

## Syntaxonomical revision of the plant communities dominated by *Calamagrostis arundinacea* (alliance *Calamagrostion arundinaceae*) in Slovakia

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**Abstract:** New classification of communities dominated by *Calamagrostis arundinacea* within the alliance *Calamagrostion arundinaceae* in Slovakia is presented. Syntaxonomical revision included relevés from mountain ranges Muránska planina, Malá Fatra, Veľká Fatra, Nízke Tatry, Belianske Tatry, and Bukovské vrchy. Authors described the new association *Sileno vulgaris-Calamagrostietum arundinaceae* with two subassociations: *caricetosum tatorum* (KLIMENT 1995) comb. nov. and *delphinietosum elati* subass. nov. on the marl limestone of the Veľká Fatra Mts. (inclusive massif of Zvolen Mt.). Stands originally ordered into the association *Senecioni fuchsii-Calamagrostietum arundinaceae* were included into the association *Digitali ambiguae-Calamagrostietum arundinaceae* with the two subassociations: *sedetosum carpaticae* KLIMENT 1995 and *luzuletosum sylvaticae* subass. nov. Knowledge on distribution and differentiation of the other described communities with dominant species *Calamagrostis arundinacea* in Slovak part of the Carpathians are also specified.

Keywords: *Calamagrostion arundinaceae*, natural communities, syntaxonomy, distribution.

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## Introduction

Autochthonous communities with dominant species *Calamagrostis arundinacea* at natural forest-free areas near the timberline engaged the attention of Pavol Sillinger already in thirties of the last century by their floristic and physiognomic variability. He described from melaphyre ridges of the Nízke Tatry Mts. two associations: *Calamagrostidetum arundinaceae altherbosum* and *Calamagrostis arundinacea-Digitalis ambigua*-Ass. (SILLINGER 1933: 251-255, 262). The first of them he arranged into the alliance *Calamagrostion villosae* in wider sense, the last into segregated higher syntaxon in hierarchical level of the alliance entitled "subxerophilous to-xerophilous tall-grass stands".

KUČEROVÁ & JENÍK (1963: 658-659) published constancy table of "subthermophilous grasslands with *Calamagrostis arundinacea*" (alliance *Calamagrostis arundinaceae*), calculated from 14 relevés made at the Riaba skala Mt. in the Bukovské vrchy Mts. Tall-grass stands rich in flowering herbs from the Dolina siedmich prameňov Valley in the Belianske Tatry Mts. HADAČ et al. (1969:124-134), classified as the new association *Helianthemo-Calamagrostietum arundinaceae* within the alliance *Seslerion tatrae*. KLIMENT (1995a: 56-64) assigned autochthonous stands of the *Calamagrostis arundinacea* in the protected depressions near the ridge of the Veľká Fatra Mts. (including massif of Zvolen Mt.) looking like smaller cirque, but without glacial influence, within the association *Digitali ambiguae-Calamagrostietum arundinaceae* into two new subassociations: *D.-C. caricetosum tatorum* and *D.-C. sedetosum carpaticae*. Later he also extended knowledge about species composition of phytocoenoses of the association *Senecioni fuchsii-Calamagrostietum arundinaceae* (SILLINGER 1933) HADAČ in MUCINA et MAGLOCKÝ 1985, bonded in the Veľká Fatra Mts at recesses of undulated timberline (KLIMENT 1998: 159-165). Also the long term stages of secondary succession at East-Carpathian high-mountain grasslands ("poloniny") in the Bukovské vrchy Mts. and at West-Carpathian high-mountain grasslands ("hole") in the Veľká Fatra Mts., that were described under the names *Achilleo strictae-Calamagrostietum arundinaceae* (HADAČ et al. 1988) and *Potentillo aurei-Calamagrostietum arundinaceae* (KLIMENT 1993) were syntaxonomically evaluated.

More detailed study of natural and secondary stands dominating by *Calamagrostis arundinacea* in the mountain ranges Muránska planina, Malá Fatra, Veľká Fatra, Nízke Tatry, and Bukovské vrchy in 1998-2003 years resulted to the re-evaluation of their syntaxonomical classification, which is the scope of this paper.

## Material and methods

81 phytocoenological relevés with dominant species *Calamagrostis arundinacea* from Slovakia were involved into the syntaxonomical revision. All phytocoenoses were analysed in the field using methods of Zürich-Montpellier school (BRAUN-BLANQUET 1928, 1964). Authors used different scales of abundance and dominance: 10-degree or combined 11-degree scale (cf. SILLINGER 1933; HADAČ et al. 1969) and modified 9-degree scale (BARKMAN et al. 1964). To obtain

comparable data for numerical classification all relevés were transformed into 9-degree ordinal scale (VAN DEN MAAREL 1979), the mosses were excluded and some taxa were included into higher or more broadly defined taxa: *Alchemilla* spec. div. (*A. crinita*, *A. glaucescens*, *A. micans*, *A. monticola*, *A. xanthochlora*, *A. vulgaris* s. str.), *Cardaminopsis arenosa* agg. (*C. borbasi*), *Carex flacca* (subsp. *claviformis*), *Dactylis glomerata* (subsp. *slovenica*), *Dianthus carthusianorum* (subsp. *latifolius*), *Heracleum sphondylium* (subsp. *trachycarpum*), *Leontodon hispidus* (subsp. *hispidus*, subsp. *danubialis*), *Lotus corniculatus* (var. *alpicola* BECK), *Primula elatior* (subsp. *carpatica*), *Silene vulgaris* (subsp. *vulgaris*), *Trisetum flavescens* (subsp. *taticum*), *Trommsdorffia maculata* (var. *carpatica*). Based on field experiences we rarely constrained definition of some taxa from species to subspecies level: *Achillea millefolium* subsp. *alpestris*, *Anthoxanthum alpinum*, *Bupleurum longifolium* subsp. *vapincense*, *Linum perenne* subsp. *extraaxillare*, *Luzula luzuloides* subsp. *rubella*. Numerical classification were performed by program NCLAS from the SYN-TAX 5 (PODANI 1993).  $\beta$ -flexible method ( $\beta = -0.25$ ) and Jaccard's, Ružička's and Wishart's similarity coefficients were used. Obtained hypotheses were evaluated by comparison and analysis of phytocoenological tables.

Nomenclature of taxa follows Checklist of non-vascular and vascular plants of Slovakia (MARHOLD & HINDÁK 1998); rare exceptions have author's citation. Subspecies (without the name of species) in the table (Tab. 1) are marked by asterisks (\*). The value of frequency (in %; 99 = 100%) and mean value of abundance in relevant column (upper index) for every taxon is calculated. Heads of columns contain shorted citation of source (for unpublished data only the name of relevé author), number of relevés and their localization on the level of orographic units according to the base map for Database of fauna of Slovakia in scale 1 : 500 000.

The names of higher syntaxa (suballiance - class) and their diagnostic value were used in harmony with works ŠEFFER et al. (1989), VALACHOVIČ et al. (1995), JAROLÍMEK et al. (1997), MORAVEC et al. (1995, 2000). In the table (Tab. 1) the names of syntaxa are shorted as follows: aa *Adenostylion*, ac *Acerenion pseudoplatani*, Ae *Arrhenatheretalia*, ae *Arrhenatherion*, ai *Alnion incanae*, ap *Aegopodion*, at *Alchemillo-Trisetion*, Be *Brometalia erecti*, ca *Calamagrostion arundinaceae*, cb *Cirsio-Brachypodion pinnati*, ce *Cephalanthero-Fagenion*, cf *Caricion firmae*, cl *Calthion*, cu *Carduo-Urticion dioicae*, Cv *Calamagrostietalia villosae*, cv *Calamagrostion villosae*, cy *Cystopteridion*, de *Delphinion elati*, EA *Epilobietea angustifolii*, ES *Elyno-Seslerietea*, FB *Festuco-Brometea*, fc *Festucion carpaticae*, Fs *Fagetalia sylvaticae*, fs *Fagion*, fv *Festucion versicoloris*, GU *Galio-Urticetea*, MA *Molinio-Arrhenatheretea*, MC = *Montio-Cardaminetea*, Mo *Molinietalia*, MU *Mulgedio-Aconitetea*, na *Nardo-Agrostion tenuis*, Ns *Nardetalia strictae*, Ov *Origanetalia*, pa *Poion alpinae*, Pc *Potentilletalia caulescentis*, po *Petasition*, pt *Polygono-Trisetion*, QF *Querco-Fagetea*, Sc *Seslerietalia coerulae*, Ss *Sedo-Scleranthalia*, ss *Salicion silesiaca*, st *Seslerion tatrae*, TG *Trifolio-Geranietea*, VP *Vaccinio-Piceetea*, (ca) taxon with lower relation to the relevant syntaxon and with coenological optimum also in other syntaxon. Floristic composition of other communities with lower abundance of *Calamagrostis arundinacea* within the alliance

*Calamagrostion arundinaceae* was also considered for selection of diagnostic taxa of analysed associations (cf. KLIMENT 1994, 1995b).

In descriptions of communities, the following abbreviations were used: baz. = bazionym, art. = the article of the Code of phytocoenological nomenclature (WEBER et al. 2000), dif. = differential taxon, dom. = dominating taxon, excl. = excluding, ined. = ineditus (unpublished data), const. = constantly companion taxon (with frequency higher than 60%), p. p. = pro parte (partially), prov. = provisionally, syn. = synonym, syntax. syn. = syntaxonomical synonym, transgr. = transgressive taxon, r. = relevé.

## Results

In spite of using of different similarity coefficients, results of numerical classification were near identical (except of order of some relevés within clusters in high levels of similarity). Similar dendrograms yielded by Jaccard's and Ružička's coefficients suggest determining importance of floristical composition and lower importance of species abundance values for differentiation of analysed communities. Main clusters of the dendrogram (Fig. 1) represent floristically well-characterised communities (Tab. 1). They differ in different genesis and development at their habitats. Comparison of communities and analysis of their floristic composition led to the new classification of communities from the Slovak part of the Carpathians within the alliance *Calamagrostion arundinaceae*. Arrangement of relevés within communities is in harmony with the dendrogram yielded using Ružička's coefficient of similarity (Fig. 1).

### *Sileno vulgaris-Calamagrostietum arundinaceae* ass. nov. hoc loco

Tab. 1, column A

**Pseudonym:** *Digitali ambiguae-Calamagrostietum arundinaceae* sensu KLIMENT 1995 non SILLINGER 1933

**Diagnostic taxa:** *Calamagrostis arundinacea* (const., dom.), *Allium oleraceum* (dif.), *Anthyllis vulneraria* subsp. *alpestris* (dif.), *Cirsium eriophorum* (dif.), *Convallaria majalis* (dif.), *Galium anisophyllum* (const.), *Linum catharticum* (dif.), *Potentilla thuringiaca* (transgr.), *Rubus saxatilis* (dif.), *Saxifraga paniculata* (dif.), *Silene vulgaris* (const.), *Tragopogon orientalis* (const.)

