

Clearing communities of the Bohemian Forest

Victoria Eltsova

Av. Jomini 16, CH-1004 Lausanne, Switzerland
victoriaeltsova@yandex.ru

Abstract

The contribution is focused on the clearing communities of the Bohemian Forest, mainly on the communities of clear cuts of high mountain level. Their variability, structure, habitats and distribution have been characterized. The main attention was concentrated on the most frequent association *Junco effusi-Calamagrostietum villosae* Šýkora 1983. The subassociation *Junco effusi-Calamagrostietum villosae athyrietosum* was distinguished and described as a new syntaxon.

Key words: clearing communities, phytosociology, distribution, ordination, Bohemian Forest

INTRODUCTION

In the last years the intensive studies of the diversity and dynamics of vegetation of the Bohemian Forest have been conducting. Mostly, the investigations were focused on the communities of spruce and spruce-beech forests. The attention of the previous studies of clearing communities of the Bohemian Forest has been paid to the detailed analysis of the stands dominated by *Calamagrostis villosa* or study of the clearings of a limited area (SOFRON 1985, MATĚJKOVÁ 1996, NEUHÄUSLOVÁ & WILD 2001). The main aim of this contribution is to analyze the clearing communities that belong to the class *Epilobietea angustifolii* in more detail. In the present work I concentrated mainly on the communities of clear cuts of high mountain level of the Šumava National Park (Studená Hora Ridge, Černá Hora Mt., Trojmezná Hornatina Highland etc.) in the area of the vast spruce plantation, where damage of forest massifs caused by attack of bark-beetle, and, correspondingly, following deforestation were most intensive.

METHODOLOGY

The phytocoenological relevés were recorded in 2000–2001 according to the principles of the Braun-Blanquet approach (BRAUN-BLANQUET 1964, MORAVEC 1994) and analyzed by the computer program TWINSPAN (HILL 1979). In addition to my own records, unpublished data collected in the Bohemian Forest by Z. Neuhäuslová (1999, 2000) also have been used for the synthesis. Detrended Correspondence Analysis (DCA) in the program package CANOCO for Windows (TER BRAAK & ŠMILAUER 1998) was used for the visualisation of variation among the communities. Before analysis, the species occurring in less than 3 relevés were excluded from the data set.

The nomenclature of the vascular plants followed EHRENDORFER (1973), the names of bryophytes to FRAHM & FREY (1992) and that of lichens to POELT (1969). The names of syntaxa were in accordance to MORAVEC (1995). The bryophytes were determined by H. Franklová and B. Buryová, the lichens by Z. Palice.

THE SURVEY OF SYNTAXA

Class *Epilobietea angustifolii* Tüxen & Preising in Tüxen 1950

Order *Atropetalia* Vlieger 1937

Alliance *Rumici-Avenellion flexuosae* Passarge 1984

As. *Junco effusi-Calamagrostietum villosae* Sýkora 1983

Subas. *Junco effusi-Calamagrostietum villosae typicum* Neuhäuslová 2001

Subas. *Junco effusi-Calamagrostietum villosae luzuletosum sylvaticae*
Neuhäuslová 2001

Subas. *Junco effusi-Calamagrostietum villosae athyrietosum*
subas. nova Eltsova hoc loco

As. *Myrtillo-Avenelletum flexuosae* (Schlüter 1966) Passarge 1984.

Order *Sambucetalia* Oberdorfer 1957

Alliance *Sambuco-Salicion capreae* Tüxen & Neumann in Tüxen 1950

As. *Senecionetum fuchsii* Kaiser 1926

As. *Rubetum idaei* Pfeifer 1936 em. Oberdorfer 1973

CHARACTERISTICS OF THE VEGETATION UNITS

1. *Epilobietea angustifolii* Tüxen & Preising in Tüxen 1950

1.1 *Rumici-Avenellion flexuosae* Passarge 1984

a) *Junco effusi-Calamagrostietum villosae* Sýkora 1983

Diagnostic species combination: *Calamagrostis villosa* (dom.), *Galium saxatile*, *Juncus effusus*, *Senecio hercynicus*, *Trientalis europaea*.

Structure and species composition: Species poor community dominated by *Calamagrostis villosa* with admixture of the indicators of mountain spruce forest (*Galium saxatile*, *Oxalis acetosella*, *Senecio hercynicus*, *Trientalis europaea*), where *Avenella flexuosa*, *Vaccinium myrtillosum*, *Luzula sylvatica*, less frequently *Athyrium distentifolium* could have subdominant position. Besides, typical species of clearing communities *Epilobium angustifolium*, *Rubus idaeus*, several species of beech forests such as *Luzula luzuloides*, *L. pilosa*, *Prenanthes purpurea*, *Polygonatum verticillatum* and the elements of moisture stands (*Juncus effusus*, *J. filiformis*, *Carex canescens*) are represented. Rarely, meadow and pasture species occur (*Deschampsia cespitosa*, *Holcus mollis*, *Agrostis capillaris*). The cover of the herb layer achieves mostly 60–90%. The scrub layer composed by the pioneer woody species such as birch and willow and the woody species native for the mountain level of the Hercynian range (*Picea abies*, *Fagus sylvatica*, *Abies alba*), which are predominantly planted. The natural regeneration of them is extremely weak and is represented, generally, by the young trees established before the logging of the forest. The ground layer is usually well developed and averaged 40–45%. The most frequent bryophytes are *Polytrichum formosum*, *Dicranum scoparium*, *Orthodicranum montanum*, and *Plagiothecium laetum*.

Habitat: The *Junco effusi-Calamagrostietum villosae* represents a substitute clearing community after logging of climax spruce forests (as. *Calamagrostio villosae-Piceetum* Hartmann in Hartmann & Jahn 1967), acidophilous spruce(-fir)-beech forests (as. *Calamagrostio villosae-Fagetum* Mikyška 1972) or spruce plantations at the mountain and high mountain level with the optimum of the development at the altitude between 800–1350 m a.s.l. In the investigated area the stands of the *Junco effusi-Calamagrostietum villosae* were

described mainly from Šumavské Pláně plateau (Černá Hora Mt., Studená Hora Ridge) and Trojmezna Hornatina Highland (Trojmezna Mt.).

Distribution: The *Junco effusi-Calamagrostietum villosae* is the most typical association of the clear cuts at the levels of climax spruce, spruce(-fir)-beech and acidophilous beech forests of the Bohemian Forest, that is similar to those found in Hercynian area of the Czech Republic as well as in the Hercynian part of Central Europe. In the Czech Republic the most stands of *Calamagrostis villosa* communities were described from the high mountain level of the borders mountains at the damaged areas of forest massifs affected by air pollution and attacked by bark beetle (Beskydy Mts., Giant Mountains, Bohemian Forest, Jizerské Hory Mts., Krušné Hory Mts., Lužické Hory Mts., and Orlické Hory Mts.) (FIALA 1998, FIALA et al. 1996, KUBÍKOVÁ 1991, NEUHÄUSLOVÁ & WILD 2001, PYŠEK 1990, 1991, VACEK et al. 1999, SOFRON 1985).

In the Czech Republic the stands of *Calamagrostis villosa* were also reported as very frequent clearing communities at lower submountain level and hilly areas at levels of acidophilous beech and fir forests (ANDRESOVÁ 1979, KOLBEK 2001, KUČERA 1966, NEUHÄUSLOVÁ 1995, NEUHÄUSLOVÁ & WILD 2001).

