



# **Czech Forest (Site) Ecosystem Classification**

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## 1 Introduction

Ecosystem (site) classification of forests in Czech Republic is among those based on environmental factors. Initially, it was developed using a phytosociological basis, but later, in view of operational application, the emphasis was placed on the environment of forest ecosystems. Climatic and soil studies helped to characterize environmental conditions and their relationships to forest communities. As the development of a true ecological classification is difficult, existing forest ecosystem classifications are driven either by vegetation or environment. These two different approaches influenced the development of forest classification (commonly referred to as forest typology) in former Czechoslovakia.

"**Typological System of Forest Management Planning Institute**" is the name of a recently established forest site classification. Taking into consideration extensive changes in forest cover, which have resulted in profound changes in forest communities and the associated forest floor and soil properties (degradation stages), the classification system is based upon relatively stable environmental conditions. In addition to characterizing humus forms and plant communities of climax (potential) vegetation, the system also attempts to quantify potential production of forest ecosystems (e.g., yield class and canopy position of trees).

This typological system, which was developed by Plíva and Průša (Plíva 1971-1976) has been applied in Czech forests since 1970. As the composition of most of the original forests was changed to Norway spruce (*Picea abies*) monocultures in last 200 years, two environmental (site) factors were used in organizing the system. These are soil and climatic properties, the latter are represented by **forest vegetation zones** which express altitudinal zonation of forest vegetation in Czech Republic. These factors make up a two-dimensional, ecological grid (Table 1).

## 2 Units

**A forest site type** is a unit with a narrow range of environmental conditions for the establishment and growth of tree species; thus it represents the basic unit of growing conditions. Zlatník (1956) defined a forest site type as "...an aggregate of natural geobiocenosis and all geobiocenoses originating from them, from the view-point of development, and partly geobiocenoses (geobiocenooids) changed to a certain degree, including development stages." (Randuška 1982, p. 162). Each forest site type includes all original geobiocenoses with homogenous ecological or growth conditions and with a certain amplitude of the potential autochthonous and allochthonous forest productivity. Thus, a given forest site type includes all forest communities regardless of the existing vegetation and development stage.

For operational application, forest site types are characterized by a diagnostic combination of plant species, soil properties, habitat, and measures of forest productivity (i.e., potential yield class of one or more tree species). **Forest site type complexes** are classes at a higher level of generalization of the typological system. Forest site types are grouped into forest site type complexes based ecological (climatic and edaphic) relationships. Each forest site type complex is characterized by a unique combination of edaphic and climatic conditions. On the ecological grid, edaphic conditions (referred to as **edaphic categories**) are displayed along the horizontal axis, and climatic conditions represented by forest vegetation zones are displayed along the vertical axis. Floristically or environmentally closely related edaphic categories are grouped into **edaphic series** (Table 1).

## 2.1 Forest vegetation zones

Forest vegetation zones manifest categorical relations between climate (using elevation as a proxy for climatic change) and the tree layer composition of forest stands along an altitudinal gradient. Forest vegetation zones are named by one or more tree species tree associated with rich edaphic series. The rationale for the mesotrophic edaphic series is that it reflects the climatic influence more strongly than other edaphic series in which this influence is confounded by other environmental factors.

The proportion of *Fagus sylvatica* in the tree species composition of mesotrophic edaphic series is the key to forest vegetation zones determining natural spread on habitats not influenced by water. Proportion and canopy position of *Fagus sylvatica* and *Quercus petraea* agg. at lower elevations, and *Fagus sylvatica* and *Picea abies* at higher elevations often determine a forest vegetation zone. As strongly gleyed and wet soils do not support a competitive growth of *Fagus sylvatica*, it is important to know the distribution and abundance of *Abies alba* which may extend from the Oak to Beech–Spruce zone. As under these edaphic circumstances the climate – elevation relationships are not strongly reflected in the composition of tree species, framing forest vegetation zones will depend on the natural proportion of *Abies alba* and *Quercus robur* or *Abies alba* and *Picea abies*. Detection of climatic changes with elevation on wet, organic soils dominated by *Picea abies*, or *Pinus sylvestris* is problematic.

### 1<sup>st</sup> - Oak zone (*Quercus* spp. mainly *Quercus petraea* agg.)

Climatic characteristics: mean annual temperature 8°C; mean annual precipitation <600 mm; growing season >165 days.

*Quercus petraea* agg. is the dominant climax species; *Quercus cerris*, *Q. pubescens*, and *Fraxinus angustifolia* are often abundant. *Fagus sylvatica* is absent or rare on wet habitats. This zone includes warm and water-deficient sites, with the exception of deep sands dominated by *Pinus sylvestris* and floodplains. The Oak zone covers 8.3 % of the forested area in Czech Republic.

### 2<sup>nd</sup> - Beech–Oak zone (*Fagus sylvatica*–*Quercus petraea* agg.)

Climatic characteristics: mean annual temperature 7.5 to 8°C; mean annual precipitation 600 to 650 mm; growing season 160 to 165 days.

*Quercus petraea* agg. is dominant. *Carpinus betulus* and *Fagus sylvatica* are very abundant in the lower tree layer. *Quercus pubescens* and *Quercus cerris* occur only on dry sites. *Carpinus betulus* is the dominant species in coppice stands, where *Fagus sylvatica* and *Q. petraea* agg. were eliminated by coppicing. This zone covers 14.9 % of the forested area in Czech Republic.

### 3<sup>rd</sup> - Oak–Beech zone (*Quercus petraea* agg.–*Fagus sylvatica*)

Climatic characteristics: mean annual temperature 6.5 to 7.5°C; mean annual precipitation 650 to 700 mm; growing season 150 to 160 days.

*Fagus sylvatica* dominates grassy-like communities. The associated *Quercus petraea* and *Carpinus betulus* have a production optimum in the zone. Coppice silvicultural system has changed *Fagus sylvatica* and *Quercus petraea* agg. by *Carpinus betulus*. *Quercus robur* and *Abies alba* who were common on water-surplus soils are advancing back. *Pinus sylvestris* is associated with nutrient-poor sites. Oak–Beech zone covers 18.4 % of the forested area in Czech Republic.

#### **4<sup>th</sup> - Beech zone** (*Fagus sylvatica*)

Climatic characteristics: mean annual temperature 6.0 to 6.5°C; mean annual precipitation 700 to 800 mm; growing season 140 to 150 days.

This zone, representing the climatic optimum for *Fagus sylvatica*, featured a large area of pure beech stands which occur at the present in the Carpathian area. *Quercus petraea* and *Abies alba* may be minor associates in the lower tree layer. In the Hercynicum area, localities with gleyed soils (sites with a strongly fluctuating water table) and wet soils within the Beech zone are substituted by the Oak–Coniferous zone. As these edaphic conditions are not tolerated by *Fagus sylvatica*, *Abies alba* and *Quercus robur* dominate these localities. Beech zone covers 5.7 % of the forested area in Czech Republic.

#### **5<sup>th</sup> - Fir–Beech zone** (*Abies alba–Fagus sylvatica*)

Climatic characteristics: mean annual temperature 5.5 to 6°C; mean annual precipitation 800 to 900 mm; growing season 130 to 140 days.

Depending on local conditions, either *Fagus sylvatica* or *Abies alba* are dominant species in forests stands, while *Quercus petraea* agg. is absent. *Abies alba* occurs more frequently on fine-textured soils and ridges where beech litter does not accumulate. Conversely, habitats with beech litter accumulation and hence with compacted forest floor are more suitable for *Fagus sylvatica*. Also present, albeit to a much greater extent than in the past, is *Picea abies* who reaches a production optimum in the Fir–Beech zone. Throughout the zone, *Fagus sylvatica* is accompanied by several understory species considered to be diagnostic of the zone and faithful companions of the species. Tree species of water-surplus sites from the lower zones ascend to this zone; similarly, some subalpine plant species descend to cool sites. Fir–Beech zone covers 30% of the forested area in Czech Republic.

#### **6<sup>th</sup> - Spruce–Beech zone** (*Picea abies–Fagus sylvatica*)

Climatic characteristics: mean annual temperature 4.5 to 5.5°C; mean annual precipitation 900 to 1,050 mm; growing season 115 to 130 days.

Three dominant tree species, i.e., *Fagus sylvatica*, *Abies alba*, and *Picea abies*, are referred to as a 'hercynian mixture'. *Fagus sylvatica*, however, does not occur on water-surplus sites. Several understory species considered to be companions of *Picea abies* occur sporadically in the herb layer, such as *Prenanthes purpurea* (ascended from relatively wetter sites in the Fir–Beech zone and yet wetter in the Beech zone to relatively drier sites in this zone), *Polygonatum verticillatum*, and *Festuca altissima*. *Calamagrostis villosa* is the understory dominant and *Pinus sylvestris* is a codominant on nutrient-poor sites. *Doronicum austriacum* (the Carpathian geoelement ranging to Orlické and Šumava Mts.), *Homogyne alpina*, and *Luzula sylvatica* are additional species. Spruce–Beech zone covers 12 % of the forested area in Czech Republic.

#### **7<sup>th</sup> - Beech–Spruce zone** (*Fagus sylvatica–Picea abies*)

Climatic characteristics: mean annual temperature 4.0 to 4.5°C; mean annual precipitation 1,050 to 1,200 mm; growing season 100 to 115 days.

*Fagus sylvatica* retreats to lower tree layer in the 'hercynian' tree species mixture, however, as krummholz, it forms occasionally the upper timberline in the Carpathians. Humus Podzols (podzol humusový) are the typical soil throughout the zone. A significant proportion of the understory species considered to be companions of *Picea abies* such as *Homogyne alpina*,

*Doronicum austriacum*, *Luzula sylvatica*, and *Poa chaixii* is present in the herb layer. Beech–Spruce zone covers 5 % of the forested area in Czech Republic.

#### **8<sup>th</sup> - Spruce zone (*Picea abies*)**

Climatic characteristics: mean annual temperature 2.5 to 4.0°C; mean annual precipitation 1,200 to 1,500 mm; growing season 60 to 100 days.