**Nomenclatural type:** KLIMENT 1995a, Tab. 2, r. 1, holotypus

Particularly species rich plant community with 42 to 88 taxa of vascular plants in relevé (mean 60 taxa). Its opened mosaic flowery tall-herb stands consist of several levels of herbs and grasses. Mosses occur only scarcely. The community prefers sunny, slightly concave rocky edges below or among discontinuous rocky walls in the upper part of steep avalanche glens and depressions looking like small cirque, but without glacial influence (depressions resulting from polygenetic destruction of ground surface). More rarely, they occur at sheer slightly concave slopes with south-to-south-east orientation on little rocky monticules above the timberline on marl limestone. Beside the mechanical influence of snow (avalanches, creeping snow, drifts, and snow overhangs) and extreme irradiation

of these habitats, also slowly landfall of unstable substratum inhibits penetration of woods into the community and support formation and development of forestless refuges. Detailed description of the association published KLIMENT (1995a: 56-63). In the Veľká Fatra Mts., two subassociations represent it:

***Sileno vulgaris-Calamagrostietum arundinaceae caricetosum tatorum* (KLIMENT 1995) comb. nov. hoc loco**

Tab. 1, column A1

**Baz.:** *Digitali ambiguae-Calamagrostietum arundinaceae* SILLINGER 1933  
*caricetosum tatorum* KLIMENT 1995

**Differential taxa:** *Carex sempervirens* subsp. *tatorum*, *Betonica officinalis*, *Festuca amethystina*, *Libanotis pyrenaica*, *Melittis melissophyllum*, *Ranunculus auricomus* agg., *Scabiosa lucida*, *Sesleria albicans*

**Nomenclatural type:** identical with the nomenclatural type of the association

Near closed stands have higher abundance of tuft hemicryptophytes in comparison with following subassociation. They are positively differed by diagnostic species of the class *Elyno-Seslerietea* and its lower syntaxa, which suggest close syngenetic relations to contact phytocoenoses. Synecologically they are strictly connected to upper parts of the avalanche glens at marl limestone in the supramontaneous belt of the Veľká Fatra Mts. (Veľká Pustalovčia Mt., Borišov Mt.), in the altitude 1340-1460 m (KLIMENT 1995a, Tab. 2, r. 1-9); closely related community was found also in the Hornojelenská dolina Valley at east oriented slopes of the Krížna Mt. (BERNÁTOVÁ et al. 1992: 6).

***Sileno vulgaris-Calamagrostietum arundinaceae delphinietosum elati* subass. nov. hoc loco**

Tab. 1, column A2

**Syn.:** *Digitali ambiguae-Calamagrostietum arundinaceae sedetosum carpaticae* KLIMENT 1995 p. p. maj. (excl. typus)

**Non:** *Calamagrostidetum arundinaceae delphiniosum* ZLATNÍK 1925

**Differential taxa:** *Delphinium elatum*, *Ajuga reptans*, *Arabis hirsuta*, *Hesperis matronalis* subsp. *nivea*, *Hieracium prenanthoides*, *Hylotelephium argutum* (syn.: *Sedum carpaticum* G. REUSS), *Hypericum hirsutum*, *Jovibarba globifera* subsp. *glabrescens*, *Plantago media*, *Poa alpina*

**Nomenclatural type:** KLIMENT 1995a, Tab. 2, r. 15, holotypus

Steep rocky scalariform glens at south-to-south-east slopes of ground elevations 1336 m, 1402 m, and 1368 m in the massif of Zvolen Mt. in the altitudes 1330-1390 m are the typical habitats of the subassociation stands. Warmer and drier microclimate conditioned also by overheating of convex parts of the surface, broken micro relief (numerous rocky steps, blocks and individually salient rocks, concave forms with accumulated humus and fine grained soil) and sufficient of moisture during vegetation period facilitates coexistence of

chasmophytes, (sub-) thermophilous species, and mesophilous montane species. They all participate in the group of differential taxa. Phytocoenological relevés of the subassociation were published by KLIMENT et al. (1994: 14), KLIMENT (1995a, Tab. 2, r. 10-16), and TURIS & TURISOVÁ (1995: 85-86).

***Helianthemo grandiflorae-Calamagrostietum arundinaceae* HADAČ et al. 1969**

Tab. 1, column B

**Syn.:** *Calamagrostietum arundinaceae mughicolum* ŠMARDÁ et al. 1971 p. p. (art. 34)

**Diagnostic taxa:** *Calamagrostis arundinacea* (const., dom.), *Allium senescens* subsp. *montanum* (dif.), *Bistorta vivipara* (dif.), *Botrychium lunaria* (dif.), *Bupleurum ranunculoides* (dif.), *Festuca carpatica* (dif.), *Helianthemum grandiflorum* (dif.), *Linum perenne* subsp. *extraaxillare* (const.), *Rhinanthus pulcher* (dif.), *Sesleria tatrae* (dif.), *Tephroseria capitata* (dif.), *Trifolium pratense* subsp. *kotulae* (dif.), *Trisetum flavescens* (dif.)

**Nomenclatural type:** HADAČ et al. 1969: 132-134, r. 269, lectotypus hoc loco

Natural, opened, species relatively rich plant community (40-56, at average 45 species of vascular plants in relevé) is conspicuous by many flowering herbs. It was described from the upper parts of avalanche trajectories in subalpine belt of the Belianske Tatry, 1520-1708 m a. s. l. by HADAČ et al. (1969: 124-134). This community differs from the other communities with *Calamagrostis arundinacea* in high number (5-12), locally also by high cover of mosses. In vascular plant composition closely similar phytocoenoses, but with negligible participation of cryptogams, were recently studied on steep south slopes of the Pekelník Mt. in the Malá Fatra Mts., 1585-1600 m a.s.l. (KLIMENT & ŠIBÍK ined.).

***Potentillo aurei-Calamagrostietum arundinaceae* KLIMENT 1993**

Tab. 1, column C

**Diagnostic taxa:** *Calamagrostis arundinacea* (const., dom.), *Avenella flexuosa* (const.), *Avenula planiculmis* (const.), *Homogyne alpina* (const.), *Potentilla aurea* (const.), *Vaccinium myrtillus* (const.)

Small isle-like, locally large stands of the association developed after the deforestation of relatively snug east slopes of the ridge of the Veľká Fatra. It has spread when the traditional maintenance had been changed. This community differs positively from other communities dominating by *Calamagrostis arundinacea* by species such as *Avenella flexuosa*, *Avenula planiculmis*, *Homogyne alpina*, and *Potentilla aurea*, which regularly with high constancy occur also in the association *Anemono-Avenelletum flexuosae* (cf. KLIMENT 1994, Tab. 1). This community was described from the Veľká Fatra Mts. (KLIMENT 1993: 34-36) and it is not known until now from other mountain ranges.

***Digitali ambiguae-Calamagrostietum arundinaceae* SILLINGER 1933**

Tab. 1, column D

**Original form of the name:** *Calamagrostis arundinacea-Digitalis ambigua*-Ass. SILLINGER 1933

**Syn.:** *Calamagrostietum arundinaceae altherbosum* SILLINGER 1933 (art. 34), *Senecioni fuchsii-Calamagrostietum arundinaceae* (SILLINGER 1933) HADAČ in MUCINA et MAGLOCKÝ 1985 (art. 2b)

**Incl.:** "subtermofilné vysokosteblové nivy s dominantným druhom *Calamagrostis arundinacea*" (*Calamagrostion arundinaceae*) sensu KUČEROVÁ et JENÍK 1963.

**Non:** *Digitali grandiflorae-Calamagrostietum subalpinum* Carbiener 1969; *Calamagrostis-Digitalis grandiflora*-Ges. prov. OBERDORFER 1957

**Diagnostic taxa:** *Calamagrostis arundinacea* (const., dom.), *Adenostyles alliariae* (dif.), *Daphne mezereum* (dif.), *Dryopteris filix-mas* (dif.), *Epilobium montanum* (dif.), *Galium schultesii* (dif.), *Melampyrum sylvaticum* (dif.), *Melica nutans* (dif.), *Pulmonaria obscura* (dif.), *Rubus idaeus* (dif.), *Senecio ovatus* (dif.), *Sorbus aucuparia* subsp. *glabrata* (dif.), *Urtica dioica* (dif.)

**Nomenclatural type:** SILLINGER 1933: 262

Several layered, open, flowery, species mid to rich community (27-77, at average 45 taxa of vascular plants) occurs at natural forestless enclaves on steep rocky slopes below the top cliffs in area of edaphically determined forest line. Closeness of forest stands has conditioned regular occurrence of the forest species. They markedly participate in composition of the diagnostic taxa group. The community represents the central association of the alliance *Calamagrostion arundinaceae*. It is distributed at marl and also dolomite limestone, melaphyre, flysh slates and sandstones in the mountains Muránska planina, Malá Fatra, Veľká Fatra, Nízke Tatry, and Bukovské vrchy. Two subassociations were distinguished based on differences in ecology and floristic composition of stands:

***Digitali ambiguae-Calamagrostietum arundinaceae sedetosum carpaticae* KLIMENT 1995**

Tab. 1, column D1

**Differential species:** *Campanula persicifolia*, *Clematis alpina*, *Cardaminopsis halleri*, *Hylotelephium argutum*

**Nomenclatural type:** identical with the type of the association name

A stands of the subassociation *D.-C. sedetosum carpaticae* occur at steep (mostly 40-55°), south/east, south to south-west slopes below the top of mountain ridges in supramontane, rarely in montane belt. They are relatively species rich, with average number 38 taxa of vascular plants in relevé. Snug sunny sites and shallow rocky soils provide occurrence of thermophilous species of calcareous beech forests (*Campanula persicifolia*, *Clematis alpina*) commonly

with diagnostic species of the alliance *Calamagrostion arundinaceae*. Stands of the subassociation are documented by phytocoenological relevés or by constancy table from the Muránska planina Mts. (KLIMENT, TURIS & VALACHOVIČ ined.), Nízke Tatry Mts. (SILLINGER 1933: 262; KLIMENT, BERNÁTOVÁ & TURIS ined.), and Bukovské vrchy Mts. (KUČEROVÁ & JENÍK 1963: 658-659; KLIMENT, JAROLÍMEK & KOCHJAROVÁ ined.).

