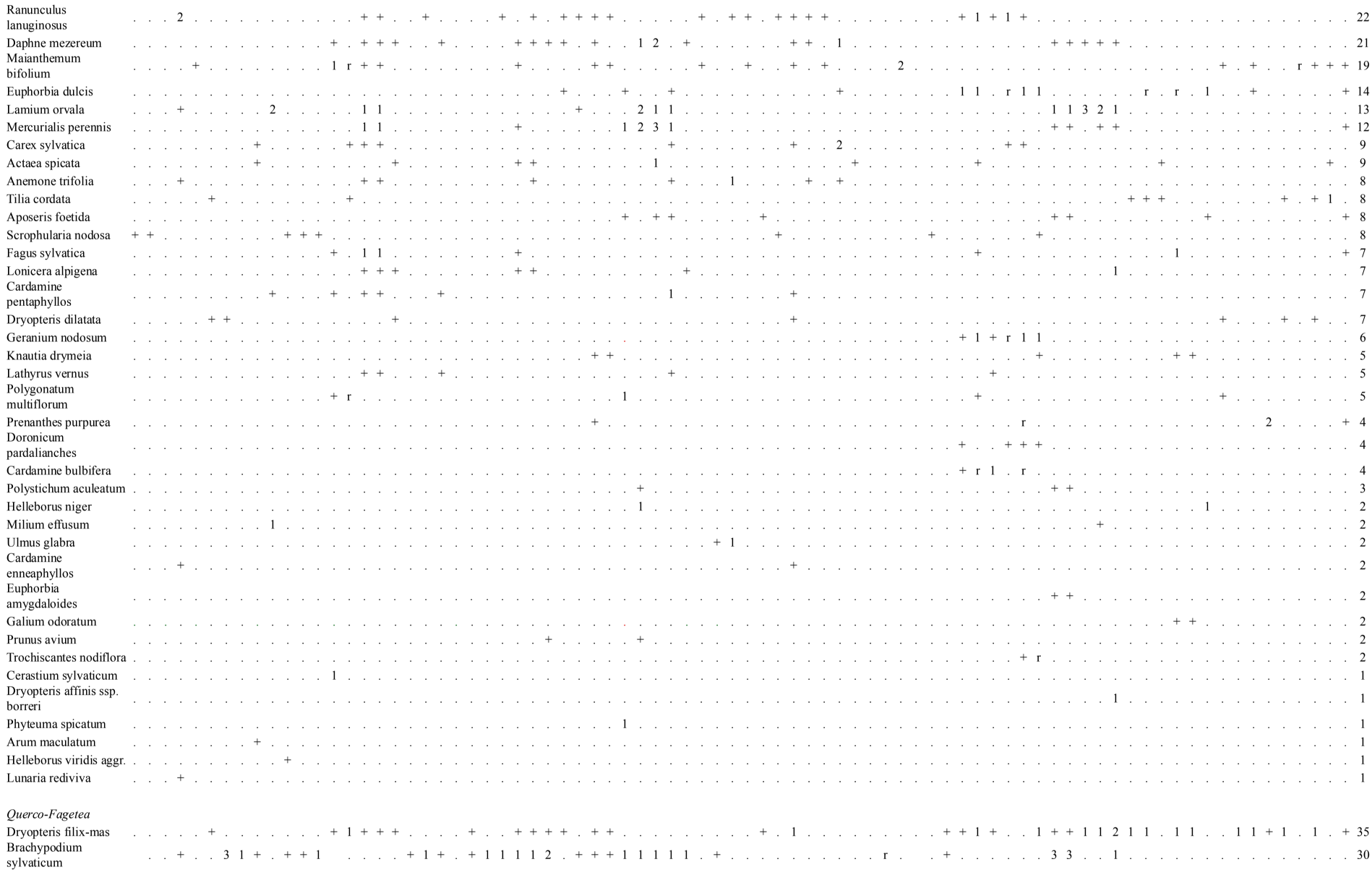
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