*Picea abies* is nearly an absolute dominant, while *Fagus sylvatica* and *Abies alba* are either absent or growing as scrub. A mid-sized *Acer pseudoplatanus* is restricted to nutrient rich soils. At the relatively narrow, upper timberline the forest grades into discontinuous clumps (cohorts) of *Picea abies* mixed with the clumps of *Pinus mugo*. The same understory species as in the Beech–Spruce zone are present in the herb layer, however, *Calamagrostis villosa* and *Avenella flexuosa* often dominate on acid habitats and nutrient-poor soils. Spruce zone covers 1.7 % of the forested area in Czech Republic.

#### **9<sup>th</sup> - Dwarf pine zone (*Pinus mugo*)**

Climatic characteristics: mean annual temperature <2.5 to 4.0°C; mean annual precipitation >1,500 mm; growing season < 60 days.

This zone, occupying localities above the upper timberline, is characterized by shrub communities of *Pinus mugo*, scattered krummholz of *Picea abies*, and the shrub growth form of other species such as *Sorbus aucuparia* ssp. *glabrata*, *Salix silesiaca*, *Betula pubescens*, and *Betula carpatica*. The Dwarf pine zone occupies a small area of Krkonoše and Jeseníky Mts.

#### **0 - Pine zone (with a minor exception, including only *Pinus sylvestris*)**

This special zone combines natural stands of pine (predominantly *Pinus sylvestris* and in some areas also *Pinus rotundata*) which occurrence is controlled not by climatic but soil conditions. *Quercus petraea* agg. and *Fagus sylvatica* (rarely *Picea abies*) are the principal associates. *Abies alba*, *Betula pubescens*, *Betula pendula* and *Picea abies* associates pine on water-surplus habitats. *Pinus sylvestris* dominates or is one of the major species only in special edaphic conditions, e.g., deep sands, serpentine, limestone, peats, and acidic (base-poor) rock outcrops (relict pine stands). These edaphic conditions override the climatic influence and make the zone apparently climate-independent. Based on the geographic distribution, most of the pine stands are within the climatic amplitude delineated by the Oak–Beech and Beech zones. The floristic affinity towards *Pineto-Quercetum* (Table 1) and a sporadic occurrence of *Pinetum dealpinum* communities suggest climatic affinity to the Beech–Oak zone. Conversely, some climatically inverse habitats with *Picea abies* or on sediments at somewhat higher elevations with low precipitation can be considered to be influenced by high-elevation climate.

In some areas, it is possible to observe deviations from the expected vegetation changes along an altitudinal gradient. Deviations occur in drier and wetter portions of forest vegetation zones.

- a) Drier, more continental, variants are situated in rain shadow areas, with the mean annual precipitation <500 mm and absence or infrequent occurrence of *Fagus sylvatica* even in the Oak–Beech zone.
- b) Wetter, more maritime variants are situated typically on western and northwestern (windward) mountain ranges, e.g., the Fir–Beech zone in Moravskoslezské Beskydy

Mts. has the mean annual temperature of 6.4°C and the mean annual precipitation of 1,330 mm which results in a greater vigorous and dominance of *Fagus sylvatica* relative to *Abies alba*.

Water-influenced soils and related edaphic categories show affinities to 'elevationally' higher and climatically cooler forest vegetation zones compared to freely-drained soils (sites) in the same area.

Some accounts of forest vegetation zones include elevation range. However, this information is over-generalization because altitudinal zonation varies between western and eastern part of the Czech Republic.

## 2.2 Edaphic Series

Based on the similarity of edaphic conditions, forest site types are organized by edaphic categories that are further organized into edaphic series. Each edaphic series has one basic category and one or more secondary or transitional categories. Edaphic series are grouped into two classes according to soil moisture regime.

### 1. Edaphic series without significant soil water influence

#### ***B series – nutrient rich*** (mesotrophic)

Basic category: B – nutrient-rich

Secondary categories: H – deep loamy soils and loess

F – slope-stony soils with ferns in the herb layer

C – water-deficient soils on basalts

W – limestone; similar to C but only on limestone

Transitional category: S – nutrient-medium; transitional between B and K series

#### ***K series – acidic*** (oligotrophic)

Basic category: K – acidic; grasses are abundant in the herb layer across all zones

Secondary categories: I – compacted acid Luvisols

N – slope-stony, nutrient-poor soil soils; similar to F category

Transitional category: M – nutrient-very poor soils; transitional to Z category

#### ***Z series – extreme***

Basic category: Z – scrub; mainly on shallow soils derived from silicate rocks

Secondary category: X – xerothermal

Transitional category: Y – skeletal; transitional to all other stony soils but with water deficit

#### ***J series – maple*** (enriched by humus (eutrophic))

Basic category: J – talus

Transitional categories: A – stony-colluvial; transitional to F category

D – enriched-colluvial; transitional to H category

### 2. Edaphic series with a significant soil water influence

#### ***L series - ash*** (enriched by water and humus)

Basic category: L – alluvial soils of floodplains; stream-edge sites

Secondary category: U – soils of ravines and gulleys

Transitional category: V – moist to wet; nitrophilous variant of O and G-categories

***P series – stagnic*** (strongly fluctuating water tables)

Basic category: P – acidic stagned soils;

Secondary category: Q – nutrient- poor, Stagnic Podzols

Transitional category: O – nutrient-medium stagned soils; transition al to H and V categories

***G series – wet***

Basic category: G – nutrient-medium Gleysols

Secondary category: T – nutrient-poor Gleysols

R – peats; organic soils

### **2.3 Forest Site Type Complex**

The forest vegetation zone and ecological category represent a **forest site type complex**, e.g., 3B (Table 1). The number **3** signifies the **3<sup>rd</sup>** forest vegetation zone (Oak–Beech), and **B** signifies the nutrient-rich **B** category. Besides these codes, each forest site complex has a common Czech name (e.g., 'bohatá dubová bučina' for the complex 3B which can be translated in English as a 'nutrient-rich oak–beech forest' or in Latin as *Querceto-Fagetum mesotrophicum* (Table 1). Each forest site type complex contains several forest site types, which are usually named according to a dominant, edaphic indicator plant (herb) species. Thus the final code for forest site type includes three characters, e.g., 3B2, which means 'bohatá dubová bučina mařinková in Czech, a "nutrient-rich oak-beech forest with woodruff in English, or *Querceto-Fagetum trophicum - Galium odoratum* in Latin.

As it may be seen from Table 1, some of the categories are absent; for example in high-elevated forest vegetation zones, acidification occurs even on the nutrient-rich sites when climate is cool and wet. Absence of some edaphic categories in low-elevation zones means either their absence in Czech Republic's forests or that the categories have features characteristics of some other categories.

### 2.3.1 Nutrient rich series (B) – *series mesotrophicum*

Nutrient-rich series includes edaphic categories and forest site complexes on nutrient-medium- and -rich soils. The soils are well developed and aerated, predominantly fresh, and have intermediate to fast decomposition of forest floor materials. Mesophytic species prevail while oxylophytes, calciphytes, and nitrophytes are infrequent, rare, or absent.

The significant silvicultural characteristics of these sites are: high forest productivity (except for C category), high brush hazard, and high windthrow hazard for spruce and fir stands owing to their shallow root system.

The principal understory species are: *Galium odoratum*, *Dentaria bulbifera*, *Carex digitata*, *Oxalis acetosella*, *Senecio ovatus*, *Athyrium filix-femina*, *Rubus hirtus*, *Carex pilosa* (predominantly in the Beech-Oak and Oak-Beech zones), *Carex montana*, *Dactylis glomerata*, *Melica uniflora*, *Poa angustifolia*, *Brachypodium sylvaticum*, and others.

**1<sup>st</sup> forest vegetation zone:** *Carpineto-Querceta mesotrophica* (nutrient-medium hornbeam-oak forests) develop in the Oak zone under the influence of a warm and dry climate with a long growing season and soil water deficit. Humus forms are thin and poorly developed. The tree layer is without *Fagus sylvatica*. Less characteristic communities of this complex are transitions to thermophilous oak stands and less extreme thermophilous oak stands, i.e., communities with a continentality trend, where *Fagus sylvatica* is absent and *Carpinus betulus* is rare. The characteristic species (especially for the transition to other edaphic series) are: *Sorbus torminalis*, *Pyrus communis*, *Pyrethrum corymbosum*, *Primula veris*, *Festuca heterophylla*, *Lathyrus niger*, *Melittis melissophyllum*, *Campanula persicifolia*, and others.

Understory vegetation composition of hornbeam-oak stands (especially that of the *Carpineto-Quercetum mesotrophicum*) has been profoundly changed. The herb layer had been more diverse compared to the low-diversity shrub layer (*Lonicera xylosteum*, *Corylus avellana*, *Daphne mezereum*, plus advance regeneration). This profound changes caused by a persistent human impact have resulted in the change in the tree species composition, transformation to a coppice forest over a large area, and luxuriant growth of the shrub layer due to the decreasing tree canopy cover.

**2<sup>nd</sup> forest vegetation zone:** *Fageto-Querceta mesotrophica* (nutrient-medium Beech-Oak forests) in the Beech-Oak zone have a more continuous occurrence at foothills, especially in the Carpathian area. These stands are usually associated with base-rich soils with an admixture or overlaying loess deposits. Compared to the Oak zone, the soils have a lower growing-season water deficit and thicker forest floors. More favourable soil moisture conditions allow establishment of *Fagus sylvatica* together with a dominant *Quercus petraea* agg, and result in the development of a species-rich, graminoids-like, herb layer.

**3<sup>rd</sup> forest vegetation zone:** *Querceto-Fageta mesotrophica* (nutrient-medium Oak-Beech forests) in the Oak-Beech zone form a transition between *Fageto-Querceta* and *Fageta* on more base-rich soils developed often from loamy loess and loess deposits. These stands extend from the upper to lower montane sites. Compared to the Beech-Oak zone, there is no significant growing-season soil moisture deficit, which results in the absence of thermophilous species and strong presence of the species associated with beech ecosystems. The understory species associated with the beech zone predominate.