***Digitali ambiguae-Calamagrostietum arundinaceae luzuletosum sylvaticae***  
subass. nov. hoc loco

Tab. 1, column D2

**Syn.:** *Calamagrostietum arundinaceae altherbosum* SILLINGER 1933 (art. 34), *Senecioni fuchsii-Calamagrostietum arundinaceae* (SILLINGER 1933) HADAČ in MUCINA et MAGLOCKÝ 1985 (art. 2b)

**Differential taxa:** *Astrantia major*, *Chaerophyllum hirsutum*, *Crepis paludosa*, *Geum rivale*, *Lathyrus vernus*, *Luzula sylvatica*, *Polystichum lonchitis*, *Stellaria nemorum*

**Nomenclatural type:** SILLINGER 1933: 252-254, column 4

In comparison with previous subassociation this one is more mesophilous and richer in species (in average 54 taxa in relevé). Synecologically it prefers the niches of undulated forest line, more rarely also rocky open glades in dwarf pine stands. Localization of stands is reflected in higher number of forest species in the group of differential taxa. The most of relevés of this community were published from the Veľká Fatra Mts. (KLIMENT 1998, Tab. 1); rarely it was found in the Nízke Tatry Mts. (SILLINGER 1933: 252-254, column 4), and in the Krivánska Malá Fatra Mts. (KLIMENT ined.).

***Achilleo strictae-Calamagrostietum arundinaceae*** HADAČ et al. 1988

Tab. 1, column E

**Diagnostic taxa:** *Calamagrostis arundinacea* (const., dom.), *Acetosa alpestris* subsp. *carpatica* (ZAPAL.) DOSTÁL (const.), *Achillea stricta* SCHLEICH. ex GREMLI (dif.), *Aposeris foetida* (dif.), *Campanula abietina* (dif.), *Jacea phrygia* subsp. *melanocalathia* (dif.), *Potentilla erecta* (dif.), *Ranunculus polyanthemus* (dif.), *Tephrosieris papposa* (dif.), *Viola dacica* (dif.)

More or less closed, floristically mid rich community (21-41, in average 30 taxa of vascular plants) was described by HADAČ (HADAČ et al. 1988: 326-330). Until now it was found only in the south to west oriented, moderate slopes of the ridge of the Bukovské vrchy Mts. in the altitude 840-1186 m a.s.l. (HADAČ l. c.; KLIMENT, JAROLÍMEK & KOCHJAROVÁ ined.). Several East Carpathian and East Carpathian-Balkan-East Alps elements, such as *Aposeris foetida*, *Campanula abietina*, *Cirsium waldsteinii*, *Dianthus barbatus* subs. *compactus*, *Tephrosieris papposa*, *Tithymalus sojakii*, and *Viola dacica*, indicate the influence of the East



Carpathian flora. Just these taxa are the basis of the group of diagnostic taxa of this community.

## Discussion

Three allochthonous associations dominated by *Calamagrostis arundinacea* were distinguished in Slovak part of the Carpathians until now: *Digitali ambiguae-Calamagrostietum arundinaceae* SILLINGER 1933 (original form of the name: *Calamagrostis arundinacea-Digitalis ambigua*-Ass.), *Senecioni fuchsii-Calamagrostietum arundinaceae* (SILLINGER 1933) HADAČ in MUCINA et MAGLOCKÝ 1985 (baz.: *Calamagrostidetum arundinaceae altherbosum* SILLINGER 1933), and *Helianthemo-Calamagrostietum arundinaceae* HADAČ et al. 1969. First and second associations were described from steep rocky melaphyre slopes in the Nízke Tatry Mts., third association from upper part of avalanche glens in the Belianske Tatry Mts. In spite of the same dominant and similar floristic composition they were ordered into the different higher syntaxa. SILLINGER (1933: 262) ordered the association *Calamagrostis arundinacea-Digitalis ambigua* into the separate higher syntaxa in the level of alliance with name “subxerofilní-xerofilní porosty vysokostébelné” (subxerophilous to xerophilous tall grass stands), and the association *Calamagrostidetum arundinaceae altherbosum* together with three other communities (*Festucetum carpaticae*, *Festuca picta-Trisetum fuscum*-Ass., *Calamagrostidetum villosae altherbosum*) he included into the widely apprehended alliance *Calamagrostion villosae* (SILLINGER 1933: 251-255). The reasons for including of the association *Helianthemo-Calamagrostietum arundinaceae* into the widely defined alliance *Seslerion tatrae* (HADAČ et al. 1969: 80) were probably more express presence of the species of this alliance in the stands and their location in subalpine belt (ca 1520-1700 m a.s.l.).

KUČEROVÁ & JENÍK (1963: 658-659) during the study of the vegetation of the Riaba skala Mt. (1168 m) in the Bukovské vrchy Mts. investigated in more detail also “subthermophilous tall grass stands with *Calamagrostis arundinacea*”. The community in their sense evidently belongs into the alliance *Calamagrostion arundinaceae*. They documented it by constancy table without particular syntaxonomical evaluation.

The name *Digitali-Calamagrostietum arundinaceae* SILLINGER 1933 was more lately used also for clearing phytocoenoses (HADAČ et al. 1969: 233-242; FAJMONOVÁ 1983: 881-886). KLIMENT (1995a: 60-68) gave a reasons for reserving of this name for the autochthonous natural subxerothermophilous stands. On the basis of relevés from marl limestone in the Veľká Fatra Mts. (including massif Zvolen) he described within the association two new subassociations: *D.-C. sedetosum carpaticae* KLIMENT 1995 and *D.-C. caricetosum tatrorum* KLIMENT 1995. Until known communities dominated by *Calamagrostis arundinacea* from the territory of Slovakia he joint into the alliance *Calamagrostion arundinaceae* (LUQUET 1926) JENÍK 1961. Later he enriched also knowledge on the floristic composition and synecology of the association *Senecioni fuchsii-Calamagrostietum arundinaceae* (KLIMENT 1998).

Supplement of new relevés from the mountains Muránska planina, Malá Fatra,

Nízke Tatry, and Bukovské vrchy allowed to do new syntaxonomical revision and lead to the new view on dividing of the alliance *Calamagrostion arundinaceae*:

i) extraordinary species rich phytocoenoses from the upper part of avalanche glens and snug depressions looking like small cirque at marl limestone of the Veľká Fatra Mts. henceforward cannot be identified with the association *Digitali ambiguae-Calamagrostietum arundinaceae* SILLINGER 1933, because it is individual community in the hierarchical level of association. In harmony with the articles 39 a 46J of the Code we have described it as a new association *Sileno vulgaris-Calamagrostietum arundinaceae*, with two subassociations: *S.-C. caricetosum tatorum* (KLIMENT 1995) comb. nov. and *S.-C. delphinietosum elati* subass. nov. (syn.: *Digitali ambiguae-Calamagrostietum arundinaceae sedetosum carpaticae* KLIMENT 1995 p. p., excl. typus). The pressure and movement of snow mass plays the key importance role in development and sustain of the community. Slow shifting of soil seems to be less important.

ii) Results of the syntaxonomical revision have shown that stands primarily divided into two segregated associations (*Digitali ambiguae-Calamagrostietum arundinaceae*, *Senecioni fuchsii-Calamagrostietum arundinaceae*), are joined by numerous common differential taxa (Tab. 1). Also synecology of the both communities is similar. They occur close to forests, but at naturally forestless sites which are determined by properties of geological background. Consequently we fused them into the one association *Digitali ambiguae-Calamagrostietum arundinaceae* SILLINGER 1933. This correct name has priority before illegitimate name (*Calamagrostietum arundinaceae altherbosum* SILLINGER 1933) or (sensu art. 2b) invalidly published name [*Senecioni fuchsii-Calamagrostietum arundinaceae* (SILLINGER 1933) HADAČ in MUCINA et MAGLOCKÝ 1985] of the last association. Differences in species composition and ecology of stands are classified at the level of subassociations *D.-C. sedetosum carpaticae* KLIMENT 1995 and *D.-C. luzuletosum sylvaticae* subass. nov.

The syntaxonomical revision has supported the justness to distinguish the following before described associations: *Helianthemo grandiflorae-Calamagrostietum arundinaceae* HADAČ et al. 1969, *Achilleo strictae-Calamagrostietum arundinaceae* HADAČ et al. 1988, and *Potentillo aurei-Calamagrostietum arundinaceae* KLIMENT 1993. Their mutual differentiation and recent distribution was specified.

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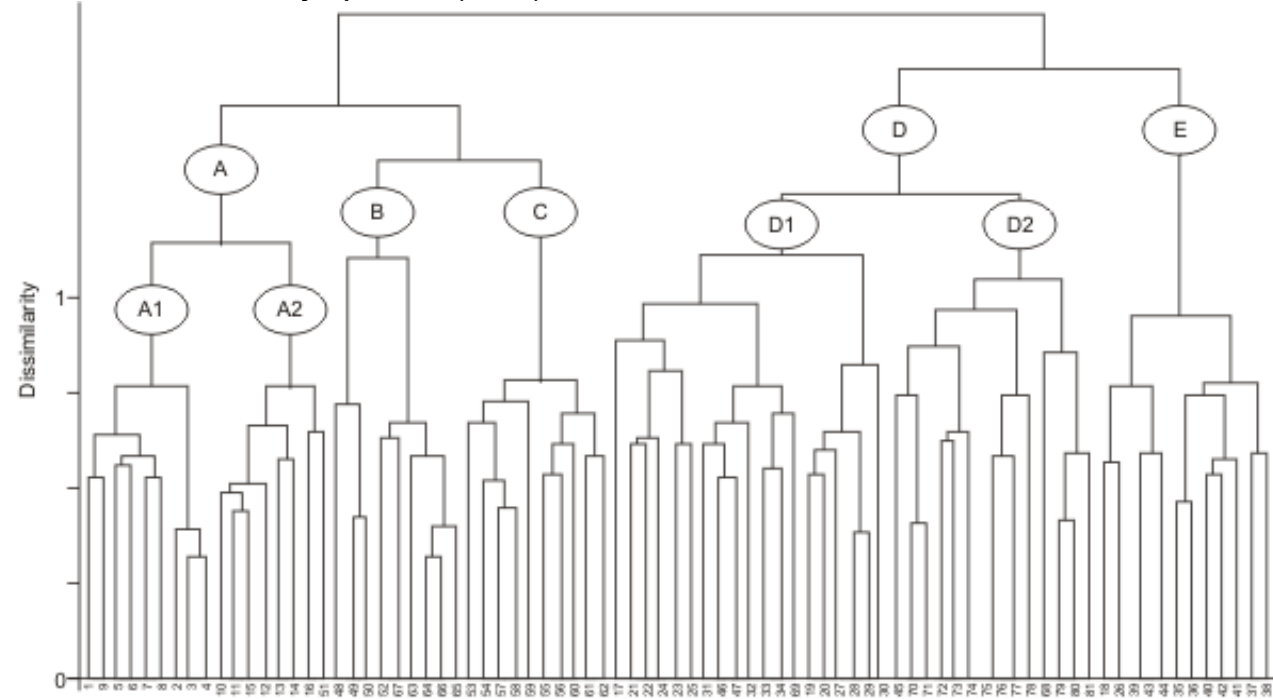
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#### Appendix 1. Sources to the table 1:

- A1: KLIMENT 1995a, Tab. 2, r. 1-9, Velká Fatra Mts. (*Digitali-Calamagrostietum caricetosum tatorum*)
- A2: KLIMENT 1995a, tab. 2, r. 10-16 (*D.-C. sedetosum carpaticae*), Velká Fatra Mts., massif of Zvolen Mt.; TURIS & TURISOVÁ 1995: 85-86, r. 1, Velká Fatra Mts., massif of Zvolen Mt.
- B: HADAČ et al. 1969: 132-134, 5 r., Belianske Tatry Mts.; ŠMARD A. J. et al. 1971, Tab. 17, r. 1 (*Calamagrostietum arundinaceae mughicolum*), Belianske Tatry Mts.; KLIMENT & ŠIBÍK ined., 3 r., Malá Fatra Mts., part near Kriváň Mt.
- C: KLIMENT 1993, Tab. 1, r. 1-10, Velká Fatra Mts. (r. 9-10: massif of Zvolen Mt.)
- D1: SILLINGER 1933: 262, 1 r. (*Calamagrostis arundinacea-Digitalis ambigua*-Ass.), Nízke Tatry Mts.; KLIMENT, TURIS & VALACHOVIČ ined., 6 r., Muránska planina Mts.; KLIMENT, BERNÁTOVÁ & TURIS ined., 6 r., Nízke Tatry Mts.; KLIMENT, JAROLÍMEK & KOCHJAROVÁ ined., 6 r., Bukovské vrchy Mts.
- D2: SILLINGER 1933: 252-254, column 4, 1 r. (*Calamagrostidetum arundinaceae altherbosum*), Nízke Tatry Mts.; KLIMENT 1998, Tab. 1, r. 1-12 (*Senecioni fuchsii-Calamagrostietum arundinaceae*), Velká Fatra Mts.; KLIMENT ined., 1 r., Malá Fatra Mts., part near Kriváň Mt.
- E: HADAČ et al. 1988, Tab. 3, r. 1-10, Bukovské vrchy Mts.; KLIMENT, JAROLÍMEK & KOCHJAROVÁ ined., 2 r., Bukovské vrchy Mts.

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Fig. 1. Dendrogram of 81 relevés of the communities dominated by *Calamagrostis arundinacea* in Slovakia. Ruzicka's coefficient and beta-flexible method ( $\beta = -0.25$ ) were used. Capital letters indicate distinguished communities, and they are identical with letters in the synoptic table (Tab. 1).



**Tab. 1. Comparison of the syntaxa with dominant species *Calamagrostis arundinacea* in Slovakia (a brief synoptic table).  
**A1 *Sileno-Calamagrostietum caricetosum tatorum*, A2 *S.-C. delphinietosum elati*, B *Helianthemo-Calamagrostietum*, C *Potentillo-Calamagrostietum*, D1 *Digitali-Calamagrostietum sedetosum carpaticae*, D2 *D.-C. luzuletosum sylvaticae*, E *Achilleo-Calamagrostietum*.****

Community	A1	A2	A	B	C	D1	D2	D	E
Number of relevés	9	8	17	9	10	19	14	33	12
<b>Differential taxa of the associations</b>									
	<i>Cirsium eriophorum</i>	99 <sup>2</sup>	38 <sup>2</sup>	71 <sup>2</sup>	.	20 <sup>2</sup>	.	.	.
ce(ca)	<i>Rubus saxatilis</i>	89 <sup>2</sup>	38 <sup>2</sup>	65 <sup>2</sup>	33 <sup>2</sup>	.	16 <sup>2</sup>	43 <sup>3</sup>	27 <sup>2</sup>
ca	<i>Potentilla thuringiaca</i>	33 <sup>2</sup>	75 <sup>3</sup>	47 <sup>2</sup>	11 <sup>2</sup>	.	.	.	.
ES	<i>Anthyllis *alpestris</i>	33 <sup>2</sup>	63 <sup>2</sup>	47 <sup>2</sup>	11 <sup>2</sup>	.	.	.	.
ce	<i>Convallaria majalis</i>	33 <sup>2</sup>	50 <sup>3</sup>	41 <sup>3</sup>	.	.	5 <sup>2</sup>	21 <sup>2</sup>	12 <sup>2</sup>
	<i>Linum catharticum</i>	22 <sup>2</sup>	63 <sup>3</sup>	41 <sup>3</sup>	.	.	7 <sup>2</sup>	3 <sup>2</sup>	.
Pc	<i>Saxifraga paniculata</i>	22 <sup>2</sup>	63 <sup>3</sup>	41 <sup>2</sup>	11 <sup>2</sup>	.	.	.	.
	<i>Allium oleraceum</i>	33 <sup>2</sup>	38 <sup>2</sup>	35 <sup>2</sup>	.	.	.	.	.
st	<i>Sesleria tatrae</i>	.	.	.	99 <sup>4</sup>	.	.	.	.
sa	<i>Allium *montanum</i>	56 <sup>2</sup>	.	29 <sup>2</sup>	78 <sup>2</sup>	.	.	.	.
fc	<i>Festuca carpatica</i>	.	.	.	78 <sup>4</sup>	.	7 <sup>2</sup>	3 <sup>2</sup>	.
ES	<i>Helianthemum grandiflorum</i>	44 <sup>2</sup>	.	24 <sup>2</sup>	78 <sup>5</sup>	.	5 <sup>2</sup>	21 <sup>2</sup>	12 <sup>2</sup>
	<i>Botrychium lunaria</i>	.	.	.	67 <sup>2</sup>	.	5 <sup>1</sup>	3 <sup>1</sup>	.
fv,st	<i>Rhinanthus pulcher</i>	.	.	.	67 <sup>3</sup>	.	11 <sup>2</sup>	6 <sup>2</sup>	.
Ae	<i>Trisetum flavescens</i>	.	13 <sup>2</sup>	6 <sup>2</sup>	56 <sup>2</sup>	.	.	.	8 <sup>2</sup>
st	<i>Tephrosieris capitata</i>	.	.	.	56 <sup>2</sup>	.	.	.	.
st	<i>Bupleurum ranunculoides</i>	.	.	.	44 <sup>2</sup>	.	.	.	.
st	<i>Trifolium *kotulae</i>	11 <sup>2</sup>	.	6 <sup>2</sup>	44 <sup>2</sup>	.	7 <sup>2</sup>	3 <sup>2</sup>	.
cf	<i>Bistorta vivipara</i>	.	.	.	44 <sup>3</sup>	.	.	.	.
QF	<i>Galium schultesii</i>	11 <sup>2</sup>	13 <sup>2</sup>	12 <sup>2</sup>	.	.	89 <sup>4</sup>	71 <sup>4</sup>	82 <sup>4</sup>
EA	<i>Rubus idaeus</i>	11 <sup>2</sup>	63 <sup>3</sup>	35 <sup>3</sup>	.	.	84 <sup>3</sup>	64 <sup>3</sup>	76 <sup>3</sup>
Fs	<i>Dryopteris filix-mas</i>	.	.	.	.	.	63 <sup>3</sup>	71 <sup>2</sup>	67 <sup>2</sup>

Community		A1	A2	A	B	C	D1	D2	D	E
Number of relevés		9	8	17	9	10	19	14	33	12
Fs,EA	<i>Epilobium montanum</i>	.	25 <sup>2</sup>	12 <sup>2</sup>	.	.	53 <sup>2</sup>	71 <sup>2</sup>	61 <sup>2</sup>	.
Fs,EA	<i>Senecio ovatus</i>	11 <sup>1</sup>	.	6 <sup>1</sup>	.	10 <sup>1</sup>	37 <sup>2</sup>	93 <sup>5</sup>	61 <sup>4</sup>	8 <sup>1</sup>
QF	<i>Melica nutans</i>	22 <sup>2</sup>	13 <sup>2</sup>	18 <sup>2</sup>	.	.	32 <sup>2</sup>	64 <sup>2</sup>	45 <sup>2</sup>	.
GU	<i>Urtica dioica</i>	.	.	.	.	.	26 <sup>2</sup>	71 <sup>2</sup>	45 <sup>2</sup>	8 <sup>1</sup>
Fs	<i>Pulmonaria obscura</i>	.	.	.	.	.	37 <sup>2</sup>	50 <sup>2</sup>	42 <sup>2</sup>	.
ac,aa	<i>Adenostyles alliariae</i>	.	.	.	.	.	37 <sup>3</sup>	43 <sup>2</sup>	39 <sup>3</sup>	.
VP	<i>Sorbus *glabrata</i>	.	.	.	.	.	42 <sup>2</sup>	36 <sup>1</sup>	39 <sup>1</sup>	.
Fs	<i>Daphne mezereum</i>	.	.	.	.	10 <sup>1</sup>	21 <sup>2</sup>	50 <sup>2</sup>	33 <sup>2</sup>	.
VP	<i>Melampyrum sylvaticum</i>	.	.	.	.	.	16 <sup>3</sup>	36 <sup>2</sup>	24 <sup>3</sup>	.
	<i>Achillea stricta</i>	.	.	.	.	.	21 <sup>2</sup>	.	12 <sup>2</sup>	99 <sup>3</sup>
na	<i>Potentilla erecta</i>	.	.	.	.	.	.	.	.	99 <sup>3</sup>
cb	<i>Ranunculus polyanthemos</i>	.	.	.	.	.	5 <sup>2</sup>	.	3 <sup>2</sup>	67 <sup>2</sup>
	<i>Aposeris foetida</i>	.	.	.	.	.	.	.	.	33 <sup>2</sup>
ca,na	<i>Viola dacica</i>	.	.	.	.	.	.	.	.	33 <sup>2</sup>
na,ca	<i>Campanula abietina</i>	.	.	.	.	.	.	.	.	25 <sup>2</sup>
ca	<i>Jacea *melanocalathia</i>	.	.	.	.	.	.	.	.	25 <sup>3</sup>
ca	<i>Tephrosieris papposa</i>	.	.	.	.	.	.	.	.	25 <sup>2</sup>
<b>Differential taxa of the subassociations</b>										
ES	<i>Carex *tatorum</i>	99 <sup>4</sup>	.	53 <sup>4</sup>	56 <sup>2</sup>	10 <sup>2</sup>	.	14 <sup>4</sup>	6 <sup>4</sup>	.
Sc	<i>Sesleria albicans</i>	99 <sup>2</sup>	.	53 <sup>2</sup>	.	20 <sup>2</sup>	11 <sup>2</sup>	36 <sup>2</sup>	21 <sup>2</sup>	.
ES	<i>Scabiosa lucida</i>	99 <sup>2</sup>	.	53 <sup>2</sup>	22 <sup>2</sup>	.	11 <sup>3</sup>	29 <sup>2</sup>	18 <sup>2</sup>	.
TG,MA	<i>Betonica officinalis</i>	89 <sup>3</sup>	.	47 <sup>3</sup>	.	.	.	.	.	8 <sup>2</sup>
	<i>Ranunculus auricomus</i> agg.	78 <sup>2</sup>	.	41 <sup>2</sup>	.	.	.	7 <sup>2</sup>	3 <sup>2</sup>	.
Sc	<i>Festuca amethystina</i>	56 <sup>3</sup>	.	29 <sup>3</sup>	.	.	.	.	.	.
sa	<i>Libanotis pyrenaica</i>	56 <sup>3</sup>	.	29 <sup>3</sup>	.	.	.	.	.	.
ce	<i>Melittis melissophyllum</i>	44 <sup>2</sup>	.	24 <sup>2</sup>	.	.	.	.	.	.
FB	<i>Arabis hirsuta</i>	11 <sup>1</sup>	99 <sup>2</sup>	53 <sup>1</sup>	22 <sup>2</sup>	.	5 <sup>1</sup>	7 <sup>1</sup>	6 <sup>1</sup>	.