Variability: Within the association the following subassociations have been distinguished:

a1) *Junco effusi-Calamagrostietum villosae typicum* Neuhäuslová 2001 (Appendix 1, rel. 1–6)

Structure and species composition: The typical subassociation is characterized by absence of its own differential species, lower development of the ground layer and lower occurrence of species belong to the *Epilobietea angustifolii* in comparison with the following subassociation *Junco effusi-Calamagrostietum villosae luzuletosum sylvaticae*. Besides, this unit differs from other subassociation by a low proportion of hygrophilous species. Only in the case of clearings developed after cutting of waterlogged spruce forest and identified also as the association *Junco effusi-Calamagrostietum villosae typicum* it could be noted a high abundance of species of the moist habitats represented in the field as well as in the ground layer. It could be illustrated by an example: Studená Hora Mt., 1249 m a.s.l., 2° NW, 100 m², F (field layer) 60%, G (ground layer) 75%, Eltsova 2001, 13°27'34" E, 48°58'58" N. F (field layer): *Calamagrostis villosa* 4, *Avenella flexuosa* 2, *Athyrium distentifolium* 2, *Agrostis stolonifera* 1, *Carex nigra* 1, *Eriophorum vaginatum* 1, *Homogine alpina* 1, *Lycopodium annotinum* 1, *Picea abies* 1, *Trientalis europaea* 1, *Carex canescens* +, *C. muricata* +, *Epilobium angustifolium* +, *Galium saxatile* +, *Soldanella montana* +, *Vaccinium myrtillus* +, G (ground layer): *Polytrichum commune* 2, *Sphagnum girgensohnii* 1, *S. fallax* +, *S. palustre* var. *centrale* +.

In comparison with the data from the other mountainous regions of the Czech Republic (NEUHÄUSLOVÁ & WILD 2001), in the Bohemian Forest the subassociation represents the absence of *Senecio ovatus* and the other clearings species of lower altitudes such as *Calamagrostis epigejos*, *C. arundinacea* et al.

Habitat: The subassociation occurs on the habitats with lower soil moisture at the altitudes of ca 800 to 1260 m a.s.l. at levels of spruce(-fir)-beech forests (as. *Calamagrostio villosae-Fagetum* Mikyška 1972).

Distribution: The *Junco effusi-Calamagrostietum villosae typicum* has been described from the most of the Czech border mountains (Novohradské Hory Mts., Krušné Hory Mts., Český Les Mts., Labské Pískovce Mts., Lužické Hory Mts., Jizerské Hory Mts., Orlické Hory Mts., and lower levels of the Giant Mts.), Brdy Mts., Hřebeny Mts., Žďárské Vrchy Mts. etc. at levels of acidophilous spruce(-fir)-beech forests and valley-fir forests, mostly at

the altitudes of 700–1000 m. a.s.l. (NEUHÄUSLOVÁ & WILD 2001). This association has not been mentioned in the investigated area.

a2) *Junco effusi-Calamagrostietum villosae luzuletosum sylvaticae* Neuhäuslová 2001

Diagnostic species combination: *Athyrium distentifolium*, *Blechnum spicant*, *Dryopteris dilatata*, *Homogyne alpina*, *Luzula sylvatica*, *Lycopodium annotinum*, *Soldanella montana* (Appendix 1, rel. 7–19).

Structure and species composition: The *Junco effusi-Calamagrostietum villosae luzuletosum sylvaticae* belongs to the most frequent clearing communities of the Bohemian Forest and is characterized by the marked dominance of *Calamagrostis villosa* with subdominance of *Luzula sylvatica*. The typical spruce forests species and species of moisture stands are also represented with frequent occurrence. In the ground layer, the dominance of hygrophilous bryophytes *Sphagnum girgensohnii*, *Polytrichum commune*, *Plagiothecium laetum* indicates moister habitats and differs this unit from the other syntaxons.

Habitat: In comparison with the fore-going subassociation, this unit is typical for colder and moister climatically more extreme sites at higher level of the Bohemian Forest with the optimum of occurrence at the altitudes of 800–1350 m. The stands of *Junco effusi-Calamagrostietum villosae luzuletosum sylvaticae* represent substitute clearing communities of climax spruce (as. *Calamagrostio villosae-Piceetum* Hartman in Hartman & Jahn 1967), spruce(-fir)-beech forests (as. *Calamagrostio villosae-Fagetum* Mikyška 1972) and spruce plantations at their level.

Distribution: The first time the unit has been described by NEUHÄUSLOVÁ & WILD (2001). Before, the analogous *Calamagrostis villosa* stands were also reported by SOFRON (1985) from the clearings developed after logging of formerly grazed forest of the top area of Můstek Mt. Except for the Bohemian Forest, the syntaxon has been recorded at higher, colder and moister sites in the most of the Czech border mountains (Krušné Hory Mts., Jizerské Hory Mts., Giant Mts., Hrubý Jeseník, and Moravsko-Slezské Beskydy Mts.) at the altitudes of (950)1000–1300(1350) m a.s.l. (NEUHÄUSLOVÁ & WILD 2001).

a3) *Junco effusi-Calamagrostietum villosae athyrietosum* subassociation nova Eltsova hoc loco

Nomenclatural type: Appendix 1, rel. 3 (holotypus).

Diagnostic species combination: *Athyrium distentifolium* (dom.), *Dryopteris dilatata*, *Luzula sylvatica*, *Oxalis acetosella*, *Soldanella montana* (Appendix 1, rel. 20–25).

Structure and species composition: For this syntaxon the dominance of *Calamagrostis villosa* and *Athyrium distentifolium*, partly with codominance of *Luzula sylvatica* and *Vaccinium myrtillus* and more or less regular occurrence of hygrophilous species (*Oxalis acetosella*, *Soldanella montana*, *Polytrichum commune*, *Sphagnum girgensohnii*, rarely *Plagiothecium laetum*) are characteristic.

Habitat and distribution: In the investigated area this syntaxon is infrequent and represents a substitute clearing community of the climax spruce forests, concrete the community *Calamagrostio villosae-Piceetum typicum* var. *athyriosum* Jirásek 1996. Stands of this subassociation was found mainly at higher mountain level (above ca 1180 m a.s.l.) of Trojmezna Hornatina Highland on moderate slopes of the mountain ridge on boulder, well aerated moist soils with long-lasting snow cover.

b) *Myrtillo-Avenelletum flexuosae* (Schlüter 1966) Passarge 1984

Diagnostic species combination: *Avenella flexuosa*, *Vaccinium myrtillus* (dom.), *Calamagrostis villosa* (subdom.), *Galium saxatile*, *Trientalis europaea*, *Soldanella montana*, *Homo-*

gyne alpina (Appendix 2).

Structure and species composition: This species poor association is characterized by the dominance of *Avenella flexuosa* and *Vaccinium myrtillus* with a marked proportion of *Calamagrostis villosa*. The elements of the moist soils and the nutrient-demanding species such as *Homogyne alpina*, *Oxalis acetosella*, *Trientalis europaea* or *Lycopodium annotinum* and hygrophilous bryophytes (*Sphagnum girgensohnii*, *Polytrichum commune*) occur less frequently, with lower cover degree. The cover of the field layer achieves 60–98%. The species rich ground layer is usually well developed and its cover reaches 15–60%. *Dicranum scoparium*, *Polytrichum formosum* and *Barbilophozia lycopodioides* are the most typical bryophytes for this type of stands.

Habitat: The association occurs on oligotrophic soils with less favourable water regime as a substitute community of the climax spruce forests, spruce plantations or acidophilous spruce(-fir)-beech forests. In the Bohemian Forest the unit has been described from mountain ridge or from the sub-top areas of isolated mounts (Studená Hora Ridge, Oblík Mt., Poledník Mt., etc.) at the altitudes of ca 1120 to 1250 m a.s.l. The physiognomy of the association is similar to that of original cover before deforestation.

Distribution: The *Myrtillo-Avenelletum flexuosae* represents a substitute community of acidophilous beech-, fir-, hornbeam- or acidophilous oak forest at collinar and mountainous regions of Central Europe (PASSARGE 1984, KOLBEK 2001).