**4<sup>th</sup> forest vegetation zone:** *Fageta mesotrophica* (nutrient-medium beech forests) in the Beech zone cover continuous area in the *Carpathicum*; in the *Hercynicum* they occur on the lower montane, base-rich sites (at České Středohoří, Branžovský Hvozd highlands) and on warmer, montane sites of the *Abieto-Fageta mesotrophica* (Fir-Beech stands). Herbaceous



associates of beech stands (*Galium odoratum*, *Dentaria bulbifera*, *Sanicula europaea*, *Asarum europaeum*) are characteristic; tall herbs and ferns are present in some forest site types. However, types without any herb layer (*Fageta paupera*) occur on leewards slopes with accumulation of beech litterfall (e.g., at Český les and Chřiby highlands, and Bílé Karpaty Mts.).

**5<sup>th</sup> forest vegetation zone:** *Abieto-Fageta mesotrophica* (nutrient-medium Fir-Beech forests) in the Fir-Beech zone represent the most extensive climax communities in Czech Republic. These stands are located across montane sites; in Carpathians (Moravskoslezské Beskydy Mts.) they ascend to higher altitudes. The soils are without growing-season deficit and the decomposition of forest floor materials is fast. These edaphic conditions are reflected in the species-rich, herb layer, including short and tall herbs and ferns (predominantly companions of beech forests), and a small admixture of nitrophytic species. *Festuca altissima* and *Hordelymus europaeus* are the typical grasses. The Fir-Beech zone represents the upper limit for *Prenanthes purpurea*. As in the Beech zone, the shrub layer is poorly developed featuring in addition to advance regeneration *Lonicera nigra* (*Lonicera xylosteum* occurs in lower altitudes) and *Daphne mezereum*. *Fagus sylvatica*, *Abies alba*, and admixture of valuable broad-leaved tree species (e.g., *Acer pseudoplatanus* and *Ulmus glabra*) formed the original tree species composition in natural stands, with *Picea abies* very rarely present. Unfortunately, nearly all natural stands were changed to *Picea abies* monocultures.

**6<sup>th</sup> forest vegetation zone:** *Piceeto-Fageta mesotrophica* (nutrient-medium Spruce-Beech forests) in the Spruce-Beech zone represent the original natural communities on the lower subalpine sites in the *Hercynicum*. *Polygonatum verticillatum* is the common species to the upper limits of the zone; subalpine species are rare, including *Doronicum austriacum*, *Cicerbita alpina*, *Adenostyles alliariae*, *Ranunculus platanifolius*, *Senecio subalpinus*, *Streptopus amplexifolius*, *Geranium sylvaticum*, *Luzula sylvatica*, *Homogyne alpina*, etc. *Fagus sylvatica* is still very vigorous and often dominant in the mixtures with *Abies alba* and *Picea abies*. *Oxalis acetosella*, *Galium rotundifolium*, *Maianthemum bifolium*, *Carex digitata*, *Gymnocarpium dryopteris*, *Festuca altissima*, *Prenanthes purpurea*, and *Polygonatum verticillatum* in the herb layer are indicative of nutrient-poorer conditions and mor humus forms in Fir-Beech and Spruce-Beech stands (transitional S category).. Tall herbs, ferns, and “beech” species retreat and the contingent of acidophilous species occur in these types.

**7<sup>th</sup> forest vegetation zone:** *Fageto-Piceeta mesotrophica* (nutrient-medium Beech-Spruce forests) in the Beech-Spruce zone are subalpine, especially in the *Hercynicum*. *Picea abies* is a dominant species in this zone; the presences of *Abies alba* varies throughout the zone; however, growing conditions for *Fagus sylvatica* are marginal due to a short growing season, low temperature, and high humidity. Subalpine plant species, especially on nutrient-rich habitats, are prominent in the herb layer; however, they tend to be oxylophytic due the development of acid humus forms in the leached soils.

#### 2.3.1.1 *Categoria mesotrophica* (B-category)

Communities of this category occur on nutrient-medium or medium base-rich soils located on sites without a significant influence of local climate, such as on heights of lands and gentle mid-slopes. In general the soils are skeletal (gravelly), mesotrophic to eutrophic Dystric Cambisols. Even-aged *Picea abies* stands are prone to windthrow above the Fir-Beech zone, to snow damage (snowbreakage and uprooting), and to impoverish on low-altitude sites. Brush hazard increases even with slightly decreased canopy cover.

The appropriate forest function is timber production as site productivity is very high; however, more complex stand structure is desired. Ecological function of stands is hydrological. The potential for natural regeneration of *Fagus sylvatica* (and of the other valuable broad-leaved tree species) is high; from the Oak-Beech through Fir-Beech zone it is very high. It is possible to establish *Pseudotsuga menziesii* (up to 10 % of the area) and *Abies grandis* (up to 5 % of the area) in the Beech-Oak through Fir-Beech zone.

### **Forest site type complexes:**

#### **1<sup>st</sup> forest vegetation zone: 1B - *Carpineto-Quercetum mesotrophicum***

Occurrence: warm and dry climates on plateaus and slopes; at higher altitudes on warm-aspect slopes underlain by base-rich soil parent materials.

Soils: moderately deep, growing-season water-deficient, mesotrophic Dystric Cambisols to eutrophic Dystric Cambisol; occasionally Cambic Vertisols (marls); Eutric Cambisols with transitions to Calcaric Cambisols on clay sites; Calcic Luvisols can occur on some sites (e.g. 1B3)

Significant (often dominant or indicator) understory species:

<i>Agrostis capillaries</i>	<i>Fragaria vesca</i>
<i>Asarum europaeum</i>	<i>Holcus lanatus</i>
<i>Brachypodium pinnatum</i>	<i>Lathyrus vernus</i>
<i>Brachypodium sylvaticum</i>	<i>Luzula pilosa</i>
<i>Maianthemum bifolium</i>	<i>Viola reichenbachiana</i>
<i>Campanula trachelium</i>	<i>Melica nutans</i>
<i>Carex montana</i>	<i>Poa nemoralis</i>
<i>Convallaria majalis</i>	<i>Primula elatior</i>
<i>Dactylis polygama</i>	<i>Rubus fruticosus</i> agg.
<i>Festuca heterophylla</i>	<i>Stellaria holostea</i>

Forest sites types:

- (0) initial stages on dumps
- (1) *Poa nemoralis* + *Carex montana*
- (2) *Galium sylvaticum* (*Galium schultesii* in Carpathians)
- (3) *Brachypodium sylvaticum*
- (4) *Dactylis polygama*
- (5) *Rubus fruticosus* agg. (degraded sites)
- (6) *Galium odoratum*; (transitional to 2B - *Fageto-Quercetum mesotrophicum*)
- (7) *Stellaria holostea*

Natural tree species composition:

1B1, 1B5 and 1B6: *Quercus petraea* agg. 80 %; *Carpinus betulus* 10 %; *Fagus sylvatica* 10 %; *Tilia cordata* 0.5 %; *Sorbus torminalis* 0.5 %; *Quercus cerris* 0.5 %; *Acer platanoides* 0.1 %; *Acer campestre* 0.1 %; *Cerasus avium* 0.1 %; and shrubs

1B2, 1B3, 1B4 and 1B7: *Quercus petraea* agg. 50 - 70 %; *Fagus sylvatica* 0 - 30 %; *Pinus sylvestris* 0 - 10 %; *Carpinus betulus* 0 - 20 %; *Acer platanoides* 0 - 10 %; *Tilia cordata* + *Tilia platyphyllos* 20 %; *Abies alba* 0.5 %; *Fraxinus excelsior* 0.5 %; *Ulmus* sp. 0.5 %; *Populus tremula* 0.1 %; *Acer campestre* 0.1 %; *Cerasus avium* 0.1 %

Absolute height yield class (= average maximum height (m) of 100 year-old trees):

*Quercus petraea* agg. 20 - 22 m, *Tilia* sp. 22 - 24 m, and *Pinus sylvestris* 20 - 22 m on Cambisols; the yield class is higher on Calcaric Cambisols, and Calcic Luvisols.

Hazards: very high growing-season soil water deficit; very low brush hazard.

## **2<sup>nd</sup> forest vegetation zone: 2B - *Fageto-Quercetum mesotrophicum***

Occurrence: occasionally in valleys; continuously on plateaus and slopes in (Moravian) Carpathian hills; at higher altitudes only on warm-aspect slopes and ridges

Soils: moderately deep to deep; growing-season water deficient, typically mesotrophic Dystric Cambisols with transitions to Eutric Cambisols and Calcaric Cambisols; eutrophic Dystric Cambisols and Calcic Luvisols occur on base-rich soil materials.

Significant (often dominant or indicator) understory species:

<i>Actaea spicata</i>	<i>Lathyrus vernus</i>
<i>Ajuga reptans</i>	<i>Melica nutans</i>
<i>Asarum europaeum</i>	<i>Melica uniflora</i>
<i>Brachypodium sylvaticum</i>	<i>Melittis melissophyllum</i>
<i>Brachypodium pinnatum</i>	<i>Mycelis muralis</i>
<i>Bromus ramosus</i>	<i>Poa nemoralis</i>
<i>Carex pilosa</i>	<i>Pulmonaria officinalis</i>
<i>Carex sylvatica</i>	<i>Pyrethrum corymbosum</i>
<i>Cruciata glabra</i>	<i>Scrophularia nodosa</i>
<i>Galium odoratum</i>	<i>Stellaria holostea</i>
<i>Galium schultesii</i>	<i>Veronica chamaedrys</i>
<i>Galium sylvaticum</i>	<i>Viola reichenbachiana</i>
<i>Hepatica nobilis</i>	<i>Viola riviniana</i>
<i>Lathyrus niger</i>	( <i>Galium rotundifolium</i> )*

\*facultative occurrence

Forest site types:

- (1) *Poa nemoralis*
- (2) *Melica nutans* (resp. *Melica uniflora*)
- (3) *Galium odoratum*
- (4) *Brachypodium sylvaticum*
- (5) *Carex pilosa* – in Carpathian influenced territories; (transition to 2H - *Fageto-Quercetum illimerosum mesotrophicum* on loess)
- (6) aceric - maple; (*acerosum*)(mainly with *Acer platanoides*); transition to 2A - *Aceri-Fageto-Quercetum lapidosum*
- (7) *Poa nemoralis* + *Galium odoratum*; transition to 2C - *Fageto-Quercetum subxerothermicum*)
- (9) steep-slope

Natural tree species composition:

*Quercus petraea* agg. 60 %; *Fagus sylvatica* 30 %; *Carpinus betulus* 10 %; *Tilia cordata* 0.5 %; *Sorbus torminalis* 0.5 %; *Acer platanoides* 0.5 %; (*Quercus cerris* 0.5 %); *Acer campestre* 0.5 %; *Cerasus avium* 0.5 %; and some shrubs; (on slopes with: *Fraxinus excelsior* 0.5 %; *Ulmus laevis* 0.5%; *Ulmus glabra* 0.5 %; and *Taxus baccata* 0.1 %).