Community		A1	A2	A	B	C	D1	D2	D	E
Number of relevés		9	8	17	9	10	19	14	33	12
	<i>Ajuga reptans</i>	.	<b>75<sup>2</sup></b>	35 <sup>2</sup>	.	.	5 <sup>2</sup>	21 <sup>2</sup>	12 <sup>2</sup>	.
de	<i>Delphinium elatum</i>	.	<b>75<sup>3</sup></b>	35 <sup>3</sup>	11 <sup>3</sup>	.	5 <sup>6</sup>	7 <sup>3</sup>	6 <sup>5</sup>	.
ac	<i>Hesperis *nivea</i>	.	<b>75<sup>2</sup></b>	35 <sup>2</sup>	.	.	.	14 <sup>3</sup>	6 <sup>3</sup>	.
Cv	<i>Hieracium prenanthoides</i>	.	<b>75<sup>3</sup></b>	35 <sup>3</sup>	33 <sup>2</sup>	10 <sup>2</sup>	16 <sup>2</sup>	.	9 <sup>2</sup>	33 <sup>2</sup>
	<i>Hypericum hirsutum</i>	.	<b>75<sup>2</sup></b>	35 <sup>2</sup>	.	.	.	21 <sup>2</sup>	9 <sup>2</sup>	.
	<i>Alchemilla glaucescens</i>	.	<b>63<sup>2</sup></b>	29 <sup>2</sup>	.	.	.	.	.	.
FB	<i>Plantago media</i>	.	<b>63<sup>2</sup></b>	29 <sup>2</sup>	.	.	.	.	.	.
pa	<i>Poa alpina</i>	.	<b>63<sup>2</sup></b>	29 <sup>2</sup>	.	.	.	.	.	.
Sc,Ss	<i>Jovibarba *glabrescens</i>	.	<b>50<sup>2</sup></b>	24 <sup>2</sup>	.	.	5 <sup>2</sup>	7 <sup>2</sup>	6 <sup>2</sup>	.
	<i>Hylotelephium argutum</i>	.	99 <sup>2</sup>	47 <sup>2</sup>	.	.	<b>74<sup>3</sup></b>	.	42 <sup>3</sup>	.
aa,st	<i>Cardaminopsis halleri</i>	.	.	.	11 <sup>2</sup>	.	<b>58<sup>3</sup></b>	.	33 <sup>3</sup>	50 <sup>2</sup>
ce	<i>Clematis alpina</i>	.	.	.	.	.	<b>53<sup>2</sup></b>	.	30 <sup>2</sup>	.
ce	<i>Campanula persicifolia</i>	.	.	.	.	.	<b>37<sup>2</sup></b>	.	21 <sup>2</sup>	.
VP,ac	<i>Luzula sylvatica</i>	.	.	.	.	10 <sup>3</sup>	5 <sup>1</sup>	<b>57<sup>3</sup></b>	27 <sup>2</sup>	.
ac,cl	<i>Geum rivale</i>	.	.	.	11 <sup>2</sup>	.	.	<b>57<sup>2</sup></b>	24 <sup>2</sup>	.
ac,po	<i>Chaerophyllum hirsutum</i>	.	.	.	11 <sup>2</sup>	.	5 <sup>2</sup>	<b>43<sup>3</sup></b>	21 <sup>3</sup>	.
Fs	<i>Lathyrus vernus</i>	.	25 <sup>2</sup>	12 <sup>2</sup>	.	.	5 <sup>2</sup>	<b>43<sup>2</sup></b>	21 <sup>2</sup>	.
Fs	<i>Stellaria nemorum</i>	.	.	.	.	.	5 <sup>2</sup>	<b>43<sup>2</sup></b>	21 <sup>2</sup>	.
ai,cl	<i>Crepis paludosa</i>	.	.	.	.	.	.	<b>36<sup>3</sup></b>	15 <sup>3</sup>	.
ac	<i>Polystichum lonchitis</i>	.	.	.	.	.	.	<b>36<sup>2</sup></b>	15 <sup>2</sup>	.
<b>Calamagrostion arundinaceae</b>										
	<i>Calamagrostis arundinacea</i>	99 <sup>8</sup>	99 <sup>7</sup>	99 <sup>7</sup>	99 <sup>7</sup>	99 <sup>8</sup>	99 <sup>8</sup>	99 <sup>8</sup>	99 <sup>8</sup>	99 <sup>8</sup>
	<i>Cyanus mollis</i>	22 <sup>2</sup>	50 <sup>3</sup>	35 <sup>3</sup>	11 <sup>5</sup>	10 <sup>3</sup>	16 <sup>2</sup>	29 <sup>3</sup>	21 <sup>3</sup>	.
	<i>Digitalis grandiflora</i>	89 <sup>4</sup>	99 <sup>3</sup>	94 <sup>4</sup>	22 <sup>5</sup>	.	95 <sup>3</sup>	71 <sup>3</sup>	85 <sup>3</sup>	.
QF	<i>Poa nemoralis</i>	99 <sup>5</sup>	99 <sup>5</sup>	99 <sup>5</sup>	11 <sup>5</sup>	.	74 <sup>4</sup>	64 <sup>3</sup>	70 <sup>3</sup>	.
	<i>Vicia sylvatica</i>	99 <sup>4</sup>	25 <sup>3</sup>	65 <sup>4</sup>	11 <sup>2</sup>	.	11 <sup>3</sup>	7 <sup>5</sup>	9 <sup>3</sup>	.
TG	<i>Clinopodium vulgare</i>	78 <sup>2</sup>	75 <sup>3</sup>	76 <sup>3</sup>	11 <sup>2</sup>	.	37 <sup>2</sup>	50 <sup>2</sup>	42 <sup>3</sup>	.
ce	<i>Laserpitium latifolium</i>	44 <sup>4</sup>	.	24 <sup>4</sup>	44 <sup>2</sup>	.	37 <sup>5</sup>	50 <sup>3</sup>	42 <sup>4</sup>	.