1.2 *Sambucetalia* Oberdorfer 1957

Sambuco-Salicion capreae Tüxen et Neumann in Tüxen 1950

a) *Senecionetum fuchsii* Kaiser 1926

Diagnostic species combination: *Senecio ovatus* (dom.), *Athyrium filix-femina*, *Epilobium angustifolium*, *Dryopteris filix-mas*, *Rubus idaeus*, *Salix caprea* (Appendix 3).

Structure and species composition: This association represents the tall-herb, species-variegated stands dominated by *Senecio ovatus* with a frequent occurrence of typical beech forest species (*Hieracium murorum*, *Mycelis muralis*, *Poa nemoralis*, *Viola reichenbachiana*) as well as the species of *Epilobietea angustifolii* group, low participation of spruce forest species and marked proportion of meadow species (*Agrostis capillaris*, *Deschampsia cespitosa*, *Phleum pratense*) and demonstrates the link with *Galio-Urticetea*. In the scrub layer, the seedlings of native woody species are predominantly planted. The pioneer woody species (*Populus tremula*, *Sambucus racemosa*) are naturally and well regenerated. The ground layer is usually weakly developed.

Habitat: The *Senecionetum fuchsii* represents a substitute clearing community of the beech forests or spruce plantation at that level. The optimum of development disposes at the level of beech forests in the moist habitats on nutrient-rich soils. In the studied area this association is localized up between ca 830 to 1360 m a.s.l. (the complex of Boubín Mt., Šumavské Pláně plateau).

Distribution: The wide-spread association from submountainous to mountainous level of the Central Europe.

b) *Rubetum idaei* Pfeifer 1936 em. Oberdorfer 1973

Diagnostic species combination: *Rubus idaeus* (dom.), *Epilobium angustifolium*, *Athyrium filix-femina*, *Dryopteris filix-mas* (Appendix 4).

Structure and species composition: For this association the dominance of *Rubus idaeus* with the marked abundance of *Calamagrostis villosa*, high proportion of typical clearings

species (*Epilobium angustifolium*, *Rumex acetosella*, *Salix caprea*, rarely *Senecio sylvaticus* and *S. ovatus*) and low participation of spruce-forest species are characteristic. The ground layer is poor and is mainly weakly developed. *Polytrichum formosum* and *Dicranum scoparium* are the most frequent bryophytes.

Habitat: The community occurs at different geologic basic at fresh to dry habitats on mesotrophic to oligotrophic soils with the optimum of occurrence at the level of acidophilous spruce-(fir)-beech forest. In the investigated area the unit has been described only fragmentary mainly on the dryer sites on the border of older clear cuts at the altitudes up to ca 1170 m a.s.l. (Třístoličník Mt., Černá Hora Mt., Trojmezí Highland, et al.). MATĚJKOVÁ et al. (1996) have also reported *Rubetum idaei* from the lower altitudes of the Šumava Mt. (Hamry-settlement area) on humus-rich soils and have marked the subdominance of *Senecio ovatus*.

Distribution: The common and frequent community from collinar to mountain level of whole Central Europe (JAROLÍMEK 1997, KOLBEK 2001, MATUSZKIEWICZ 2001, MUCINA 1993, NEUHÄUSLOVÁ 1995) mainly on older clearings developed after cutting of older forests massifs where *Rubus idaeus* could already reach higher abundance. The association represents a substitute community of acidophilous spruce-beech-, beech- or hornbeam forests.

DISCUSSION

Comparison with the bibliographical data

The first time the name *Junco effusi-Calamagrostietum villosae* was used by SÝKORA (1983) for the clearing communities dominated by *Calamagrostis villosa* in the Western Sudetes Mts., developed after logging of climax spruce or spruce-beech forest and referred by the author to the alliance *Epilobion angustifolii* at the upper limit of its distribution. In the Bohemian Forest the clearings with the dominance of *Calamagrostis villosa* were studied by SOFRON (1985) in the formerly grazed stands (Můstek Mt.) and by MATĚJKOVÁ (1996) from the clearings of the northwest part of the Královský Hvozd Mts. NEUHÄUSLOVÁ & WILD (2001) realized very detailed analysis of the *Calamagrostis villosa* habitats in the whole area of the Czech Republic. They confirmed the correctness of the definition of the association *Junco effusi-Calamagrostietum villosae* as a well separate syntaxa with marked floristic homogeneity. Within the association *Junco effusi-Calamagrostietum villosae* the authors distinguished two new subassociations: *Junco effusi-Calamagrostietum villosae typicum* and *Junco effusi-Calamagrostietum villosae luzuletosum*. The stands almost totally miss diagnostic species of the association have been described by authors as the *Calamagrostis villosa* community, occurs as a substitute clearing community of spruce plantations at lower levels of *Luzulo-Fagetum* Markgraf 1937 or *Luzulo pilosae-Abietetum* Mráz 1957 at the altitudes 420–600 m a.s.l. (NEUHÄUSLOVÁ & WILD 2001). Added to the mentioned studies, I reported subassociation *Junco effusi-Calamagrostietum villosae typicum*, has not been recorded in the Bohemian Forest before, and described the new subassociation *Junco effusi-Calamagrostietum villosae athyrietosum*. It could be possible, that more detailed analysis of the *Junco effusi-Calamagrostietum villosae* could result in an increase of the variety within the association.

The *Calamagrostis villosa*-dominated stands were also mentioned from the subalpine levels of the Tatra National Park, High Sudetes, and East Carpatians (JENÍK 1961, 1984, JENÍK et al. 1980, SILLINGER 1933, ŠMARDÁ 1963) but they represent the vegetation units of the alliances *Nardion strictae* Pawl.-Sokol-Wall. 1928 or the *Calamagrostion villosae* Pawlowski et al. (1928). These stands are different from the communities of the clearings and are similar to them only physiognomically.

The association *Myrtillo-Avenelletum flexuosae* was described by PASSARGE (1984). Author has distinguished two subassociations, the *Myrtillo-Avenelletum flexuosae typicum* and the *Myrtillo-Avenelletum flexuosae molinietosum*. In the Czech Republic the stands dominated by *Avenella flexuosa* were also reported from the formerly grazed places in the high levels of Hrubý Jeseník Mts. and were described as the community *Deschampsia flexuosa-Calamagrostis villosa*, representing the vegetation unit of the alliance *Nardion strictae* Pawl.-Sokol-Wall. (ŠMARDÁ 1950). At localities on well aerated, stony soils due to the high occurrence of dwarf-shrubs *Vaccinium myrtillus* and rarely *V. vitis-idaea*, the *Myrtillo-Avenelletum flexuosae* to some extent has a relation with *Rhodococco-Vaccinietum myrtilli* Sýkora 1972 (SOFRON 1985, SÝKORA 1972), but in difference of them the *Myrtillo-Avenelletum flexuosae* occurs on less extreme habitats.

The associations *Senecionetum fuchsii* and *Rubetum idaei* are very frequent clearing communities, often mentioned in the literature and very well differentiated from the other by the floristic composition.