Absolute height yield class: *Quercus petraea* agg. 20 - 24 m ; *Fagus sylvatica* 24 - 26 m; *Carpinus betulus* 16 - 20 m; (on nutrient-richer soils and slopes: *Quercus petraea* agg. up to 28 m, *Pinus sylvestris* 22 - 24 m; *Abies alba* 28 m; *Picea abies* 28 - 32 m).

Hazards: moderate growing-season water deficit and brush (herbaceous) hazard

### **3<sup>rd</sup> forest vegetation zone: 3B - *Querceto-Fagetum mesotrophicum***

Occurrence: on cool-aspect slopes at lower altitudes; continuous distribution on base-rich soils at mid-altitudes; on warm-aspect slopes at higher altitudes.

Soils: deep, non-skeletal with a minor growing-season water deficit; typically mesotrophic to eutrophic Dystric Cambisols; Eutric Cambisols, and occasionally, Calcaric Cambisols are on limestone; Luvic Cambisols rarely develop on shallow loess deposits.

Significant (often dominant or indicator) understory species:

<i>Actaea spicata</i>	<i>Maianthemum bifolium</i>
<i>Asarum europaeum</i>	<i>Melica nutans</i>
<i>Athyrium filix-femina</i>	<i>Melica uniflora</i>
<i>Brachypodium sylvaticum</i>	<i>Mycelis muralis</i>
<i>Bromus ramosus</i>	<i>Poa nemoralis</i>
<i>Carex digitata</i>	<i>Pulmonaria officinalis</i>
<i>Dentaria bulbifera</i>	<i>Salvia glutinosa</i> (in Carpathians)
<i>Dentaria enneaphyllos</i>	<i>Sanicula europaea</i>
<i>Dentaria glandulosa</i> (in Carpathians)	<i>Senecio jacquinianus</i>
<i>Galeobdolon luteum</i>	<i>Viola reichenbachiana</i>
<i>Galium schultesii</i> (in Carpathians)	<i>Viola riviniana</i>
<i>Galium odoratum</i>	( <i>Dryopteris filix-mas</i> )
<i>Galium sylvaticum</i>	( <i>Galium rotundifolium</i> )
<i>Gymnocarpium dryopteris</i>	( <i>Oxalis acetosella</i> )
<i>Hepatica nobilis</i>	<i>Lathyrus vernus</i>

Forest sites types:

- (1) *Melica uniflora* (more abundant in the east territories); *Melica nutans* (more abundant in the west)
- (2) *Galium odoratum*
- (3) *Brachypodium sylvaticum*
- (5) *Carex pilosa* - in Carpathian influenced territories; transition to 3H - *Querceto-Fagetum illimerosum mesotrophicum*
- (6) aceric - maple; (*acerosum*) (mainly with *Acer platanoides*); transition to 3A *Tilia-Querceto-Fagetum acerosum lapidosum*
- (8) fir (*Abies alba*) - on slopes
- (9) steep-slopes

Natural tree species composition:

3B3, 3B6, and (3B8): *Fagus sylvatica* 60 %; *Quercus petraea* agg. 30 %; *Carpinus betulus* 10 %; *Abies alba* 0.5 %; *Tilia cordata* 0.5 %; *Acer platanoides* 0.5 %; *Taxus baccata* 0.1 %; and some shrubs

3B1, 3B2, and 3B3: *Abies alba* 20 %; *Quercus petraea* agg. 30 %; *Fagus sylvatica* 50 - 70 %; *Tilia cordata* + *Tilia platyphyllos* 20 %; *Carpinus betulus* 0 - 10 %; *Fraxinus excelsior* 0.5 %; *Ulmus* sp. 0.5 %; *Cerasus avium* 0.1 %; *Populus tremula* 0.1 %

3B9: *Abies alba* 10 - 20 %; *Quercus petraea* agg. 30 %; *Fagus sylvatica* 50-70 %; *Acer platanoides* 20 %; *Tilia cordata* + *Tilia platyphyllos* 20 %; *Ulmus* sp. 0.1 %; *Fraxinus excelsior* 0.1 %

Absolute height yield class: *Fagus sylvatica* 24 - 28 m (28 - 34 m)\*; *Picea abies* 24 - 28 m (26 - 30 m)\*; *Quercus petraea* agg. 26 - 28 m (28 - 32 m)\*; *Pinus sylvestris* 22 - 26 m; *Abies alba* 24 - 26 m; (*Larix decidua* 26 - 32 m)

\* possible range of the yield class under more favourable growing conditions

Hazards: Slight growing-season water deficit; moderate brush (herbaceous) hazard; moderate windthrow hazard in even-aged (cultural) *Picea abies* stands

#### **4<sup>th</sup> forest vegetation zone: 4B - *Fagetum mesotrophicum***

Occurrence: from submontane to montane sites; from hilly landscapes to highlands; depressions and slope bases in lowlands; warm-aspect slopes at higher altitudes

Soil: fresh, well-aerated and - drained, slightly gravelly; mesotrophic, often transitional to eutrophic Dystric Cambisols are typical; Eutric Cambisols are associated with limestone materials, with infrequent occurrence of Calcaric Cambisols.

Significant (often dominant or indicator) understory species:

<i>Ajuga reptans</i>	<i>Galium sylvaticum</i>
<i>Asarum europaeum</i>	<i>Hepatica nobilis</i>
<i>Athyrium filix-femina</i>	<i>Maianthemum bifolium</i>
<i>Brachypodium sylvaticum</i>	<i>Melica nutans</i>
<i>Bromus remosus</i>	<i>Melica uniflora</i>
<i>Campanula persicifolia</i>	<i>Mycelis muralis</i>
<i>Carex digitata</i>	<i>Pulmonaria officinalis</i>
<i>Carex pilosa</i>	<i>Salvia glutinosa</i> (in Carpathians)
<i>Carex sylvatica</i>	<i>Sanicula europaea</i>
<i>Dentaria bulbifera</i>	<i>Veronica officinalis</i>
<i>Dentaria enneaphyllos</i>	<i>Viola reichenbachiana</i>
<i>Dentaria glandulosa</i> (pure in Carpathians)	( <i>Dryopteris filix-mas</i> )
<i>Euphorbia amygdaloides</i>	( <i>Festuca altissima</i> )
<i>Galeobdolon luteum</i>	( <i>Galium rotundifolium</i> )
<i>Galium odoratum</i>	( <i>Senecio ovatus</i> )
<i>Galium schultesii</i> (in Carpathians)	

Forest site types:

- (1) *Galium odoratum*
- (2) *Carex pilosa* - in Carpathian influenced territories;; transitional to 4H - *Fagetum illimerosum mesotrophicum*
- (3) *Brachypodium sylvaticum*
- (4) aceric - maple; (*acerosum*)(*Acer platanoides* mainly; *Acer pseudoplatanus* rarely); transitional to 4A - *Tilieto-Fagetum acerosum lapidosum*
- (5) *Festuca altissima*; transitional to 5B - *Abieto-Fagetum mesotrophicum*
- (7) *Senecio ovatus*; prevailing *Picea abies* monocultures

(9) steep-slope

Natural tree species composition:

4B1, 4B2, and 4B3: *Fagus sylvatica* 80 %; *Abies alba* 20 %; *Quercus petraea* agg. 0.5 %; *Tilia cordata* 0.5 %; shrubs lack; (locally *Fagus sylvatica* 100 %)

4B4, 4B5 and 4B7: *Fagus sylvatica* 50 - 70 %; *Abies alba* 20 %; *Quercus petraea* agg. 30 %; *Carpinus betulus* 0 - 10 %; *Acer platanoides* 0 - 10 %; *Tilia cordata* + *Tilia platyphyllos* 20 %; *Fraxinus excelsior* 0.5 %; *Ulmus* sp. 0.5 %; *Cerasus avium* 0.1 %; *Populus tremula* 0.1 %

4B9: *Abies alba* 10 - 0 %; *Quercus petraea* agg. 30 %; *Fagus sylvatica* 50 - 70 %; *Acer platanoides* 20 %; *Carpinus betulus* 0.1 %; *Tilia cordata* + *Tilia platyphyllos* 20 %; *Ulmus* sp. 0.1 %; *Fraxinus excelsior* 0.1 %; *Taxus baccata* 0.1 %

Absolute height yield class:

*Picea abies* 24 - 32 m (36); *Fagus sylvatica* 26 - 30 m (34); *Abies alba* (22) 29 - 30 m (34); *Larix decidua* 26 - 30 m (34); *Acer pseudoplatanus* 24 - 28 m (32)

Hazards: increasing brush hazard with decreasing canopy cover; low growing-season water deficit; moderate windthrow hazard in *Picea abies* monocultures

**5<sup>th</sup> forest vegetation zone: 5B - *Abieto-Fagetum mesotrophicum***

Occurrence: on submontane to montane slopes and plateaus with varying base status but most often on base-rich sites.

Soil: fresh to moist; well-aerated and -drained, slightly gravelled; mesotrophic to eutrophic Dystric Cambisols are typical.