Community		A1	A2	A	B	C	D1	D2	D	E
Number of relevés		9	8	17	9	10	19	14	33	12
Ov	<i>Silene vulgaris</i>	56 <sup>4</sup>	99 <sup>3</sup>	76 <sup>3</sup>	.	.	5 <sup>2</sup>	14 <sup>3</sup>	9 <sup>2</sup>	17 <sup>2</sup>
	<i>Origanum vulgare</i>	56 <sup>2</sup>	38 <sup>3</sup>	47 <sup>3</sup>	.	.	47 <sup>4</sup>	64 <sup>3</sup>	55 <sup>4</sup>	.
	<i>Pleurospermum austriacum</i>	.	13 <sup>5</sup>	6 <sup>5</sup>	33 <sup>2</sup>	.	32 <sup>2</sup>	14 <sup>2</sup>	24 <sup>2</sup>	.
	<i>Trommsdorffia maculata</i>	56 <sup>2</sup>	25 <sup>2</sup>	41 <sup>2</sup>	.	.	.	.	.	.
cy na	<i>Conioselinum tataricum</i>	.	38 <sup>2</sup>	18 <sup>2</sup>	.	.	.	7 <sup>2</sup>	3 <sup>2</sup>	.
	<i>Dianthus *compactus</i>	.	.	.	.	.	11 <sup>2</sup>	.	6 <sup>2</sup>	50 <sup>2</sup>
	<i>Tithymalus sojakii</i>	.	.	.	.	.	5 <sup>2</sup>	.	3 <sup>2</sup>	25 <sup>3</sup>
(Fs)	<i>Aconitum lasiocarpum</i>	.	.	.	.	.	21 <sup>3</sup>	.	12 <sup>3</sup>	8 <sup>3</sup>
	<i>Cirsium waldsteinii</i>	.	.	.	.	.	5 <sup>3</sup>	.	8 <sup>3</sup>	8 <sup>2</sup>
	<i>Picris *villarsii</i>	.	.	.	.	.	.	7 <sup>2</sup>	3 <sup>2</sup>	.
<b>Calamagrostietalia villosae</b>										
Ns	<i>Luzula *rubella</i>	89 <sup>3</sup>	38 <sup>2</sup>	65 <sup>3</sup>	99 <sup>4</sup>	99 <sup>4</sup>	79 <sup>3</sup>	71 <sup>2</sup>	76 <sup>2</sup>	92 <sup>3</sup>
	<i>Pyrethrum clusii</i>	99 <sup>3</sup>	99 <sup>3</sup>	99 <sup>3</sup>	67 <sup>3</sup>	99 <sup>2</sup>	68 <sup>3</sup>	43 <sup>3</sup>	58 <sup>3</sup>	58 <sup>3</sup>
	<i>Campanula serrata</i>	89 <sup>2</sup>	99 <sup>2</sup>	94 <sup>2</sup>	33 <sup>2</sup>	99 <sup>3</sup>	5 <sup>2</sup>	79 <sup>2</sup>	36 <sup>2</sup>	17 <sup>2</sup>
	<i>Achillea *alpestris</i>	99 <sup>3</sup>	88 <sup>2</sup>	94 <sup>2</sup>	99 <sup>3</sup>	70 <sup>3</sup>	26 <sup>2</sup>	64 <sup>3</sup>	42 <sup>2</sup>	.
ac	<i>Pimpinella *rhodochlamys</i>	99 <sup>4</sup>	99 <sup>5</sup>	99 <sup>4</sup>	89 <sup>3</sup>	60 <sup>2</sup>	5 <sup>2</sup>	93 <sup>3</sup>	42 <sup>3</sup>	.
	<i>Acetosa arifolia</i>	22 <sup>2</sup>	50 <sup>2</sup>	35 <sup>2</sup>	22 <sup>2</sup>	10 <sup>2</sup>	26 <sup>4</sup>	64 <sup>5</sup>	42 <sup>4</sup>	.
	<i>A. *carpatica</i>	.	.	.	.	.	.	.	.	92 <sup>3</sup>
st na	<i>Crepis mollis</i>	89 <sup>3</sup>	.	47 <sup>3</sup>	99 <sup>2</sup>	60 <sup>2</sup>	5 <sup>2</sup>	57 <sup>2</sup>	27 <sup>2</sup>	8 <sup>1</sup>
	<i>Linum extraaxillare</i>	22 <sup>4</sup>	75 <sup>3</sup>	47 <sup>3</sup>	99 <sup>4</sup>	20 <sup>4</sup>	.	14 <sup>2</sup>	6 <sup>2</sup>	.
(ca)	<i>Poa chaixii</i>	33 <sup>2</sup>	.	18 <sup>2</sup>	22 <sup>2</sup>	.	5 <sup>2</sup>	43 <sup>2</sup>	21 <sup>2</sup>	67 <sup>3</sup>
	<i>Solidago *minuta</i>	33 <sup>2</sup>	13 <sup>1</sup>	24 <sup>2</sup>	.	.	68 <sup>3</sup>	21 <sup>2</sup>	48 <sup>3</sup>	67 <sup>3</sup>
	<i>Bupleurum *vapincense</i>	33 <sup>2</sup>	75 <sup>3</sup>	53 <sup>3</sup>	33 <sup>2</sup>	.	21 <sup>3</sup>	21 <sup>4</sup>	21 <sup>3</sup>	.
na st	<i>Vicia oreophila</i>	89 <sup>2</sup>	75 <sup>3</sup>	82 <sup>3</sup>	22 <sup>3</sup>	30 <sup>2</sup>	.	7 <sup>2</sup>	3 <sup>2</sup>	.
	<i>Ranunculus nemorosus</i>	78 <sup>3</sup>	88 <sup>3</sup>	82 <sup>3</sup>	11 <sup>1</sup>	80 <sup>2</sup>	.	64 <sup>2</sup>	27 <sup>2</sup>	.
	<i>Phleum hirsutum</i>	78 <sup>2</sup>	75 <sup>3</sup>	76 <sup>2</sup>	89 <sup>3</sup>	60 <sup>2</sup>	.	29 <sup>2</sup>	12 <sup>2</sup>	.
	<i>Allium victorialis</i>	33 <sup>2</sup>	.	18 <sup>2</sup>	.	50 <sup>2</sup>	.	14 <sup>2</sup>	6 <sup>2</sup>	.
	<i>Trollius altissimus</i>	56 <sup>2</sup>	.	29 <sup>2</sup>	.	40 <sup>3</sup>	.	21 <sup>2</sup>	9 <sup>2</sup>	.

Community		A1	A2	A	B	C	D1	D2	D	E
Number of relevés		9	8	17	9	10	19	14	33	12
na	<i>Avenella flexuosa</i>	22 <sup>2</sup>	.	12 <sup>2</sup>	22 <sup>2</sup>	80 <sup>4</sup>	.	.	.	.
	<i>Avenula planiculmis</i>	22 <sup>1</sup>	13 <sup>2</sup>	18 <sup>1</sup>	.	60 <sup>4</sup>	.	.	.	.
Ns	<i>Potentilla aurea</i>	.	.	.	33 <sup>3</sup>	80 <sup>3</sup>	11 <sup>2</sup>	21 <sup>2</sup>	15 <sup>2</sup>	.
	<i>Anemone narcissiflora</i>	11 <sup>1</sup>	.	6 <sup>1</sup>	67 <sup>3</sup>	50 <sup>2</sup>	.	.	.	.
	<i>Jacea pseudophrygia</i>	44 <sup>3</sup>	.	24 <sup>3</sup>	.	10 <sup>2</sup>	.	.	.	.
	<i>Viola *sudetica</i>	.	38 <sup>2</sup>	18 <sup>2</sup>	.	40 <sup>3</sup>	.	.	.	.
QF	<i>Crepis sibirica</i>	.	13 <sup>3</sup>	6 <sup>3</sup>	.	.	.	.	.	.
Ns	<i>Crepis conyzifolia</i>	.	.	.	44 <sup>4</sup>	30 <sup>3</sup>	.	.	.	75 <sup>3</sup>
cv	<i>Trommsdorfia uniflora</i>	.	.	.	44 <sup>3</sup>	10 <sup>2</sup>	.	.	.	50 <sup>2</sup>
VP	<i>Calamagrostis villosa</i>	.	.	.	22 <sup>3</sup>	.	.	21 <sup>3</sup>	9 <sup>3</sup>	.
cv	<i>Campanula tatrae</i>	.	.	.	22 <sup>2</sup>	.	.	.	.	.
<b>Mulgedio-Aconitetea</b>										
	<i>Campanula elliptica</i>	99 <sup>4</sup>	99 <sup>4</sup>	99 <sup>4</sup>	99 <sup>2</sup>	20 <sup>2</sup>	21 <sup>2</sup>	36 <sup>2</sup>	27 <sup>2</sup>	42 <sup>2</sup>
	<i>Heracleum *trachycarpum</i>	44 <sup>2</sup>	99 <sup>3</sup>	71 <sup>3</sup>	56 <sup>2</sup>	10 <sup>2</sup>	58 <sup>2</sup>	43 <sup>2</sup>	52 <sup>2</sup>	25 <sup>2</sup>
	<i>Knautia maxima</i>	67 <sup>3</sup>	88 <sup>3</sup>	76 <sup>3</sup>	.	30 <sup>2</sup>	58 <sup>3</sup>	79 <sup>2</sup>	67 <sup>3</sup>	75 <sup>3</sup>
fs	<i>Astrantia major</i>	22 <sup>3</sup>	88 <sup>2</sup>	53 <sup>2</sup>	44 <sup>3</sup>	10 <sup>1</sup>	.	64 <sup>2</sup>	27 <sup>2</sup>	25 <sup>3</sup>
ce	<i>Cirsium erisithales</i>	99 <sup>3</sup>	38 <sup>3</sup>	71 <sup>3</sup>	99 <sup>2</sup>	10 <sup>1</sup>	79 <sup>2</sup>	71 <sup>3</sup>	76 <sup>3</sup>	.
ac	<i>Geranium sylvaticum</i>	56 <sup>2</sup>	75 <sup>3</sup>	65 <sup>2</sup>	99 <sup>3</sup>	40 <sup>2</sup>	53 <sup>3</sup>	86 <sup>3</sup>	67 <sup>3</sup>	.
	<i>Gentiana asclepiadea</i>	11 <sup>2</sup>	.	6 <sup>2</sup>	44 <sup>2</sup>	.	63 <sup>2</sup>	67 <sup>2</sup>	67 <sup>2</sup>	83 <sup>3</sup>
po	<i>Aconitum variegatum</i>	56 <sup>3</sup>	13 <sup>2</sup>	35 <sup>3</sup>	.	.	11 <sup>2</sup>	43 <sup>4</sup>	24 <sup>3</sup>	.
aa	<i>Ranunculus platanifolius</i>	.	50 <sup>2</sup>	24 <sup>2</sup>	.	.	47 <sup>2</sup>	29 <sup>2</sup>	39 <sup>2</sup>	8 <sup>2</sup>
po, cu	<i>Carduus personata</i>	.	38 <sup>2</sup>	18 <sup>2</sup>	.	.	26 <sup>2</sup>	21 <sup>2</sup>	24 <sup>2</sup>	8 <sup>1</sup>
po, ai	<i>Roegneria canina</i>	.	50 <sup>2</sup>	24 <sup>2</sup>	.	.	16 <sup>2</sup>	29 <sup>2</sup>	21 <sup>2</sup>	.
ac	<i>Veratrum *lobelianum</i>	.	.	.	11 <sup>2</sup>	.	5 <sup>2</sup>	36 <sup>1</sup>	18 <sup>2</sup>	8 <sup>2</sup>
aa	<i>Aconitum firmum</i>	.	.	.	11 <sup>2</sup>	.	5 <sup>2</sup>	7 <sup>1</sup>	6 <sup>2</sup>	.
ac	<i>Senecio subalpinus</i>	.	.	.	33 <sup>2</sup>	30 <sup>2</sup>	.	50 <sup>2</sup>	21 <sup>2</sup>	.
aa, cu	<i>Epilobium alpestre</i>	.	.	.	33 <sup>2</sup>	.	.	36 <sup>2</sup>	15 <sup>2</sup>	.
aa, ai	<i>Thalictrum aquilegifolium</i>	.	.	.	11 <sup>2</sup>	.	.	21 <sup>1</sup>	9 <sup>1</sup>	.