Ordination

In DCA ordination space (Fig. 1) most of the communities are clearly differentiated. The *Myrtillo-Avenelletum flexuosae* represents very acidophilous community occurs on the oligotrophic soils and is disposed quite separately from the other syntaxon in runout left posi-

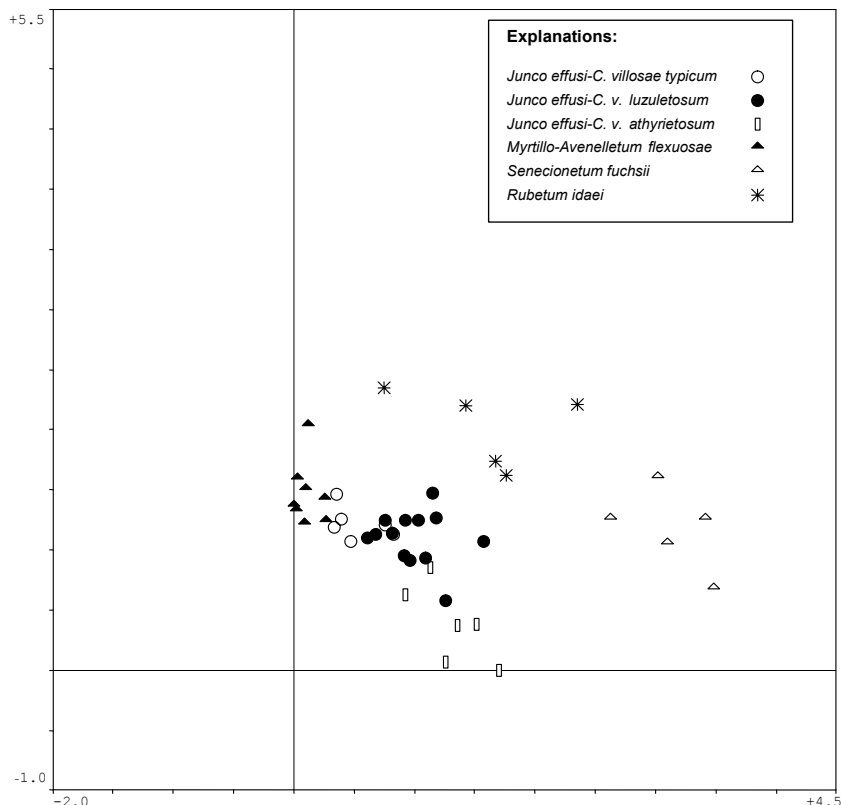


Fig. 1. Relevé ordination (DCA).

tion. It could confirm the validity of distinguishing this unit as a well separated association. The *Myrtillo-Avenelletum flexuosae* demonstrates resemblance with the subassociation *Junco effusi-Calamagrostietum villosae typicum* above all due to the floristic composition (high occurrence of *Vaccinium myrtillus*, *Avenella flexuosa*, and *Calamagrostis villosa*), but the *Myrtillo-Avenelletum flexuosae* occupies more acidophilous habitats. The stands of the *Senecionetum fuchsii* representing the nutrient-rich community are placed on the right side and are also markedly separated. Thus, it could be supposed that the first axis reflects the level of the soil acidity.

The relevés of the association *Junco effusi-Calamagrostietum villosae* are placed mainly in the centre of the ordination space with remarkable habitat heterogeneity, where the stands of the *Junco effusi-Calamagrostietum villosae athyrietosum* demonstrate more or less evident differentiation and to take the lowermost position in the ordination diagram. The upper position within the ordination space belongs to the *Rubetum idaei*. As long as the *Junco effusi-Calamagrostietum villosae athyrietosum* occurs generally on well aerated moist soils of shady slopes and the *Rubetum idaei* occupies mostly drier habitats, the second axis could reflect the soil moisture.

Aknowledgement. This study was supported by Grant Agency of the Czech Republic Nr. 206/99/1416 and by research project of the Institute of Botany of the Academy of Sciences of the Czech Republic, Nr. AVOZ6005908. Autor thanks Z. Neuhäuslová for her comments to this paper, B. Buryová and H. Franklová for determination of bryophytes, and Z. Palice for determination of lichens.

REFERENCES

- ANDRESOVÁ J., 1979: Lesní a paseková společenstva lesa Království u Dvora Králové [Forest and clearing communities of the Království forest near Králův Dvůr]. Ms., Charles University, Prague, 145 pp. (in Czech). (Botanical Library of the Faculty of Nature Sciences, Charles University, Prague).
- BRAUN-BLANQUET J., 1964: *Pflanzensoziologie*. Springer Verlag, Wien & New York, 865 pp.
- EHRENDORFER F. (ed.), 1973: *Liste der Gefäßpflanzen Mitteleuropas*. 2. Aufl. Gustav Fischer Verlag, Stuttgart, 318 pp.
- FIALA K. (ed.), 1998: The role of grass ecosystems of deforested areas in the region affected by air pollution (the Beskydy Mts., the Czech Republic). *Ekologia*, Bratislava, 17, suppl. 1/1998: 241–255.
- FIALA K., ZELENÁ V. & JARKLOVÁ J., 1996: Struktura a produkce porostů s dominantními druhy rodu *Calamagrostis* na imisních holinách [The structure and production of *Calamagrostis* stands on deforested sites affected by pollution]. *Zprávy České botanické společnosti*, 31, Mater. 13: 97–99 (in Czech).
- FRAHM J.-P. & FREY W., 1992: *Moosflora*. Ed. 3. E. Ulmer, Stuttgart, 522 pp.
- HILL M.O., 1979: *TWINSPAN. A Fortran program for arranging multivariate data in an ordered two-way table by classification of the individuals and attributes*. Cornell University, Ithaca.
- JAROLÍMEK I. (ed.), 1997: *Rastlinné spoločenstvá Slovenska. 2. Synantropná vegetácia* [Plant Communities of the Slovak Republic. 2. Synantropic vegetation]. Veda, Bratislava, 416 pp. (in Slovak).
- JENÍK J., 1961: *Alpínská vegetace Krkonoš, Králického Sněžníku a Hrubého Jeseníku* [Alpine Vegetation of Krkonoše, Králický Sněžník and Hrubý Jeseník Mts.]. NČSAV, Praha, 412 pp. (in Czech).
- JENÍK J., 1984: Occurrence of *Calamagrostis villosa* in the Bieszczady Mts., the Eastern Carpathians. *Preslia*, 56: 153–158.
- JENÍK J., BUREŠ L. & BUREŠOVÁ Z., 1980: Syntaxonomic study of vegetation in Velká Kotlina cirque, the Sudeten Mountains. *Folia Geobotanica Phytotaxonomica*, 15: 1–28.
- KOLBEK J. (ed.), 2001: *Vegetace Chráněné krajinné oblasti a Biosférické rezervace Křivoklátsko. 2.* [Vegetation of the Protected Landscape Area and Biosphere Reserve Křivoklátsko. 2.]. Academia, Praha, 364 pp. (in Czech).
- KUBÍKOVÁ J., 1991: Forest dieback in Czechoslovakia. *Vegetatio*, 93: 101–108.
- KUČERA S., 1966: Fytocenologický a fytogeografický rozbor vegetace Novohradských hor [Phytocenological and phytogeographical analysis of the vegetation of the Novohradské Hory Mts.]. Ms., PhD thesis, Charles University, Prague, 275 pp. (in Czech) (Botanical Library of the Faculty of Nature Sciences, Charles University, Prague).
- MATĚJKOVÁ I., NESVADBOVÁ J., SOFRON J. & VONDRÁČEK M., 1996: Poznámky k vegetaci a flóře severozápadní části Královského hvozdu (skupina Ostrý – Šumava) [Bemerkungen zu der Vegetation und Flora der nordwestlichen