Significant (often dominant or indicator) understory species:

<i>Asarum europaeum</i>	<i>Mycelis muralis</i>
<i>Athyrium filix-femina</i>	<i>Oxalis acetosella</i>
<i>Cardamine trifolia</i>	<i>Petasites albus</i>
<i>Carex pilosa</i>	<i>Prenanthes purpurea</i>
<i>Carex sylvatica</i>	<i>Rubus hirtus</i>
<i>Dentaria bulbifera</i>	<i>Sanicula europaea</i>
<i>Dentaria enneaphyllos</i>	<i>Senecio jacquinianus</i>
<i>Dentaria glandulosa</i> (in Carpathians)	<i>Senecio ovatus</i>
<i>Dryopteris filix-mas</i>	<i>Solidago virgaurea</i>
<i>Festuca altissima</i>	<i>Vinca minor</i>
<i>Galeobdolon luteum</i>	( <i>Calamagrostis arundinacea</i> )
<i>Galium odoratum</i>	( <i>Carex pilosa</i> )
<i>Galium rotundifolium</i>	( <i>Viola reichenbachiana</i> )

Forest site types:

- (1) *Galium odoratum*
- (2) *Rubus hirtus* (Moravskoslezské Beskydy Mts.)
- (3) *Festuca altissima*
- (5) *Carex pilosa* - in Carpathian influenced territories;; transition to 4B - *Fagetum mesotrophicum*
- (6) aceric - maple; (*acerosum*)(mostly *Acer pseudoplatanus*, rarely *Acer platanoides*); transition to 5A *Acereto-Fagetum lapidosum*
- (7) *Hordelymus europaeus* (on basalts); transition to 4H *Fagetum illimerosum mesotrophicum*

- (8) *Melica uniflora*  
(9) steep-slopes

Natural tree species composition:

5B2, 5B3, and 5B5: *Fagus sylvatica* 60 %; *Abies alba* 40 %; *Acer pseudoplatanus* 0.5 %; *Picea abies* 0.1 %

5B1, 5B6, 5B7, and 5B8: *Picea abies* 20 %; *Abies alba* 30 - 40 %; *Fagus sylvatica* 40 - 70 %; *Acer pseudoplatanus* 10 %; *Tilia cordata* + *Tilia platyphyllos* 10 %; *Fraxinus excelsior* 0.5 %; *Ulmus glabra* + *Ulmus laevis* 0.5 %; *Taxus baccata* 0.1 %

5B9: *Picea abies* 20 %; *Abies alba* 20 - 40 %; *Fagus sylvatica* 40 - 60 %; *Acer pseudoplatanus* 20 %; *Ulmus glabra* (+ *U. laevis*) 10 %; *Tilia cordata* + *Tilia platyphyllos* 10 %; *Fraxinus excelsior* 0.1 %; *Taxus baccata* 0.1 %

Absolute height yield class:

*Picea abies* (26) 28 - 34 m (36); *Abies alba* (22) 24 - 30 m (36); *Fagus sylvatica* 24 - 30 m (34); *Acer pseudoplatanus* 26 - 32 m; *Larix decidua* 30 - 34 m

Hazards: high brush hazard; moderate snow (breaks and falls) and windthrow hazard due to a poor proportion in crown and root development.

**6<sup>th</sup> forest vegetation zone: 6B - *Piceeto-Fagetum mesotrophicum***

Occurrence: predominantly on base-rich, montane and subalpine sites (700 - 900 m) in Šumava Mts. up to 1040 m.

Soils: deep, fresh to moist, well-aerated and -drained, often skeletal; typically mesotrophic Cambic Podzols; occasionally mesotrophic Dystric Cambisols

Significant (often dominant or indicator) understory species:

<i>Actaea spicata</i>	<i>Polygonatum verticillatum</i>
<i>Athyrium distentifolium</i>	<i>Prenanthes purpurea</i>
<i>Cardamine trifolia</i>	<i>Rubus hirtus</i>
<i>Daphne mezereum</i>	<i>Sanicula europaea</i>
<i>Dentaria bulbifera</i>	<i>Senecio ovatus</i>
<i>Festuca altissima</i>	( <i>Athyrium filix-femina</i> )
<i>Galium odoratum</i>	( <i>Dentaria enneaphyllos</i> )
<i>Mycelis muralis</i>	( <i>Dentaria glandulosa</i> - in Carpathians)
<i>Oxalis acetosella</i>	( <i>Galeobdolon luteum</i> )
<i>Petasites albus</i>	( <i>Polygonatum verticillatum</i> )

Forest site types:

- (1) *Galium odoratum*  
(4) *Cardamine trifolia*  
(6) aceric - maple; (acerosum)(*Acer pseudoplatanus*)  
(9) steep-slopes

Natural tree species composition:

6B4: *Fagus sylvatica* 60 %; *Picea abies* 20 %; *Abies alba* 20 %

6B1 and 6B6: *Fagus sylvatica* 30 - 70 %; *Picea abies* 20 - 40 %; *Abies alba* 20 - 40 %; *Acer pseudoplatanus* 10 %; *Fraxinus excelsior* 0.5 %; *Ulmus glabra* 0.5 %; (*Taxus baccata* 0.1 %)

6B9: *Fagus sylvatica* 40 - 60 %; *Picea abies* 10 - 30 %; *Abies alba* 20 - 40 %; *Ulmus glabra* 10 %; *Taxus baccata* 0.1 %

Absolute height yield class:

*Fagus sylvatica* (24) 26 - 32 m (34), *Picea abies* (26) 28 - 32 m (34), *Abies alba* 26 - 30 m (40)

Hazards: high brush hazard; high snow (falls and breaks) and windthrow hazards.

### **7<sup>th</sup> forest vegetation zone: 7B - *Fageto-Piceetum mesotrophicum***

Occurrence: scattered localities (predominantly in Šumava and Jeseníky Mts.)

Soils: deep, permeable; typically mesotrophic Cambic Podzols; mesotrophic Dystric Cambisols are occasionally present.

Significant (often dominant or indicator) understory species:

<i>Adenostyles alliariae</i>	<i>Senecio jacquinianus</i>
<i>Athyrium distentifolium</i>	<i>Senecio ovatus</i>
<i>Calamagrostis villosa</i>	<i>Soldanella montana</i>
<i>Cicerbita alpina</i>	<i>Stellaria nemorum</i>
<i>Doronicum austriacum*</i>	<i>Telekia speciosa</i>
<i>Luzula sylvatica</i>	( <i>Blechnum spicant</i> )
<i>Mycelis muralis</i>	( <i>Dryopteris filix-mas</i> )
<i>Oxalis acetosella</i>	( <i>Galeobdolon luteum</i> )
<i>Polygonatum verticillatum</i>	( <i>Homogyne alpina</i> )
<i>Polytrichum formosum</i>	( <i>Sanicula europaea</i> )
<i>Prenanthes purpurea</i>	( <i>Vaccinium myrtillus</i> )

\*a Carpathian goeement extending only to the Orlické and Novohradské Mts.

Forest site types:

(1) herbaceous (*herbaceum*) (a few “beech species” present; an admixture of “spruce” species)

Natural treespecies composition:

*Picea abies* 60 - 80 %; *Abies alba* 20 %; *Fagus sylvatica* 10 - 30 %; *Acer pseudoplatanus* 0.5 - 10 %; *Sorbus aucuparia* 0.5 %

Absolute height yield class:

*Picea abies* 28 - 32 m; *Fagus sylvatica* 24 - 26 m

Hazards: moderate paludification and brush hazard; high snowpack, freezing rain, and wind (more breakages than windthrow)

#### **2.3.1.2 *Categoria illimerosa mesotrophica* (H- category)**

This category is an edaphic variant of trophic series on loess and loams, specifically on base-rich pure loess or loams developed from rock weathering on lower slopes. Natural soil types are Calcic Luvisols and Albic Luvisols, often with an incipient gleying and transition to meso- and eutrophic Dystric Cambisols and to Luvic Chernozems; variants of these soil types are found on loess with a higher lime content.

The forest site types are *Oxalis acetosella* (most prevalent), *Carex pilosa* or *Carex montana* (at lower altitudes) *Calamagrostis arundinacea* (in transitions to I category (*categoria*



*illimerosa acidophila*)). Magnoherbaceous and *Luzula* sp. stages, which are very difficult to reconstruct, prevail in the introduced *Picea abies* and *Pinus sylvestris* stands.

Forest function is timber production with an above-average yield class. A poor decomposition of surface organic materials occurs on sites prone to degradation as indicated by a simple floristic pattern. In the Oak and Oak-Beech zone natural regeneration of *Carpinus betulus* is plentiful; however *Quercus petraea* agg. regenerates poorly. The natural regeneration of *Fagus sylvatica* in the Oak-Beech, Beech, and Fir-Beech zones is moderate but in the Spruce-Beech zone is low. *Picea abies* regenerates only on nutrient-poor microsites. The suitability of planting *Pseudotsuga menziesii* and *Abies grandis* is similar as in the nutrient-rich, B-category (*categoria mesotrophica*).

### Forest site type complexes:

#### 1<sup>st</sup> forest vegetation zone: 1H - *Carpineto-Quercetum illimerosum mesotrophicum*

Occurrence: on plateaus and gentle, warm-aspect slopes and marginally at hills associated with loess, loess loams, and loess capping.

Soils: growing-season water deficient, slightly firm; Haplic Luvisols and Albic Luvisols are most frequent; less frequent and marginal are Calcaric Cambisols and Luvic Chernozems, respectively.