Community		A1	A2	A	B	C	D1	D2	D	E
Number of relevés		9	8	17	9	10	19	14	33	12
po,aa	<i>Laserpitium archangelica</i>	.	.	.	.	.	.	29 <sup>7</sup>	12 <sup>7</sup>	.
aa,ac	<i>Cicerbita alpina</i>	.	.	.	.	.	.	21 <sup>2</sup>	9 <sup>2</sup>	.
ca,po	<i>Erysimum wahlenbergii</i>	.	.	.	.	.	.	14 <sup>6</sup>	6 <sup>6</sup>	.
aa	<i>Athyrium distentifolium</i>	.	.	.	.	.	.	14 <sup>2</sup>	6 <sup>2</sup>	.
<b>Querco-Fagetea, Vaccinio-Piceetea and other forest taxa</b>										
Fs(ca)	<i>Lilium martagon</i>	56 <sup>2</sup>	25 <sup>1</sup>	41 <sup>1</sup>	44 <sup>2</sup>	10 <sup>2</sup>	47 <sup>1</sup>	14 <sup>2</sup>	33 <sup>2</sup>	17 <sup>1</sup>
fs	<i>Polygonatum verticillatum</i>	.	63 <sup>2</sup>	29 <sup>2</sup>	44 <sup>3</sup>	20 <sup>2</sup>	53 <sup>2</sup>	50 <sup>2</sup>	52 <sup>2</sup>	50 <sup>2</sup>
Fs,EA	<i>Senecio nemorensis</i> agg. <sup>(1)</sup>	.	25 <sup>2</sup>	12 <sup>2</sup>	22 <sup>1</sup>	.	37 <sup>4</sup>	36 <sup>3</sup>	36 <sup>4</sup>	8 <sup>1</sup>
VP	<i>Vaccinium vitis-idaea</i>	11 <sup>2</sup>	.	6 <sup>2</sup>	11 <sup>3</sup>	10 <sup>3</sup>	.	7 <sup>2</sup>	3 <sup>2</sup>	25 <sup>1</sup>
Fs	<i>Asarum europaeum</i>	44 <sup>2</sup>	75 <sup>2</sup>	59 <sup>2</sup>	33 <sup>3</sup>	.	.	50 <sup>3</sup>	21 <sup>3</sup>	8 <sup>2</sup>
Fs	<i>Mercurialis perennis</i>	33 <sup>2</sup>	13 <sup>2</sup>	24 <sup>2</sup>	11 <sup>2</sup>	.	32 <sup>2</sup>	21 <sup>2</sup>	27 <sup>2</sup>	.
Fs,VP	<i>Hieracium murorum</i>	44 <sup>2</sup>	63 <sup>2</sup>	53 <sup>2</sup>	.	.	32 <sup>2</sup>	14 <sup>2</sup>	24 <sup>2</sup>	25 <sup>1</sup>
	<i>Rosa pendulina</i>	33 <sup>2</sup>	.	18 <sup>2</sup>	.	.	32 <sup>2</sup>	36 <sup>2</sup>	33 <sup>2</sup>	17 <sup>3</sup>
Fs	<i>Tithymalus amygdaloides</i>	11 <sup>1</sup>	88 <sup>2</sup>	47 <sup>2</sup>	.	10 <sup>2</sup>	.	71 <sup>2</sup>	30 <sup>2</sup>	.
ac,cy	<i>Valeriana tripteris</i>	22 <sup>2</sup>	13 <sup>2</sup>	18 <sup>2</sup>	.	.	42 <sup>2</sup>	21 <sup>2</sup>	33 <sup>2</sup>	.
Fs	<i>Acer pseudoplatanus</i>	.	25 <sup>3</sup>	12 <sup>3</sup>	.	.	32 <sup>2</sup>	14 <sup>2</sup>	24 <sup>2</sup>	17 <sup>1</sup>
Fs,ap	<i>Aegopodium podagraria</i>	.	25 <sup>2</sup>	12 <sup>2</sup>	.	.	5 <sup>2</sup>	14 <sup>2</sup>	9 <sup>2</sup>	17 <sup>2</sup>
Fs,Cv	<i>Phyteuma spicatum</i>	.	.	.	33 <sup>2</sup>	10 <sup>2</sup>	21 <sup>2</sup>	7 <sup>2</sup>	15 <sup>2</sup>	25 <sup>2</sup>
ac,GU	<i>Scrophularia scopolii</i>	.	13 <sup>1</sup>	6 <sup>1</sup>	.	.	11 <sup>2</sup>	36 <sup>2</sup>	21 <sup>2</sup>	.
Fs	<i>Cardamine impatiens</i>	.	13 <sup>1</sup>	6 <sup>1</sup>	.	.	5 <sup>1</sup>	14 <sup>2</sup>	9 <sup>2</sup>	.
Fs	<i>Myosotis sylvatica</i>	.	.	.	33 <sup>2</sup>	.	11 <sup>3</sup>	50 <sup>2</sup>	27 <sup>2</sup>	.
ai,Mo	<i>Angelica sylvestris</i>	.	.	.	33 <sup>3</sup>	.	32 <sup>2</sup>	.	18 <sup>2</sup>	33 <sup>3</sup>
Fs	<i>Paris quadrifolia</i>	.	.	.	11 <sup>2</sup>	.	.	14 <sup>2</sup>	6 <sup>2</sup>	8 <sup>1</sup>
VP	<i>Vaccinium myrtillus</i>	.	.	.	.	70 <sup>5</sup>	16 <sup>3</sup>	36 <sup>3</sup>	24 <sup>3</sup>	42 <sup>2</sup>
ac,aa	<i>Silene dioica</i>	.	.	.	.	.	32 <sup>2</sup>	7 <sup>2</sup>	21 <sup>2</sup>	8 <sup>2</sup>
Fs	<i>Athyrium filix-femina</i>	.	.	.	.	.	5 <sup>1</sup>	7 <sup>2</sup>	6 <sup>2</sup>	17 <sup>2</sup>
ac,aa	<i>Doronicum austriacum</i>	.	.	.	.	.	5 <sup>2</sup>	7 <sup>2</sup>	6 <sup>2</sup>	8 <sup>1</sup>
QF	<i>Campanula rapunculoides</i>	.	.	.	.	.	32 <sup>2</sup>	7 <sup>2</sup>	21 <sup>2</sup>	.

Community		A1	A2	A	B	C	D1	D2	D	E
Number of relevés		9	8	17	9	10	19	14	33	12
ac,po	<i>Valeriana *sambucifolia</i>	.	.	.	.	.	26 <sup>2</sup>	7 <sup>2</sup>	18 <sup>2</sup>	.
	<i>Maianthemum bifolium</i>	.	.	.	.	.	11 <sup>2</sup>	29 <sup>2</sup>	18 <sup>2</sup>	.
fs	<i>Prenanthes purpurea</i>	.	.	.	.	.	16 <sup>2</sup>	14 <sup>2</sup>	15 <sup>2</sup>	.
	<i>Dryopteris carthusiana</i>	.	.	.	.	.	11 <sup>2</sup>	14 <sup>2</sup>	12 <sup>2</sup>	.
Fs,aa	<i>Milium effusum</i>	.	.	.	.	.	11 <sup>2</sup>	14 <sup>2</sup>	12 <sup>2</sup>	.
ai	<i>Oxalis acetosella</i>	.	.	.	.	.	11 <sup>2</sup>	14 <sup>2</sup>	12 <sup>2</sup>	.
fs	<i>Dentaria bulbifera</i>	.	.	.	.	.	11 <sup>2</sup>	7 <sup>2</sup>	9 <sup>2</sup>	.
fs	<i>Hordelymus europaeus</i>	.	.	.	.	.	5 <sup>3</sup>	7 <sup>3</sup>	6 <sup>3</sup>	.
Fs	<i>Epilobium collinum</i>	.	.	.	.	.	5 <sup>2</sup>	14 <sup>2</sup>	9 <sup>2</sup>	.
fs	<i>Dentaria enneaphyllos</i>	.	.	.	.	.	5 <sup>2</sup>	7 <sup>2</sup>	6 <sup>2</sup>	.
ta	<i>Ribes alpinum</i>	.	.	.	.	.	5 <sup>1</sup>	7 <sup>2</sup>	6 <sup>2</sup>	.
ta	<i>Aruncus vulgaris</i>	.	.	.	.	.	5 <sup>1</sup>	7 <sup>1</sup>	6 <sup>1</sup>	.
Fs	<i>Lonicera xylosteum</i>	.	.	.	.	.	32 <sup>2</sup>	.	18 <sup>2</sup>	.
Fs	<i>Aconitum moldavicum</i>	.	.	.	.	.	21 <sup>2</sup>	.	12 <sup>2</sup>	.
Fs(ca)	<i>Lathyrus laevigatus</i>	.	.	.	.	.	16 <sup>2</sup>	.	9 <sup>2</sup>	.
Fs	<i>Campanula trachelium</i>	.	.	.	.	.	.	21 <sup>2</sup>	9 <sup>2</sup>	.
Fs	<i>Anemone nemorosa</i>	.	.	.	.	.	.	.	.	33 <sup>3</sup>
<b>Molinio-Arrhenatheretea, Nardo-Callunetea</b>										
Ae,na	<i>Leucanthemum margaritae</i>	89 <sup>2</sup>	88 <sup>3</sup>	88 <sup>3</sup>	22 <sup>2</sup>	30 <sup>2</sup>	5 <sup>2</sup>	29 <sup>2</sup>	15 <sup>2</sup>	.
Ae	<i>Veronica chamaedrys</i>	11 <sup>2</sup>	75 <sup>2</sup>	41 <sup>2</sup>	.	40 <sup>2</sup>	53 <sup>2</sup>	50 <sup>2</sup>	52 <sup>2</sup>	50 <sup>2</sup>
na	<i>Hieracium lachenalii</i>	33 <sup>1</sup>	25 <sup>2</sup>	29 <sup>2</sup>	.	50 <sup>1</sup>	37 <sup>2</sup>	7 <sup>2</sup>	24 <sup>2</sup>	8 <sup>2</sup>
na	<i>Cruciata glabra</i>	33 <sup>3</sup>	88 <sup>3</sup>	59 <sup>3</sup>	.	90 <sup>2</sup>	5 <sup>2</sup>	21 <sup>2</sup>	12 <sup>2</sup>	83 <sup>3</sup>
Ae	<i>Dactylis *slovenica</i>	22 <sup>2</sup>	25 <sup>3</sup>	24 <sup>2</sup>	11 <sup>2</sup>	.	16 <sup>3</sup>	64 <sup>2</sup>	36 <sup>3</sup>	42 <sup>3</sup>
Ae,be	<i>Tragopogon orientalis</i>	99 <sup>2</sup>	75 <sup>2</sup>	88 <sup>2</sup>	11 <sup>2</sup>	10 <sup>1</sup>	.	7 <sup>2</sup>	3 <sup>2</sup>	.
Ae,na	<i>Lotus corniculatus</i>	67 <sup>2</sup>	75 <sup>2</sup>	71 <sup>2</sup>	56 <sup>2</sup>	10 <sup>2</sup>	.	7 <sup>2</sup>	3 <sup>2</sup>	17 <sup>2</sup>
MA	<i>Lathyrus pratensis</i>	44 <sup>3</sup>	63 <sup>2</sup>	53 <sup>3</sup>	11 <sup>3</sup>	10 <sup>2</sup>	21 <sup>2</sup>	7 <sup>2</sup>	15 <sup>2</sup>	.
Ae	<i>Vicia sepium</i>	22 <sup>2</sup>	38 <sup>2</sup>	29 <sup>2</sup>	22 <sup>2</sup>	10 <sup>2</sup>	.	64 <sup>3</sup>	27 <sup>3</sup>	.
Ae	<i>Trifolium pratense</i>	11 <sup>2</sup>	75 <sup>2</sup>	41 <sup>2</sup>	.	20 <sup>2</sup>	5 <sup>2</sup>	.	3 <sup>2</sup>	17 <sup>2</sup>