- Teils des Künishen Gebirges (Berggruppe des Ossers, Böhmerwald)]. *Erica*, 5: 51–108 (in Czech).
- MATUSZKIEWICZ W., 2001. *Przewodnik do oznaczania zbiorowisk roślinnych Polski* [Handbuch der Pflanzengesellschaften Polen]. Państwowe Wydawnictwo Naukowe, Warszawa, 297 pp. (in Polish).
- MORAVEC J. (ed.), 1994: *Fytocenologie (Nauka o vegetaci)* [Phytosociology]. Academia, Praha, 404 pp. (in Czech).
- MORAVEC J. (ed.), 1995: Rostlinná společenstva České republiky a jejich ohrožení [Red List of Plant Communities of the Czech Republic and their endangerment. Ed. 2.]. *Severočeskou Přírodou*, Suppl. 1995: 1–206 (in Czech).
- MUCINA L., GRABHERR G. & ELLMAUER T., 1993: *Die Pflanzengesellschaften Österreichs. Teil 1*. Gustav Fischer Verlag, Jena, 578 pp.
- NEUHÄUSLOVÁ Z., 1995: Paseková vegetace Železných hor [The vegetation of the clearings of Železné Hory Mts.]. *Železné hory*, Nasavrky, 2: 1–102. (in Czech).
- NEUHÄUSLOVÁ Z. & WILD J., 2001: Clearing communities dominated by *Calamagrostis villosa* in the Czech Republic. *Biologia*, Bratislava, 56/4: 389–404.
- PASSARGE H., 1984: Mitteleuropäische Waldschlagrasen. *Folia Geobotanica Phytotaxonomica*, 19: 225–336.
- POELT J., 1969: *Bestimmungsschlüssel Europäischer Flechten*. J. Cramer Verlag, Lehre, 757 pp.
- PYŠEK P., 1990: The influence of *Calamagrostis villosa* on the species diversity of deforested sites in the Krušné hory Mts. *Preslia*, 62: 323–335.
- PYŠEK P., 1991: Biomass production and size structure of *Calamagrostis villosa* in different habitats. *Preslia*, 63: 9–20.
- SILLINGER P., 1933: Monografická studie o vegetaci Nízkých Tater [Monographic study of the vegetation of Nízké Tatry Mts.]. *Knihovna sboru pro výzkum Slovenska a Podkarpatské Rusi při Slovanském ústavu v Praze*, 6, 338 pp. (in Czech).
- SOFRON J., 1985: Vrcholový fenomen hory Mústek na Šumavě [Das Gipfelphänomen des Berges Mústek (Brückel) im Šumava-Gebirge (Böhmerwald)]. *Zprávy Muzei Západočeského Kraje, Příroda*, 30–31: 19–31 (in Czech).
- SÝKORA T., 1972: Příspěvek k vegetaci skupiny Klíče v Lužických horách [Contribution to the vegetation of the Klíč Hill, Lužické Hory Mts.]. *Sborník Severočeského muzea, Přírodní vědy*, 4: 53–96 (in Czech).
- SÝKORA T., 1983: *Junco effusi-calamagrostietum villosae*, významné společenstvo po smrkových lesích v Západních Sudetech [Junco effusi-calamagrostietum villosae, a significant community of spruce clearings in the Western Sudeten]. *Preslia*, 55: 165–172 (in Czech).
- ŠMARDKA J., 1950: Květena Hrubého Jeseníku [Flora of Hrubý Jeseník Mts.]. *Časopis Moravského muzea*, Brno: 78–156 (in Czech).
- ŠMARDKA J. (ed.), 1963: Druhotté spoločnosti rastlín v Tatranskom národnom parku [Secondary plant communities in Tatra National Park]. *Knížnica sborníka prác o Tatranskom Národnom parku*, 4, 219 pp. (in Slovak).
- TER BRAAK C.J.F. & ŠMILAUER P., 1998: *Canoco Release 4. Reference manual and user's guid to Canoco for Windows: Software for Canonical Community Ordination*. Microcomputer Power, Ithaca, New York.
- VACEK S., BASTL M. & LEPŠ J., 1999: Vegetation changes in forests of the Krkonoše Mts. over a period of air pollution stress (1980–1995). *Plant Ecology*, 143: 1–11.

Received: 11 October 2004
Accepted: 1 November 2005

Appendix 1. *Junco effusi-Calamagrostietum villosae*.

Subassociation relevé nr.	typicum				luzuletosum				athyrietosum																	
	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	%
number of species	12	14	15	12	13	12	15	25	34	19	15	17	15	22	24	30	23	31	19	19	19	16	16	13	16	
S (%)	85	85	40	55	85	80	75	90	65	85	80	85	70	70	85	85	65	75	70	75	85	85	75	80	80	
F (%)	35	35	30	65	50	60	65	35	30	30	10	45	45	45	50	45	25	30	40	40	40	40	40	15	35	
G (%)	7	0	e	sw	s	0	0	7	8	10	5	3	7	e	nvw	e	nvw	s	nw	nw	nw	0	6	15	5	ne
orientation (°)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
relevé area (m ²)	818	916	1092	1128	1203	1260	1152	1180	1218	1235	1179	1285	1191	1094	1118	1141	911	1118	1214	1217	1199	1229	1184	1311		
altitude (m a.s.l.)																										

S

<i>Picea abies</i>	2	.	.	.	.	1	33	.	+	1	.	1	.	1	1	1	.	.	.	.	.	2	2	.	.	33
<i>Sorbus aucuparia</i>	.	1	.	.	.	.	17	.	+	.	.	.	.	i	.	.	.	.	15	+	.	.	.	.	.	33
<i>Acer pseudoplatanus</i>	.	.	.	.	.	.	0	.	+	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.	0

F

D-*Junco effusi-Calamagrostietum villosae*

<i>Calamagrostis villosa</i>	3	4	3	3	3	3	100	4	4	4	4	3	3	4	4	4	3	3	100	3	3	3	3	2	2	100
<i>Junco effusus</i>	.	.	.	.	.	1	17	.	.	.	.	.	.	+	.	+	2	1	38	.	.	.	.	.	.	0
<i>Senecio hercynicus</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	2	38	.	.	.	.	.	.	33
<i>Galium saxatile</i>	+	.	.	.	.	.	17	.	2	1	.	.	.	.	.	.	.	1	31	.	.	.	.	.	.	0
<i>Trientalis europaea</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	31	.	.	.	.	.	.	17

D-*Junco effusi-Calamagrostietum villosae luzuletosum*

<i>Luzula sylvatica</i>	.	.	.	.	.	.	0	1	2	2	2	3	1	+	1	2	3	1	92	2	2	2	3	.	.	83
<i>Soldanella Montana</i>	.	.	.	.	.	.	0	.	+	+	.	.	.	.	.	.	.	.	46	+	.	.	2	.	.	50
<i>Lycopodium annotinum</i>	.	.	.	.	.	.	0	.	+	+	.	.	.	.	.	.	.	.	31	.	.	.	.	.	.	0
<i>Homogyne alpina</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.	0
<i>Blechnum spicant</i>	.	.	.	.	.	.	17	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	0

D-*Junco effusi-Calamagrostietum villosae athyrietosum*

<i>Athyrium distentifolium</i>	.	.	.	.	.	.	0	.	+	1	1	1	2	1	2	1	+	.	8	3	3	3	3	3	3	100
<i>Dryopteris dilatata</i>	.	.	.	.	.	.	0	+	1	1	1	2	1	2	1	2	1	+	100	1	2	1	2	1	2	100
<i>Oxalis acetosella</i>	.	.	.	.	.	.	0	+	1	1	1	2	1	2	1	2	1	+	100	3	2	2	2	2	2	100

D-*Epilobietea angustifolii*

<i>Rubus idaeus</i>	1	+	+	+	.	.	67	1	1	2	1	+	1	2	3	+	3	2	100	2	1	2	.	.	.	83
<i>Epilobium angustifolium</i>	1	2	+	1	.	.	50	1	1	+	2	1	+	1	+	+	1	+	85	+	2	.	.	.	.	67
<i>Salix caprea</i>	.	.	.	.	.	.	33	1	.	.	.	.	.	.	.	.	.	.	46	.	.	.	.	.	.	0
<i>Rumex acetosella</i>	.	.	.	.	.	.	17	1	.	.	.	.	.	.	.	.	.	2	38	.	.	.	.	.	.	0
<i>Epilobium montanum</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	25	.	.	.	.	.	.	0
<i>Galeopsis bifida</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.	0
<i>Senecio sylvaticus</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	0

Accompanying species:

A

<i>Vaccinium vitis-idaea</i>	1	.	.	.	1	.	33	0	0
------------------------------	---	---	---	---	---	---	----	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