#### Significant (often dominant or indicator) understory species:

<i>Asperula tinctoria</i>	<i>Fragaria viridis</i>
<i>Astragalus glycyphyllos</i>	<i>Melica nutans</i>
<i>Betonica officinalis</i>	<i>Melica uniflora</i>
<i>Brachypodium pinnatum</i>	<i>Poa angustifolia</i>
<i>Brachypodium sylvaticum</i>	<i>Poa nemoralis</i>
<i>Buglossoides purpureocaerulea</i>	<i>Pyrethrum corymbosum</i>
<i>Carex digitata</i>	<i>Trifolium alpestre</i>
<i>Carex humilis</i>	<i>Veronica chamaedrys</i>
<i>Carex michelii</i>	<i>Vincetoxicum hirundinaria</i>
<i>Carex montana</i>	<i>Viola hirta</i>
<i>Carex pallescens</i>	<i>Viola riviniana</i>
<i>Clinopodium vulgare</i>	( <i>Dactylis polygama</i> )
<i>Dictamnus albus</i>	( <i>Fragaria moschata</i> )
<i>Festuca heterophylla</i>	( <i>Vinca minor</i> )

#### Forest site types:

- (1) *Brachypodium pinnatum*
- (2) *Poa angustifolia* (typical for loess sites)
- (3) *Carex montana*
- (4) *Brachypodium sylvaticum*
- (5) *Corni-Carpineto-Quercetum-Vinca minor* (transitional to X-category (*categoria xerothermica*))
- (6) *Buglossoides purpureocaerulea*

#### Natural tree species composition:

1H1 - 1H5: *Quercus petraea* agg. 80 %; *Carpinus betulus* 20 %; *Tilia cordata* 0.1 % *Acer campestre* 0.1 %; and shrubs

1H6: *Quercus petraea* agg. 50 - 70 %; *Pinus sylvestris* 0 - 10 %; *Sorbus torminalis* 0.5 %; *Quercus pubescens* 0.1 %; *Carpinus betulus* 0 - 20 %; *Acer platanoides* 0 - 10 %; *Fraxinus*

*excelsior* 0 - 0.5 %; *Ulmus laevis* 0 - 0.5 %; *Ulmus minor* 0 - 0.5 %; *Tilia cordata* + *Tilia platyphyllos* 20 %; *Populus tremula* 0.1 %; *Betula pendula* 0.1 %; *Acer campestre* 0.1 %; *Cerasus avium* 0.1 %

Absolute height yield class:

*Quercus petraea* agg. (20) 22 - 24 (30) m; *Pinus sylvestris* (16) 22 - 24 (28) m; *Tilia* sp. 24 (26) m; *Carpinus betulus* 16 - 18 m

Hazards: high water deficit; moderate by shrubs, prone to soil degradation

## **2<sup>nd</sup> forest vegetation zone: 2H - *Fageto-Quercetum illimerosum mesotrophicum***

Occurrence: lower hills, plateaus and gentle, lower slopes; typically associated with base-rich soil parent materials with loess or loamy loess capping

Soil: slight growing-season water deficient; mesotrophic Haplic Luvisols are most frequent; they can be either (depending on site conditions) Albi-Haplic or slightly gleyed; Calcaric Cambisols on strongly calcic loess, slightly gleyed; Cambic Stagnosols are very infrequent.. (Luvi-)Hortic Anthrosols occur on agricultural recultivations.

Significant (often dominant or indicator) understory species:

<i>Ajuga reptans</i>	<i>Galium sylvaticum</i>
<i>Asarum europaeum</i>	<i>Lathyrus niger</i>
<i>Brachypodium pinnatum</i>	<i>Luzula pilosa</i>
<i>Brachypodium sylvaticum</i>	<i>Melampyrum nemorosum</i>
<i>Buglossoides purpurocaerulea</i>	<i>Melittis melissophyllum</i>
<i>Carex digitata</i>	<i>Oxalis acetosella</i>
<i>Carex michelii</i>	<i>Pulmonaria officinalis</i>
<i>Carex montana</i>	<i>Pyrethrum corymbosum</i>
<i>Carex pilosa</i>	<i>Stellaria holostea</i>
<i>Convallaria majalis</i>	( <i>Aegopodium podagraria</i> )
<i>Euphorbia amygdaloides</i>	( <i>Dactylis polygama</i> )
<i>Festuca ovina</i> agg.	( <i>Euphorbia dulcis</i> )
<i>Galeobdolon luteum</i>	( <i>Genista germanica</i> )
<i>Galium odoratum</i>	( <i>Luzula luzuloides</i> )
<i>Galium schultesii</i> (in Carpathians)	

Forest site types:

- (0) initial (*anthropicum*)(on agricultural recultivations)
- (1) *Dactylis polygama*
- (2) *Carex pilosa*
- (3) *Luzula luzuloides* + *Carex pilosa* (transitional to 2I (*Fageto-Quercetum illimerosum acidophilum*))
- (4) *Carex montana*
- (5) *Luzula luzuloides* + *Carex montana*
- (6) *Oxalis acetosella*; (transitional to 3 H (*Querceto-Fagetum illimerosum mesotrophicum*))
- (7) stagnic; (*variohumidum*)(transitional to 2O (*Abieto-Fagi-Quercetum variohumidum mesotrophicum*))
- (8) *Convallaria majalis*
- (9) steep-slope

Natural tree species composition:

all types except 2H7: *Quercus petraea* agg. 60 %; *Carpinus betulus* 10 %; *Fagus sylvatica* 30 %; *Tilia cordata* 0.5 %; *Acer platanoides* 0.5 %; *Sorbus torminalis* 0.5 %

2H7: *Quercus petraea* agg. 50 - 70 %; *Fagus sylvatica* 0 - 20 %; *Carpinus betulus* 0 - 20 %; *Acer platanoides* 0 - 10 %; *Tilia cordata* + *Tilia platyphyllos* 20 %; *Abies alba* 0.1 - 0.5 %; *Fraxinus excelsior* 0.1 - 0.5 %; *Ulmus minor* 0.1 - 0.5 %; *Ulmus laevis* 0.1 - 0.5 %; *Populus tremula* 0.1 - 0.5 %; *Betula pendula* 0.1 - 0.5 %; *Acer campestre* 0.1 - 0.5 %; *Cerasus avium* 0.1 - 0.5 %

Absolute height yield class:

*Quercus petraea* agg. (18) 24 - 26 (28) m; *Fagus sylvatica* 24 - 26 (30) m; *Larix decidua* 28 m; *Carpinus betulus* (14) 18 - 20 (22) m; *Pinus sylvestris* 22 - 24 (28) m; *Picea abies* 28 - 30 (32) m

Hazards: moderate growing season soil water deficit and brush hazard; prone to soil soil degradation

**3<sup>rd</sup> forest vegetation zone: 3H - *Querceto-Fagetum illimerosum mesotrophicum***

Occurrence: plateaus and gentle slopes; nutrient-rich basins; deluvia of base-rich soil parent materials with loess or loamy loess capping

Soils: slightly dry; mesotrophic Luvic Cambisols are the most frequent, less frequent are slightly Stagni-Dystric Cambisols; occasionally Stagnic, Albic Luvisols; infrequent are occasionally Stagnic Haplic and Albi-Haplic Luvisols; Luvic Stagnosols are very rare.

Significant (often dominant or indicator) understory species:

<i>Actaea spicata</i>	<i>Maianthemum bifolium</i>
<i>Aegopodium podagraria</i>	<i>Melica nutans</i>
<i>Asarum europaeum</i>	<i>Mycelis muralis</i>
<i>Carex digitata</i>	<i>Oxalis acetosella</i>
<i>Carex montana</i>	<i>Pulmonaria officinalis</i>
<i>Carex pilosa</i>	<i>Rubus hirtus</i>
<i>Convallaria majalis</i>	<i>Sanicula europaea</i>
<i>Dentaria bulbifera</i>	<i>Senecio jacquinianus</i>
<i>Dentaria enneaphyllos</i>	<i>Stelleria holostea</i>
<i>Dryopteris filix-mas</i>	<i>Vinca minor</i>
<i>Festuca gigantea</i>	<i>Viola reichenbachiana</i>
<i>Galium odoratum</i>	( <i>Galium rotundifolium</i> )
<i>Hepatica nobilis</i>	( <i>Luzula luzuloides</i> )
<i>Lathyrus vernus</i>	( <i>Senecio ovatus</i> )
<i>Luzula pilosa</i>	

Forest site types:

- (1) *Oxalis acetosella*
- (2) *Carex pilosa*
- (3) *Luzula luzuloides* + *Carex pilosa* (transitional to 3I (*Querceto-Fagetum illimerosum acidophilum*))
- (4) *Carex digitata*
- (5) Stagnic (variohumidum); (transitional to 3O (*Abieti-Querceto-Fagetum variohumidum mesotrophicum*))
- (6) magnoherbaceous + *Rubus hirtus*; (*magnoherbaceum*)(nutrient poor sites predominantly in Morabskoslezské Beskydy Mts.)
- (7) *Melica nutans*
- (8) *Abies alba*
- (9) steep-slope

Natural tree species composition:

3H1, 3H2, 3H3, 3H4, 3H5, 3H7, and 3H9: *Fagus sylvatica* 60 %; *Quercus petraea* agg. 30 %; *Carpinus betulus* 10 %; *Fraxinus excelsior* 0.5 %; *Abies alba* 0.1 %

3H5 and 3H8: *Fagus sylvatica* 50 - 70 %; *Quercus petraea* agg. 30 %; *Abies alba* 20 %; *Carpinus betulus* 0 - 10 %; *Acer campestre* 0 - 10 %; *Tilia cordata* + *Tilia platyphyllos* 20 %; (*Fraxinus excelsior* + *Ulmus* sp. 0.5 %)\*; (*Cerasus avium* + *Populus tremula* 0 - 0.5 %)\*\*

\* on moister soils

\*\* in semi-open canopied stands

Absolute height yield class:

*Picea abies* (24) 26 - 30 (32) m; *Fagus sylvatica* (22) 26 - 30 (34) m; *Larix decidua* 32 m; *Abies alba* 24 - 26 m; *Quercus petraea* agg. (22) 24 - 28 (32) m; *Pinus sylvestris* (24) 26 - 28 (32) m; *Carpinus betulus* 16 - 20 m

Hazards: high brush hazard; moderate windthrow and impoverish (*Picea abies*) hazards; prone to soil degradation

**4<sup>th</sup> forest vegetation zone: 4H - *Fagetum illimerosum mesotrophicum***

Occurrence: submontane to lower montane flats, gentle slopes, and ravines; on base-rich soil parent materials with loamy loess capping

Soils: the most frequently mesotrophic Dystric Cambisols and mesotrophic Luvic Cambisols which can be both slightly Stagnic; quite infrequently Stagni-Haplic Luvisols;

Significant (often dominant or indicator) understory species:

sometimes *Nudum*      *Impatiens noli-tangere*

*Actaea spicata*      *Lathyrus vernus*

*Ajuga reptans*      *Luzula pilosa*

*Asarum europaeum*      *Mycelis muralis*

*Carex digitata*      *Oxalis acetosella*

*Carex sylvatica*      *Sanicula europaea*

*Dentaria bulbifera*      *Stachys sylvatica*

*Galeobdolon luteum*      *Viola reichenbachiana*

*Galium odoratum*      (*Carex remota*)

Forest site types:

(1) *Oxalis acetosella*

(2) *Carex pilosa*

(3) stagic (*variohumidum*); (transition to 4O (*Querceto-Abietum variohumidum mesotrophicum*))

Natural tree species composition:

Predominantly: *Fagus sylvatica* 80 %; *Abies alba* 20 %; *Quercus petraea* agg. 0.5 %; *Tilia cordata* 0.5 %

Occasionally: *Fagus sylvatica* 50 - 70 %; *Abies alba* 20 %; *Quercus petraea* agg. 30 %; *Carpinus betulus* 0 - 10 %; *Acer platanoides* 0 - 10 %; *Tilia cordata* + *Tilia platyphyllos* 20 %; (*Fraxinus excelsior* + *Ulmus* sp. 0.5 %)\*; (*Cerasus avium* + *Populus tremula* 0 - 0.5 %)\*\*

\* on more humid soils

\*\* in a small canopy stands

Absolute height yield class:

*Fagus sylvatica* (24) 26 - 30 (32) m; *Picea abies* 26 - 30 (34) m; *Abies alba* 24 - 26 (28) m; *Larix decidua* 28 - 34 m; *Pinus sylvestris* 28 - 32 m; *Quercus petraea* agg. 24 - 28 (32) m  
Hazards: high brush hazard; moderate windthrow (especially in *Picea abies* monocultures); prone to soil degradation

#### **5<sup>th</sup> forest vegetation zone 5H - *Abieto-Fagetum illimerosum mesotrophicum***

Occurrence: continuous occurrence on mid-altitude flats; discontinuous occurrence in submontane and montane ravines; generally associated with base-rich deluvia;

Soils: fresh to moist; mesotrophic Dystric Cambisols, often Stagnic or Luvic; Cambic Vertisols are rare.