Community	A1	A2	A	B	C	D1	D2	D	E	
Number of relevés	9	8	17	9	10	19	14	33	12	
<b>Elyno-Seslerietea</b>										
	<i>Phyteuma orbiculare</i>	78 <sup>2</sup>	63 <sup>2</sup>	71 <sup>2</sup>	78 <sup>2</sup>	.	16 <sup>2</sup>	36 <sup>2</sup>	24 <sup>2</sup>	.
	<i>Galium anisophyllum</i>	78 <sup>2</sup>	99 <sup>3</sup>	88 <sup>2</sup>	33 <sup>2</sup>	.	.	43 <sup>2</sup>	18 <sup>2</sup>	.
	<i>Polygala *brachyptera</i>	11 <sup>2</sup>	50 <sup>2</sup>	29 <sup>2</sup>	.	.	11 <sup>2</sup>	.	6 <sup>2</sup>	.
	<i>Thesium alpinum</i>	44 <sup>2</sup>	63 <sup>2</sup>	53 <sup>2</sup>	.	.	.	14 <sup>2</sup>	6 <sup>2</sup>	.
sa	<i>Festuca tatrae</i>	22 <sup>3</sup>	.	12 <sup>3</sup>	.	.	5 <sup>5</sup>	21 <sup>3</sup>	12 <sup>4</sup>	.
sa	<i>Knautia kitaibelii</i>	.	25 <sup>2</sup>	12 <sup>2</sup>	.	.	.	.	.	.
cf,st	<i>Potentilla crantzii</i>	.	.	.	33 <sup>2</sup>	.	.	.	.	.
st,fv	<i>Myosotis alpestris</i>	.	.	.	22 <sup>2</sup>	.	.	.	.	.
	<i>Ranunculus breyninus</i>	.	.	.	22 <sup>2</sup>	.	.	.	.	.
ce	<i>Carduus glaucinus</i>	.	.	.	22 <sup>2</sup>	.	.	.	.	.
<b>Other taxa</b>										
	<i>Hypericum maculatum</i>	44 <sup>2</sup>	75 <sup>2</sup>	59 <sup>2</sup>	56 <sup>2</sup>	99 <sup>3</sup>	89 <sup>3</sup>	93 <sup>3</sup>	91 <sup>3</sup>	99 <sup>5</sup>
	<i>Thymus alpestris</i>	33 <sup>2</sup>	75 <sup>3</sup>	53 <sup>2</sup>	78 <sup>3</sup>	20 <sup>2</sup>	16 <sup>2</sup>	7 <sup>2</sup>	12 <sup>2</sup>	25 <sup>2</sup>
	<i>Agrostis capillaris</i>	78 <sup>2</sup>	50 <sup>3</sup>	65 <sup>3</sup>	.	99 <sup>4</sup>	11 <sup>3</sup>	21 <sup>2</sup>	15 <sup>2</sup>	83 <sup>3</sup>
	<i>Primula elatior</i>	67 <sup>2</sup>	50 <sup>2</sup>	59 <sup>2</sup>	67 <sup>2</sup>	.	16 <sup>2</sup>	57 <sup>2</sup>	33 <sup>2</sup>	8 <sup>2</sup>
	<i>Carlina acaulis</i>	78 <sup>2</sup>	75 <sup>3</sup>	76 <sup>2</sup>	78 <sup>3</sup>	90 <sup>2</sup>	.	21 <sup>3</sup>	9 <sup>3</sup>	67 <sup>2</sup>
FB(ca)	<i>Dianthus carthusianorum</i>	44 <sup>3</sup>	88 <sup>2</sup>	65 <sup>3</sup>	33 <sup>2</sup>	20 <sup>4</sup>	5 <sup>2</sup>	14 <sup>2</sup>	9 <sup>2</sup>	.
	<i>Hieracium bifidum</i>	.	38 <sup>2</sup>	18 <sup>2</sup>	11 <sup>3</sup>	20 <sup>2</sup>	16 <sup>2</sup>	14 <sup>2</sup>	15 <sup>2</sup>	.
EA	<i>Fragaria vesca</i>	99 <sup>2</sup>	99 <sup>2</sup>	99 <sup>2</sup>	33 <sup>2</sup>	10 <sup>2</sup>	95 <sup>2</sup>	64 <sup>3</sup>	82 <sup>2</sup>	.
MC	<i>Viola biflora</i>	11 <sup>2</sup>	.	6 <sup>2</sup>	22 <sup>2</sup>	10 <sup>2</sup>	16 <sup>2</sup>	50 <sup>4</sup>	30 <sup>3</sup>	.
Be(ca)	<i>Briza media</i>	67 <sup>2</sup>	88 <sup>3</sup>	76 <sup>3</sup>	.	30 <sup>2</sup>	.	14 <sup>2</sup>	6 <sup>2</sup>	17 <sup>2</sup>
	<i>Gymnadenia conopsea</i>	11 <sup>1</sup>	25 <sup>2</sup>	18 <sup>1</sup>	.	20 <sup>1</sup>	.	7 <sup>1</sup>	3 <sup>1</sup>	17 <sup>1</sup>
	<i>Cardaminopsis arenosa</i> agg.	78 <sup>2</sup>	38 <sup>2</sup>	59 <sup>2</sup>	33 <sup>2</sup>	.	11 <sup>2</sup>	57 <sup>2</sup>	30 <sup>2</sup>	.
	<i>Stachys alpina</i>	11 <sup>2</sup>	13 <sup>3</sup>	12 <sup>3</sup>	22 <sup>2</sup>	.	5 <sup>2</sup>	29 <sup>2</sup>	15 <sup>2</sup>	.
	<i>Carex flacca</i>	11 <sup>1</sup>	25 <sup>2</sup>	18 <sup>1</sup>	22 <sup>3</sup>	.	.	29 <sup>2</sup>	12 <sup>2</sup>	.
	<i>Thymus pulegioides</i>	44 <sup>2</sup>	38 <sup>3</sup>	41 <sup>2</sup>	.	.	11 <sup>2</sup>	.	6 <sup>2</sup>	.

Community		A1	A2	A	B	C	D1	D2	D	E
Number of relevés		9	8	17	9	10	19	14	33	12
ss	<i>Salix silesiaca</i>	44 <sup>2</sup>	.	24 <sup>2</sup>	.	.	5 <sup>1</sup>	50 <sup>2</sup>	24 <sup>2</sup>	.
	<i>Rhinanthus serotinus</i>	.	13 <sup>3</sup>	6 <sup>3</sup>	.	.	11 <sup>3</sup>	29 <sup>3</sup>	18 <sup>3</sup>	25 <sup>2</sup>
cy	<i>Cystopteris fragilis</i>	.	25 <sup>2</sup>	12 <sup>2</sup>	.	.	5 <sup>2</sup>	14 <sup>2</sup>	9 <sup>2</sup>	.
	<i>Geranium robertianum</i>	.	13 <sup>2</sup>	6 <sup>2</sup>	.	.	5 <sup>1</sup>	7 <sup>3</sup>	6 <sup>2</sup>	.
	<i>Alchemilla xanthochlora</i>	.	13 <sup>2</sup>	6 <sup>2</sup>	.	.	.	7 <sup>2</sup>	3 <sup>2</sup>	.
	<i>Viola hirta</i>	.	13 <sup>2</sup>	6 <sup>2</sup>	.	.	5 <sup>2</sup>	.	3 <sup>2</sup>	.
	<i>Aquilegia vulgaris</i>	.	13 <sup>1</sup>	6 <sup>1</sup>	.	.	5 <sup>2</sup>	.	3 <sup>2</sup>	.
	<i>Carex muricata</i>	.	13 <sup>1</sup>	6 <sup>1</sup>	.	.	5 <sup>2</sup>	.	3 <sup>2</sup>	.
GU	<i>Lamium maculatum</i>	.	13 <sup>2</sup>	6 <sup>2</sup>	.	.	.	7 <sup>2</sup>	3 <sup>2</sup>	.
	<i>Anthoxanthum alpinum</i>	.	13 <sup>2</sup>	6 <sup>2</sup>	78 <sup>3</sup>	30 <sup>2</sup>	.	.	.	8 <sup>3</sup>
	<i>Alchemilla</i> sp.	.	.	.	11 <sup>2</sup>	.	16 <sup>2</sup>	7 <sup>2</sup>	12 <sup>2</sup>	.
cb	<i>Brachypodium pinnatum</i>	33 <sup>2</sup>	38 <sup>2</sup>	35 <sup>2</sup>	.	.	.	.	.	.
	<i>Traunsteinera globosa</i>	33 <sup>1</sup>	13 <sup>1</sup>	24 <sup>1</sup>	.	.	.	.	.	.
pc	<i>Primula auricula</i>	22 <sup>2</sup>	.	12 <sup>2</sup>	.	.	.	.	.	.
pc	<i>Cotoneaster matrensis</i>	22 <sup>2</sup>	.	12 <sup>2</sup>	.	.	.	.	.	.
	<i>Tithymalus epithymoides</i>	.	25 <sup>2</sup>	12 <sup>2</sup>	.	.	.	.	.	.
	<i>Gentianella lutescens</i>	.	25 <sup>2</sup>	12 <sup>2</sup>	.	.	.	.	.	.
	<i>Euphrasia kernerii</i>	.	.	.	.	.	5 <sup>2</sup>	7 <sup>2</sup>	6 <sup>2</sup>	.
cy	<i>Asplenium viride</i>	.	.	.	.	.	5 <sup>2</sup>	7 <sup>2</sup>	6 <sup>2</sup>	.
	<i>Campanula rotundifolia</i>	.	.	.	.	.	21 <sup>2</sup>	.	12 <sup>2</sup>	.
fv	<i>Festuca versicolor</i>	.	.	.	33 <sup>3</sup>	.	.	.	.	.
	<i>Bistorta major</i>	.	.	.	22 <sup>2</sup>	.	.	.	.	.
	<i>Parnassia palustris</i>	.	.	.	22 <sup>2</sup>	.	.	.	.	.
	<i>Pilosella aurantiaca</i>	.	.	.	22 <sup>2</sup>	.	.	.	.	.
<b>Bryophytes</b>										
	<i>Tortella tortuosa</i>	.	38 <sup>2</sup>	18 <sup>2</sup>	33 <sup>3</sup>	.	5 <sup>2</sup>	36 <sup>3</sup>	18 <sup>3</sup>	.
	<i>Pleurozium schreberi</i>	.	13 <sup>2</sup>	6 <sup>2</sup>	11 <sup>1</sup>	.	5 <sup>2</sup>	.	3 <sup>2</sup>	17 <sup>2</sup>
	<i>Brachythecium velutinum</i>	.	13 <sup>2</sup>	6 <sup>2</sup>	.	.	.	29 <sup>2</sup>	12 <sup>2</sup>	.