AI

<i>Avenella flexuosa</i>	2	3	2	3	2	1	100	3	3	3	3	2	3	2	3	2	3	2	92	1	+	2	2	.	.	67
--------------------------	---	---	---	---	---	---	-----	---	---	---	---	---	---	---	---	---	---	---	----	---	---	---	---	---	---	----

relevé nr.	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	%	
<i>Vaccinium myrtillus</i>	2	2	2	+	2	2	100	3	+	2	1	1	.	2	2	3	+	.	2	1	77	2	2	2	3	.	2	83	
<i>Ilex aquifolium</i>	.	.	.	.	+	.	17	.	.	.	.	+	.	.	.	.	.	.	.	.	23	.	.	+	.	.	.	0
<i>Maianthemum bifolium</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.	33
<i>Luzula pilosa</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.	0
C																													
<i>Carex canescens</i>	+	+	.	.	.	.	33	+	1	+	+	+	.	.	.	.	+	1	1	62	+	.	.	.	.	.	.	17
<i>Carex leporine</i>	.	.	.	.	.	.	17	+	+	.	.	.	.	.	.	.	.	1	+	1	38	.	.	.	+	.	.	17
<i>Carex muricata</i> ags.	.	.	.	.	.	.	17	.	.	.	.	.	.	.	.	.	.	.	+	+	15	.	.	.	.	.	.	0
<i>Ranunculus repens</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.	0
<i>Stellaria nemorum</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	+	.	.	15	.	.	.	.	.	.	17
<i>Deschampsia cespitosa</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	+	.	.	15	.	.	.	.	.	.	0
<i>Poa annua</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.	0
<i>Holcus mollis</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	1	1	15	.	.	.	.	.	.	0
D																													
<i>Taraxacum</i> sect. <i>Ruderalia</i>	.	.	+	.	+	.	33	.	.	.	.	+	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	0
E																													
<i>Picea abies</i>	2	2	2	1	1	3	100	2	2	2	2	2	1	2	2	2	2	2	2	2	92	2	1	2	2	+	1	100	
<i>Sorbus aucuparia</i>	2	2	+	+	.	.	50	1	.	+	1	+	.	.	1	.	.	1	+	+	62	1	1	.	.	.	1	67	
<i>Betula pendula</i>	.	.	.	.	+	.	17	.	.	.	.	.	.	.	.	.	.	.	.	.	38	.	.	.	.	.	.	17
<i>Fagus sylvatica</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	23	.	.	.	.	.	.	17
<i>Abies alba</i>	.	+	.	.	.	.	17	.	.	.	.	.	.	.	.	.	.	.	.	.	8	1	1	.	.	.	.	33
<i>Acer pseudoplatanus</i>	.	1	.	.	.	.	17	.	.	.	.	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	0
C																													
<i>Dicranum scoparium</i>	2	2	3	3	2	2	100	+	1	2	2	1	+	2	1	2	1	2	1	1	100	1	+	+	2	1	+	100	
<i>Polytrichum formosum</i>	+	+	1	1	2	2	83	3	3	2	2	+	1	2	3	1	1	2	2	2	100	+	2	3	2	+	2	100	
<i>Sphagnum girgensohnii</i>	+	+	.	.	.	.	50	2	1	+	.	+	.	.	.	.	.	.	.	.	69	2	1	+	+	+	+	33
<i>Cladonia digitata</i>	+	1	.	.	+	.	17	.	.	.	.	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	50
<i>Plagiothecium laetum</i>	.	.	.	+	.	.	17	.	+	.	.	+	+	.	.	.	.	.	.	.	23	.	+	+	.	.	.	33
<i>Barbilotragia lycopodioides</i>	.	.	.	.	.	.	17	.	.	.	.	.	.	.	.	.	.	.	.	.	23	.	.	.	.	.	.	33
<i>Polytrichum commune</i>	.	.	.	.	.	.	0	.	1	+	1	.	.	.	.	.	+	.	.	.	46	3	.	.	.	.	1	33
<i>Pohlia nutans</i>	.	.	.	.	1	.	17	.	+	.	.	.	.	.	.	.	+	.	.	.	15	.	.	.	.	.	.	0
<i>Dicranella heteromalla</i>	.	.	.	.	.	.	0	.	.	+	.	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.	0
<i>Orthodicranum montanum</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	+	.	.	23	.	.	.	.	.	.	0
<i>Lophozia ventricosa</i>	.	.	+	.	.	.	17	.	.	+	.	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	0
<i>Eurynchium pulchellum</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	+	.	.	.	15	.	.	.	.	.	.	0
<i>Cladonia coniocraea</i>	.	.	.	.	+	.	17	.	.	.	.	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	17
<i>Sphagnum capillifolium</i>	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	1	1	8	.	2	.	.	+	.	17
<i>Ceratodon purpureus</i>	.	.	.	.	.	.	0	.	+	.	.	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.	0

Species in 1 relevé only: **S:** *Betula pendula* (14:+), *Pinus sylvestris* (8:+), *Rubus idaeus* (15:+), **F:** *Agrostis capillaris* (17:+), *Carex pilulifera* (8:+), *Epilobium ciliatum* (5:1), *Equisetum sylvaticum* (11:1), *Gnaphalium sylvaticum* (17:1), *Juncus filiformis* (14:1), *Paris quadrifolia* (17:1), *Phlegopteris connectilis* (17:1), *Prenanthes purpurea* (17:1), *Senecio ovatus* (19:1), *Viola reichenbachiana* (17:2), **G:** *Barbilotragia attenuata* (15:1), *Dicranodontium denudatum* (7:1), *Drepanocladus uncinatus* (7:1), *Lophoclea heterophylla* (7:1), *Olygothecium herycynicum* (15:1), *Plagiothecium juniperinum* (13:1), *Polytrichum succulentum* (18:1), *Plagiothecium juniperinum* (13:1), *P. longisetum* (14:1), *Ptilidium ciliare* (3:1), *P. pulcherrimum* (19:1), *Tetraphis pellucida* (3:1).

Explanations: S – shrub layer; F – field layer; G – ground layer; D – diagnostic species; A – diagnostic species of the class *Vaccinio-Piceetea* and lower syntaxa; A1 – species with a large phytocenotic and ecological amplitude; B – diagnostic species of the class *Querceto-Fagetea* and lower syntaxa; C – species of meadows, pastures, mires; D – species of synantropic vegetation; E – regenerating woody species.

Appendix I. Continued.

Localities: *Junco effusi-Calamagrostietum villosae typicum*: 1. Nové Udolí area, V. Eltsova 2000, 13°48'42" E, 48°50'48" N; 2. Kamenná Mt., V. Eltsova 2000, 13°48'42" E, 48°48'24" N; 3. Beside of the road from Kvilda to Bučina settlements, V. Eltsova 2000, 13°35'24" E, 48°58'45" N; 4. Černá hora Mt., V. Eltsova 2000, 13°33'28" E, 48°58'45" N; 5. Tetřev Mt., V. Eltsova 2000, 13°33'49" E, 49°01'22" N; 6. Tetřev Mt., the top area, V. Eltsova 2000. *Junco effusi-Calamagrostietum villosae luzulerosum*: 7. Lovčí Skála Mt., beside to the road to Filipova Hut' settlement, V. Eltsova 2000, 13°31'12" E, 48°59'56" N; 8. NW slope of Studená Hora Mt., above of Roklanská Hájovna, V. Eltsova 2001, 13°26'08" E, 48°59'16" N; 9. Studená Hora Mt., above of "Široká cesta", road, V. Eltsova 2001, 13°27'19" E, 48°59'03" N; 10. NW slope of Studená Hora Mt., V. Eltsova 2001, 13°27'33" E, 48°58'51" N; 11. Stráž Mt., V. Eltsova 2000, 13°34'36" E, 48°58'22" N; 12. Poledník Mt., V. Eltsova 2001, 13°23'39" E, 49°03'32" N; 13. Trojmezí Highland, V. Eltsova 2000, 13°50'30" E, 48°47'01" N; 14. Between Kvilda and Bučina settlements, V. Eltsova 2000, 13°35'26" E, 48°59'33" N; 15. Stráž Mt., V. Eltsova 2000, 13°34'07" E, 48°58'07" N; 16. Besides of the road from Prameny Vltavy to Kvilda settlement, V. Eltsova 2000, 13°33'33" E, 48°59'51" N; 17. Studená Hora Mt., close by the road from Roklanská Hájovna to Javorí Pila, V. Eltsova 2001, 13°26'22" E, 48°59'49" N; 18. Kamenná Mt., V. Eltsova 2000, 13°49'13" E, 48°47'25" N; 19. The area of water reservoir at Ptáčí Nádrž, V. Eltsova 2000, 13°33'32" E, 49°00'04" N. *Junco effusi-Calamagrostietum villosae athyrietosum*: 20. Trojmezí Highland, V. Eltsova 2001, 13°50'33" E, 48°47'04" N; 21. Trojmezí Highland, V. Eltsova 2001, 13°50'41" E, 48°46'58" N; 22. Poledník Mt., beside of the road, V. Eltsova 2000, 13°24'05" E, 49°02'43" N; 23. Trojmezí Highland, V. Eltsova 2000, 13°51'07" E, 48°46'43" N; 24. Trojmezí Highland, V. Eltsova 2000, 13°55'39" E, 48°44'60" N; 25. Trifolník Mt., V. Eltsova 2000, 13°48'46" E, 48°47'08".