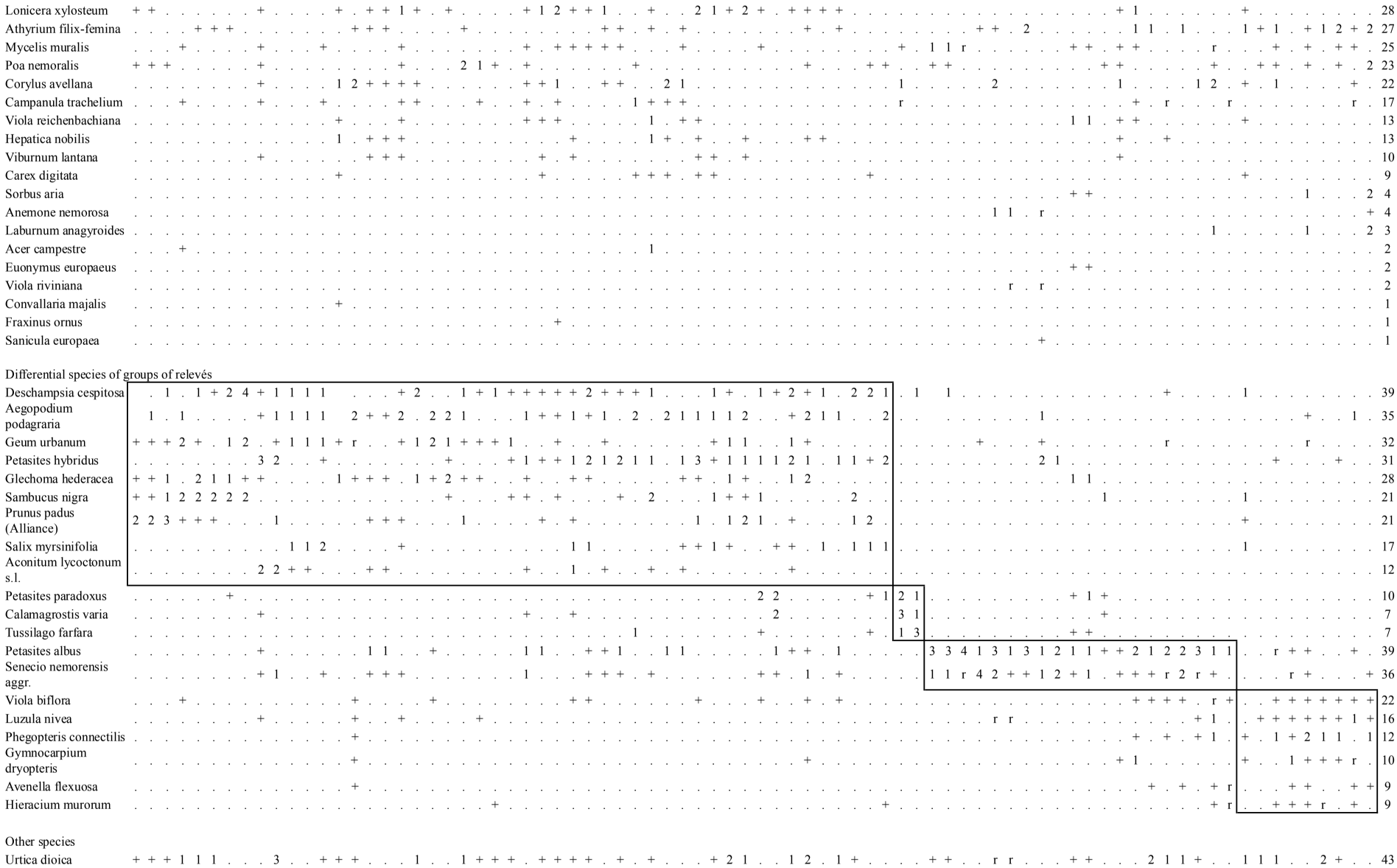
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