#### Significant (often dominant or indicator) understory species:

<i>Athyrium filix-femina</i>	<i>Oxalis acetosella</i>
<i>Carex digitata</i>	<i>Prenanthes purpurea</i>
<i>Dentaria bulbifera</i>	<i>Rubus idaeus</i>
<i>Dryopteris filix-mas</i>	<i>Sanicula europaea</i>
<i>Festuca altissima</i>	<i>Senecio jacquinianus</i>
<i>Galium odoratum</i>	<i>Senecio ovatus</i>
<i>Galium rotundifolium</i>	<i>Veronica officinalis</i>
<i>Mycelis muralis</i>	( <i>Athyrium distentifolium</i> )

#### Forest site types:

- (1) *Oxalis acetosella*
- (2) magnoherbaceous (*magnoherbaceum*)
- (3) *Galium odoratum*
- (4) stagnic (*variohumidum*); (transition to 5O ((*Fageto*-)*Abietum variohumidum mesotrophicum*))

#### Natural tree species composition:

5H3 and 5H4: *Fagus sylvatica* 60 %; *Abies alba* 40 %; (*Picea abies* 0.5 %)

5H1 and 5H2: *Fagus sylvatica* 40 - 70 %; *Abies alba* 30 - 40 %; *Picea abies* 20 %; *Acer pseudoplatanus* 10 %; *Tilia cordata* + *Tilia platyphyllos* 10 %; (*Fraxinus excelsior* + *Ulmus* sp. 0.5 %)\*

\* on moister soils

#### Absolute height yield class:

*Picea abies* (26) 28 - 32 (34) m; *Abies alba* 24 - 26 (32) m; *Fagus sylvatica* (24) 26 - 30 (34) m

Hazards: high brush, windthrow (*Picea abies* monocultures), and snowpack hazards.

#### **6<sup>th</sup> forest vegetation zone 6H - *Piceeto-Fagetum illimerosum mesotrophicum***

Occurrence: submontane to montane, deluvial sites; transitional to O-category (*categoria variohumida mesotrophica*) and V-category (*categoria humida*)

Soils: fresh to moist (occasionally with fluctuating growing-season water table and slow decomposition of forest floor materials); Cambic Podzols and Stagni-Cambic Podzols are the most frequent; occasionally mostly Stagnic Dystric Cambisols

#### Significant (often dominant or indicator) understory species:

<i>Actaea spicata</i>	<i>Prenanthes purpurea</i>
<i>Athyrium distentifolium</i>	<i>Rubus idaeus</i>

<i>Calamagrostis villosa</i>	<i>Senecio ovatus</i>
<i>Dryopteris filix-mas</i>	( <i>Athyrium filix-femina</i> )
<i>Festuca altissima</i>	( <i>Calamagrostis arundinacea</i> )
<i>Galium odoratum</i>	( <i>Blechnum spicant</i> )
<i>Galium rotundifolium</i>	( <i>Homogyne alpina</i> )
<i>Oxalis acetosella</i>	( <i>Polygonatum verticillatum</i> )
<i>Petasites albus</i>	( <i>Senecio jacquinianus</i> )

Forest site types:

- (1) *Oxalis acetosella*
- (2) magnoherbaceous (*magnoherbaceum*); (with a sporadic presence of subalpine species)

Natural tree species composition:

Typically: *Fagus sylvatica* 60 %; *Picea abies* 20 %; *Abies alba* 20 %

Frequently, depending on site conditions: *Fagus sylvatica* 30 - 70 %; *Picea abies* 20 - 40 %; *Abies alba* 20 - 40 %; *Acer pseudoplatanus* 10 %; (*Fraxinus excelsior* + *Ulmus glabra* 0.5 %)\*

\* on moister soils

Absolute height yield class:

*Picea abies* 26 - 30 (34) m ; *Abies alba* (24) 26 - 32 m; *Fagus sylvatica* 26 m

Hazards: high brush, windthrow (in *Picea abies* monocultures), and snowpack hazards.

### 2.3.1.3 Categoria subxerothermica (C-category)

This category includes nutrient-medium and -rich, exposed sites subjected to severe growin-season water deficit. Skeletic Mesotrophic Cambisols dominate; Rendzinas (= Rendoll), Calcaric Cambisols and Eutric Cambisols occur on calcareous parent materials (limestone, marl, and clay slate). These, typically stony, soils are rapidly drained. Basalts and other basic rocks are typical substrates which provide characteristic conditions of this category on sunny stony slopes. As these soils are sensitive to disturbance, they can be easily degraded.

The herb layer includes graminoids such as *Poa nemoralis* and *Brachypodium pinnatum* together with herbs such as *Pyrethrum corymbosum*, *Campanula persicifolia*, *Silene nutans*, and *Vincetoxicum hirundinaria*. The occurrence of *Luzula luzuloides* and *Calamagrostis arundinacea* indicate nutrient-degraded sites.

Forest function is timber production. Yield class is below-average to average (in forest vegetation zones at higher elevations). Ecological function of forest communities is hydrological and prevention of soil erosion on slopes. Potential for natural regeneration of broad-leaves tree species on nutrient-rich sites in the Beech and Fir-Beech zone is high, elsewhere is moderate or poor. Water-deficient and degraded soils make the ecosystem restoration difficult. The presence of thermophilous species increases with decreasing canopy cover.

### Forest site type complexes

#### 1<sup>st</sup> forest vegetation zone 1C - *Carpineto-Quercetum subxerothermicum*

Occurence: upper parts of sunny slopes and dry ridges; lowlands and hills on the base-medium and -rich soil parent material with the dominance of thermophilous flora.

Soils: often stony, moderately deep, and weakly developed; the most common are mesotrophic Skeletic Cambisols, occasionally eutrophic; Rendzic Leptosols are frequent,

sometimes Cambi-Rendzic; Calcaric Cambisols, Calcaric Vertisols and Calcic Luvisols are rare.

Significant (often dominant or indicator) understory species:

<i>Brachypodium pinnatum</i>	<i>Poa angustifolia</i>
<i>Campanula persicifolia</i>	<i>Poa nemoralis</i>
<i>Clinopodium vulgare</i>	<i>Primula veris</i>
<i>Coronilla varia</i>	<i>Pyrethrum corymbosum</i>
<i>Digitalis grandiflora</i>	<i>Silene nutans</i>
<i>Festuca ovina</i>	<i>Teucrium chamaedrys</i>
<i>Lathyrus vernus</i>	<i>Trifolium alpestre</i>
<i>Lembotropis nigricans</i>	<i>Vincetoxicum hirundinaria</i>
<i>(Luzula luzuloides)</i>	<i>Viola hirta</i>

Forest site types:

- (1) *Luzula luzuloides* (- nutrient impoverished)
- (2) *Poa nemoralis*
- (3) *Brachypodium pinnatum*
- (4) basiphilous (rendzinas) (*basiphilum*)

Natural tree species composition:

1C4: *Quercus petraea* agg. 50 - 80 %; *Carpinus betulus* ± 30 %; *Tilia cordata* ± 20 %; *Fagus sylvatica* 0 - 20 %; *Pinus sylvestris* ± 0,5 %; (*Sorbus torminalis* + *Sorbus aria* + *Acer campestre* ± 0,5 %)\*

Other types: *Quercus petraea* agg. 80 %; *Carpinus betulus* 10 %; *Tilia cordata* 10 %; *Sorbus torminalis* 0,5 %

\* mainly on limestone

Absolute height yield class:

*Pinus sylvestris* 16 - 20 (24) m; *Quercus petraea* agg. (14) 16 - 20 (24) m; *Fagus sylvatica* 16 - 20 (22) m; *Tilia cordata* 24 - 26 m; *Carpinus betulus* 16 - 20 m

Hazards: dominantly desiccation; mostly by erosion and nutrient impoverished

**2<sup>nd</sup> forest vegetation zones 2C - *Fageto-Quercetum subxerothermicum***

Occurrence: sunny slopes top and upper parts largely base-richer soil parent material (e.g. limestone, amphibol, diabase, basalt, phonolite, granodiorite, algonkic slates, sandstones with calcic cement, clay states, e.t.c.)

Soils: desiccated, mostly with gravel and stone admixtures; the most frequently basic Skeletic Cambisols, sometimes Eutric Cambisols, Leached-Rendzic Leptosols, Cambi-Rendzic Leptosols, Lithi-Rendzic Leptosols and Calcaric Cambisols; occasionally Rendzic Leptosols; extraordinary Calcic Luvisols.