Appendix 2. Myrtillo-Avenelletum flexuosae.

Relevé nr.	1	2	3	4	5	6	7	8	%
number of species	21	16	14	17	15	18	18	12	
S (%)	7	1	-	-	-	-	-	-	
H (%)	60	95	98	75	60	95	65	75	
G (%)	20	15	15	50	40	60	50	30	
orientation	ne	w	-	nw	nw	-	e	s	
inclination (°)	2	5	0	7	3	0	5	7	
relevé area (m ²)	100	100	100	100	100	100	100	100	
altitude (m a.s.l.)	1190	1220	1250	1208	1210	1214	1124	1182	

S

<i>Picea abies</i>	2	+	25
--------------------	---	---	---	---	---	---	---	---	----

F

D-Myrtillo-Avenelletum flexuosae

<i>Avenella flexuosa</i>	3	3	3	4	4	5	3	3	100
--------------------------	---	---	---	---	---	---	---	---	-----

<i>Vaccinium myrtillus</i>	1	3	3	3	+	1	3	3	100
----------------------------	---	---	---	---	---	---	---	---	-----

D-Epilobietea angustifolii

<i>Epilobium angustifolium</i>	+	+	+	.	.	+	1	.	63
--------------------------------	---	---	---	---	---	---	---	---	----

<i>Salix caprea</i>	r	+	.	25
---------------------	---	---	---	---	---	---	---	---	----

Accompanying species:

A

<i>Calamagrostis villosa</i>	+	1	2	2	2	2	+	2	100
------------------------------	---	---	---	---	---	---	---	---	-----

<i>Luzula sylvatica</i>	r	+	1	r	2	r	.	.	75
-------------------------	---	---	---	---	---	---	---	---	----

<i>Galium saxatile</i>	.	2	1	1	.	2	.	.	50
------------------------	---	---	---	---	---	---	---	---	----

<i>Lycopodium annotinum</i>	+	.	.	.	1	+	.	+	50
-----------------------------	---	---	---	---	---	---	---	---	----

<i>Homogyne alpina</i>	.	+	.	r	.	.	+	.	38
------------------------	---	---	---	---	---	---	---	---	----

<i>Trientalis europaea</i>	.	.	.	2	.	.	.	+	25
----------------------------	---	---	---	---	---	---	---	---	----

<i>Vaccinium vitis-idaea</i>	1	+	25
------------------------------	---	---	---	---	---	---	---	---	----

AI

<i>Dryopteris dilatata</i>	+	+	2	1	50
----------------------------	---	---	---	---	---	---	---	---	----

<i>Oxalis acetosella</i>	.	.	+	.	r	2	.	.	38
--------------------------	---	---	---	---	---	---	---	---	----

E

<i>Sorbus aucuparia</i>	+	r	1	1	1	.	2	1	88
-------------------------	---	---	---	---	---	---	---	---	----

<i>Picea abies</i>	.	+	2	.	2	2	2	1	75
--------------------	---	---	---	---	---	---	---	---	----

G

<i>Dicranum scoparium</i>	1	1	1	1	2	1	2	3	100
---------------------------	---	---	---	---	---	---	---	---	-----

<i>Polytrichum formosum</i>	1	.	2	2	1	2	2	.	75
-----------------------------	---	---	---	---	---	---	---	---	----

<i>Barbilophozia lycopodioides</i>	.	r	+	+	1	+	.	.	63
------------------------------------	---	---	---	---	---	---	---	---	----

<i>Barbilophozia floerkei</i>	+	.	+	.	.	+	.	.	38
-------------------------------	---	---	---	---	---	---	---	---	----

<i>Sphagnum capillifolium</i>	2	.	.	+	.	.	+	.	38
-------------------------------	---	---	---	---	---	---	---	---	----

<i>Ptilidium ciliare</i>	.	+	.	.	.	+	.	+	38
--------------------------	---	---	---	---	---	---	---	---	----

<i>Dicranodontium denudatum</i>	1	+	25
---------------------------------	---	---	---	---	---	---	---	---	----

<i>Cladonia digitata</i>	.	+	.	.	.	+	.	.	25
--------------------------	---	---	---	---	---	---	---	---	----

<i>Plagiothecium laetum</i>	.	.	.	+	+	.	.	.	25
-----------------------------	---	---	---	---	---	---	---	---	----

Species in 1 relevé only: **S:** *Betula pendula* (1:r), *Sorbus aucuparia* (1:+), **F:** *Carex canescens* (7:+), *C. leporina* (7:r), *Cirsium palustre* (5:r), *Epilobium ciliatum* (1:1), *Luzula pilosa* (4:r), *Maianthemum bifolium* (3:r), *Poa annua* (1:+), *Rubus idaeus* (8:+), *Rumex acetosella* (7:1), *Senecio sylvaticus* (1:+), *Taraxacum* sect. *Ruderalia* (7:r), *Tussilago farfara* (7:+), *Vicia cracca* (1:+), **G:** *Brachythecium starkei* (6:+), *Ceratodon purpureus* (4:+), *Dicranum fuscescens* (1:+), *Lophocolea heterophylla* (5:+), *Orthodicranum montanum* (5:+), *Plagiothecium undulatum* (6:1), *Pohlia nutans* (4:+), *Polytrichum juniperinum* (2:r), *Ptilidium pulcherrimum* (4:+), *Tetraphis pellucida* (1:+), *Trapeliopsis granulosa* (2:+).

Localities: 1. The ridge NW from Svaroh Mt., Z. Neuhäuslová 1999, 13°08'35" E, 49°11'17" N; 2. Oblík Mt., 50 m under of the top, Z. Neuhäuslová 2000, 13°26'33" E, 49°03'13" N; 3. The area of water reservoir at Ptačí Nádrž, V. Eltsova 2001, 13°28'23" E, 48°59'18" N; 4. Studená Hora Mt., V. Eltsova 2000, 13°26'24" E, 48°59'12" N; 5. Studená Hora Mt., V. Eltsova 2000, 13°27'09" E, 48°59'26" N; 6. The area of water reservoir at Ptačí Nádrž, V. Eltsova 2000, 13°28'16" E, 48°59'30" N; 7. The area of Churáňov settlement, V. Eltsova, 2000, 13°37'21" E, 49°03'47" N; 8. Stráž Mt., V. Eltsova 2000, 13°34'07" E, 48°58'16" N.

Appendix 3. Senecionetum fuchsii.

Relevé nr.	1	2	3	4	5	%
number of species	18	18	23	19	32	
S (%)	-	-	10	10	15	
F (%)	80	100	95	90	95	
G (%)	1	-	-	50	30	
orientation	e	-	-	-	nw	
inclination (°)	20	0	0	0	7	
relevé area (m ²)	30	100	100	100	100	
altitude (m a.s.l.)	1362	1100	990	830	1092	
S						
<i>Fagus sylvatica</i>	.	.	2	2	.	40
F						
D- Senecionetum fuchsii						
<i>Senecio ovatus</i>	4	4	4	4	4	100
D-Epilobietea angustifolii						
<i>Rubus idaeus</i>	+	3	2	1	2	100
<i>Epilobium angustifolium</i>	2	1	.	.	2	60
<i>Fragaria vesca</i>	.	+	+	2	.	60
<i>Salix caprea</i>	.	r	r	.	1	60
<i>Galeopsis bifida</i>	.	r	.	.	1	40
<i>Sambucus racemosa</i>	.	.	+	.	1	40
<i>Epilobium montanum</i>	.	.	+	.	r	40
Accompanying species:						
A						
<i>Calamagrostis villosa</i>	1	2	.	.	2	60
A1						
<i>Oxalis acetosella</i>	+	+	2	3	1	100
<i>Dryopteris dilatata</i>	+	1	+	.	1	80
<i>Athyrium filix-femina</i>	.	+	1	2	.	60
<i>Maianthemum bifolium</i>	+	.	+	.	.	40
B						
<i>Mycelis muralis</i>	.	+	1	+	.	60
<i>Poa nemoralis</i>	.	.	+	1	.	40
C						
<i>Deschampsia cespitosa</i>	1	+	+	+	.	80
<i>Agrostis capillaris</i>	1	+	.	.	1	60
<i>Ranunculus repens</i>	.	.	+	+	2	60
<i>Cirsium heterophyllum</i>	+	+	.	.	.	40
<i>Stellaria nemorum</i>	.	.	3	.	2	40
<i>Petasites albus</i>	.	.	+	.	+	40
<i>Dactylis glomerata</i>	.	.	.	+	+	40
D						
<i>Urtica dioica</i>	.	.	1	1	2	60
E						
<i>Fagus sylvatica</i>	.	.	2	1	+	60
<i>Populus tremula</i>	.	+	.	r	.	40
<i>Picea abies</i>	.	.	1	.	1	40
<i>Sorbus aucuparia</i>	.	.	+	.	1	40

Species in 1 relevé only: S: *Betula pendula* (5:2), **F:** *Acer pseudoplatanus* (4:+), *Ajuga reptans* (5:1), *Athyrium distentifolium* (5:+), *Avenella flexuosa* (4:r), *Betula pendula* (4:+), *Cardamine amara* (3:r), *Carex leporina* (1 :+), *Carex sylvatica* (3:r), *Circaea alpina* (4:+), *Cirsium palustre* (5:1), *Epilobium ciliatum* (1:r), *Equisetum sylvaticum* (5:+), *Hieracium murorum* (1:+), *Homogyne alpina* (1:+), *Galium saxatile* (5:+), *G. palustre* agg. (5:r), *Gymnocarpium dryopteris* (2:1), *Juncus effusus* (5:1), *Luzula luzuloides* (2:+), *Luzula sylvatica* (1:2), *Lychnis flos-cuculi* (5:r), *Moehringia trinervia* (4:+), *Pheum pratense* (1:+), *Poa annua* (1 +), *Polygonatum verticillatum* (2:+), *Prenanthes purpurea* (3:1), *Veronica officinalis* (1:+), *Viola reichenbachiana* (4:+), **G:** *Dicranum scoparium* (1:+), *Brachytecium rutabulum* (5:+), *Pohlia nutans* (5:+), *Polytrichum formosum* (5:1), *P. juniperinum* (5:+).

Localities: 1. Boubín Mt., the top area, Z. Neuhäuslová 2000, 13°49'05" E, 48°59'28" N; 2. Ca 1.3 km N from the point "Na Křížkách", Z. Neuhäuslová 2000, 13°49'54" E, 49°00'05" N; 3. The komplex of Boubín Mt., Z. Neuhäuslová 2000, 13°50'15" E, 48°58'03" N; 4. Svojshe settlement, Z. Neuhäuslová 2000, 13°30'30" E, 49°06'00" N; 5. The clearing on the left side of the road from Kvilda settlement to Bučina settlement, V. Eltsova 2001, 13°36'41" E, 48°58'27" N.

Appendix 4. *Rubetum idaei*.

Relevé nr.	1	2	3	4	5	%
number of species	21	15	14	16	17	
S (%)	7	35	20	10	3	
F (%)	70	85	80	70	100	
G (%)	25	10	55	30	1	
orientation	ne	s	-	nw	s	
inclination (°)	12	12	0	5	30	
relevé area (m ²)	100	50	100	100	40	
altitude (m a.s.l.)	1300	1179	1200	1205	1230	

S						
<i>Sorbus aucuparia</i>	1	1	+	.	+	80
<i>Betula pendula</i>	.	+	+	2	.	60
<i>Picea abies</i>	.	2	2	.	+	60
F						
D-<i>Rubetum idaei</i>						
<i>Rubus idaeus</i>	3	3	4	4	5	100
D-<i>Epilobietea</i>						
<i>Epilobium angustifolium</i>	2	1	1	2	2	100
<i>Salix caprea</i>	+	1	+	1	+	100

Accompanying species:

A						
<i>Calamagrostis villosa</i>	2	+	2	2	1	100
<i>Luzula sylvatica</i>	1	1	1	1	+	100
<i>Athyrium distentifolium</i>	.	.	.	2	+	40
AI						
<i>Vaccinium myrtillus</i>	2	2	2	2	.	80
<i>Dryopteris dilatata</i>	1	.	+	1	1	80
<i>Oxalis acetosella</i>	1	.	.	+	2	60
<i>Avenella flexuosa</i>	.	3	.	.	+	40
C						
<i>Carex leporina</i>	+	.	.	+	.	40
E						
<i>Picea abies</i>	+	2	2	2	.	80
<i>Sorbus aucuparia</i>	1	+	.	1	.	60
<i>Betula pendula</i>	.	1	1	.	.	40
G						
<i>Polytrichum formosum</i>	2	1	2	2	.	80
<i>Dicranum scoparium</i>	+	+	.	2	1	80

Species in 1 relevé only: **S:** *Fagus sylvatica* (1:2), **F:** *Carex canescens* (1:+), *C. remota* (2:+), *Cirsium palustre* (5:r), *Deschampsia cespitosa* (5:+), *Epilobium ciliatum* (5:r), *Galeopsis bifida* (2:+), *Juncus effusus* (4:1), *J. filiformis* (1:+), *Maianthemum bifolium* (1:+), *Mycelis muralis* (5:r), *Populus tremula* (2:+), *Prenanthes purpurea* (1:r), *Rumex acetosella* (3:1), *Senecio ovatus* (5:+), *S. sylvaticus* (1:r), *Veronica officinalis* (3:+), **G:** *Cladonia coniocraea* (4:+), *C. digitata* (2:+), *Plagiothecium laetum* (1:+), *Pogonatum urnigerum* (3:1), *Polytrichum commune* (1:1), *Sphagnum girgensohnii* (1:+).

Localities: 1. Trístoličník Mt., V. Eltsova 2000, 13°48'46" E, 48°47'08" N; 2. Stráž Mt., the clearing under of the road, V. Eltsova 2000, 13°35'23" E, 48°58'12" N; 3. Černá Hora Mt., V. Eltsova 2000, 13°33'41" E, 48°58'19" N; 4. Trojmezi Highland, V. Eltsova 2001, 13°49'56" E, 48°46'53" N; 5. The south slope of Boubin Mt., Z. Neuhäuslová 1999, 13°49'05" E, 48°59'28" N.

Poznámky