Significant (often dominant or indicator) understory species:

<i>Astragalus glycyphyllos</i>	<i>Galium odoratum</i>
<i>Brachypodium pinnatum</i>	<i>Galium sylvaticum</i>
<i>Bupleurum falcatum</i>	<i>Genista tinctoria</i>
<i>Campanula persicifolia</i>	<i>Lathyrus niger</i>
<i>Campanula rapunculoides</i>	<i>Lembotropis nigricans</i>
<i>Carex digitata</i>	<i>(Luzula luzuloides)*</i>
<i>Carex michelii</i>	<i>Melica nutans</i>

<i>Carex montana</i>	<i>Poa angustifolia</i>
<i>Clinopodium vulgare</i>	<i>Poa nemoralis</i>
( <i>Convallaria majalis</i> )*	<i>Pyrethrum corymbosum</i>
<i>Cruciata glabra</i>	<i>Scabiosa columbaria</i>
<i>Festuca heterophylla</i>	<i>Stellaria holostea</i>
<i>Festuca ovina</i>	<i>Viola hirta</i>

\*facultative occurrence on nutrient impoverished soils

Forest site types:

- (1) *Luzula luzuloides* (- nutrient impoverished)
- (2) *Poa nemoralis*
- (3) *Brachypodium pinnatum*
- (4) calciphilous (*calcarium*)- on calcic sandstones (with *Calamagrostis arundinacea* - Polabí lowland) - on clay slates and limestones (with significant dominance of *Carex montana* and *Brachypodium pinnatum*)
- (5) on basic igneous rocks - Žlutice area

Natural tree species composition:

Predominantly: *Quercus petraea* agg. 70 %; *Fagus sylvatica* 20 %; *Carpinus betulus* 10 %

Exceptionally - 2C1: *Quercus petraea* agg. 50 - 80 %; *Carpinus betulus* ± 30 %; *Fagus sylvatica* 0 - 20 %; *Tilia cordata* 20 %; *Pinus sylvestris* 0 - 10 %; *Betula pendula* ± 20 %; *Acer campestre* + *Sorbus torminalis* + *Sorbus aria* 0.5 %

2C4 on transition to 2W1 (see below): *Quercus petraea* agg. 50 - 80 %; *Carpinus betulus* ± 30 %; *Fagus sylvatica* 0 - 20 %; *Tilia cordata* ± 20 %; *Pinus sylvestris* 0.1 %; *Acer campestre* + *Sorbus torminalis* + *Sorbus aria* 0.1 %

Absolute height yield class:

*Quercus petraea* agg. (14) 16 - 22 (26) m; *Pinus sylvestris* (16) 18 - 22 (24) m; *Fagus sylvatica* 16 -20 (22) m; *Carpinus betulus* 16 - 20 m; *Tilia cordata* 24 - 26 m

Hazards: considerably by drying; mostly by erosion and nutrient impoverish.

**3<sup>rd</sup> forest vegetation zone: 3C - *Querceto-Fagetum subxerothermicum***

Occurrence: predominantly sunny slopes, rarely hill peaks; hills on moderate rich and rich nutrient soil parent material

Soil: strongly subject to desiccation, often not quite well developed; dominantly basic Dystric Cambisols rarely eutrophic; so often Skeletic Cambisols; sometimes Skeletic Leptosols, Cambic Leptosols, Calcaric Cambisols and Lithi-Calcaric Cambisols

Significant (often dominant or indicator) understory species:

<i>Actaea spicata</i>	<i>Hieracium pilosella</i>
<i>Agrostis capillaris</i>	( <i>Luzula luzuloides</i> )*
<i>Brachypodium pinnatum</i>	<i>Melica nutans</i>
( <i>Brachypodium sylvaticum</i> )*	<i>Mycelis muralis</i>
( <i>Calamagrostis arundinacea</i> )*	<i>Campalula trachelium</i>
<i>Campanula persicifolia</i>	<i>Convallaria majalis</i>
<i>Campanula rapunculoides</i>	<i>Carex digitata</i>
<i>Fragaria viridis</i>	<i>Poa angustifolia</i>
<i>Fragaria vesca</i>	<i>Poa nemoralis</i>
<i>Fragaria moschata</i>	<i>Sanicula europaea</i>



*Galium odoratum*

*Viola hirta*

*Galium sylvaticum*

\*facultative occurrence on nutrient impoverished soils

Forest site types:

(1) *Luzula luzuloides* (on nutrient impoverished soils)

(2) *Poa nemoralis*

(3) *Melica nutans*

(4) on basic igneous rocks

(5) *Brachypodium pinnatum*

(9) steep sloped

Natural tree species composition:

3C1, 3C3, 3C4 and 3C9: *Fagus sylvatica* 60 %; *Quercus petraea* agg. 30 %; *Tilia cordata* 10 %

3C2 and 3C5: *Fagus sylvatica* 50 - 80 %; *Quercus petraea* agg. ± 30%; *Abies alba* ± 20 %; *Pinus sylvestris* 0 - 10 %; *Tilia cordata* + *Tilia platyphyllos* 20 %; *Carpinus betulus* 0.5 %; *Fraxinus excelsior* 0.5 %; *Acer platanoides* 0.1 %

Absolute height yield class:

*Pinus sylvestris* (16) 20 - 22 (24) m; *Quercus petraea* agg. (16) 18 - 22 (26) m; *Fagus sylvatica* (18) 20 - 24 (26) m; *Picea abies* (18) 22 - 26 (28) m; *Larix decidua* 18 - 22 (26) m

Hazards: predominantly desiccation; mostly erosion; soils inclined to nutrient impoverish

**4<sup>th</sup> forest vegetation zone: 4C - *Fagetum subxerothermicum***

Occurrence: predominantly sunny slopes and ridges; on middle-to-rich nutrient soil parent material from foothills to hills .

Soil: strongly subject to desiccation in summer; dominantly basic Dystric Cambisols and Skeletic Cambisols; less Cambic Leptosols; Cambi-Rendzic Leptosols to Eutric Cambisols are on limestones

Significant (often dominant or indicator) understory species:

*Brachypodium pinnatum*      *Poa nemoralis*

*Campanula persicifolia*      *Senecio ovatus*

*Carex digitata*      *Viola hirta*

*Carex muricata*      *Viola mirabilis*

*Galium odoratum*

Forest site types:

(1) thermophilous (*thermophilum*)

(2) *Poa nemoralis*

(3) limy (*calcarium*)

(4) calcareous with *Carex digitata*

(5) *Brachypodium pinnatum*

Natural tree species composition:

4C1: *Fagus sylvatica* 70 %; *Abies alba* 10 %; *Quercus petraea* agg. 20 %; *Tilia cordata* 10 %

4C2 - 4C4: *Fagus sylvatica* 50 - 80 %; *Quercus petraea* agg. 30 %; *Abies alba* 20 %; *Pinus sylvestris* 0 - 10 %; *Tilia cordata* 20 %; *Acer platanoides* 0.5 %; *Fraxinus excelsior* 0.5 %

Absolute height yield class:

*Fagus sylvatica* 18 - 22 (26, 30) m; *Picea abies* 22 - 24 (26) m; *Pinus sylvestris* (18) 20 - 22 (24) m; *Abies alba* 20 - 24 m; *Tilia cordata* 24 m

Hazards: sometimes desiccation; soils inclined to nutrient impoverish

**5<sup>th</sup> forest vegetation zone 5C - *Abieto-Fagetum subxerothermicum***

Occurrence: dominantly sunny slopes and ridges on middle acid to basic soil parent material foothills to hills

Soil: not fully developed; Dystric Cambisols, Skeletic Cambisols mesotrophic and oligotrophic; Eutric Cambisols and Rendzic Leptosols or Cambi-Rendzic Leptosols are on limestone

Significant (often dominant or indicator) understory species:

<i>Campanula persicifolia</i>	<i>Prenanthes purpurea</i>
<i>Brachypodium pinnatum</i>	( <i>Dentaria bulbifera</i> )
<i>Dryopteris filix-mas</i>	( <i>Dentaria enneaphyllos</i> )
<i>Poa nemoralis</i>	( <i>Galium odoratum</i> )

Forest site types:

- (1) *Poa nemoralis*
- (2) calcareous (*calcarium*)
- (3) on basic igneous rocks
- (4) *Brachypodium pinnatum*

Natural tree species composition:

Generally: *Fagus sylvatica* 70 %; *Abies alba* 30 %; *Sorbus aucuparia* 0.5 %

Exceptionally - 5C1: *Fagus sylvatica* 50 - 80 %; *Quercus petraea* agg. 30 %; *Abies alba* 20 %; *Pinus sylvestris* 0 - 10 %; *Carpinus betulus* 0.5 %; *Fraxinus excelsior* 0.5 %; *Tilia cordata* + *Tilia platyphyllos* 20 %; *Acer pseudoplatanus* 0.1 %

Absolute height yield class:

*Fagus sylvatica* (18) 20 - 24 (26) m; *Abies alba* 20 m; *Quercus petraea* agg. 20 - 24 m; *Picea abies* (20) 22 - 24 (28) m; *Pinus sylvestris* 22 - 24 m

Hazards: predominantly erosion; moderate desiccation, snow, and brush hazard.;

**Azonal 0C - *Pinetum serpentanicum***

Occurrence: on serpentine soil parent material in different terrain and soil conditions (depth, moisture); it reaches 5th forest vegetation zone (up only with *Picea abies* in forest site complex 0N and in forest site complex 0G on wet soils). More extreme areas belong to forest site complexes 0Z and 0X.

Soils: on the upper slopes shallower and drier, on the lower slopes often Stagnic; predominantly loamy, in frequently clayey, mostly gravelled, desiccated with a thick mor humus layer; dominantly (Serpenti-)Dystric Cambisols, sometimes Stagnic; (Serpenti-)Cambic Leptosols are on shallow soils; (Serpenti-)Cambic Stagnosols are on transition to 0G (*Piceeto-Pinetum paludosum mesotrophicum*); Serpenti-Lithic Leptosols are in transition to 0X3 (*Pinetum dealpinum (xerothermicum) - serpentanicum*) and 0Z2 (*Pinetum relictum - serpentanicum (Stipa capillata)*); Stagni-Haplic Podzols are in the 5th forest vegetation zone.

Significant (often dominant or indicator) understory species:

<i>Asplenium cuneifolium</i>	<i>Genista tinctoria</i>
<i>Brachypodium pinnatum</i>	<i>Molinia arundinacea</i>
<i>Brachypodium sylvaticum</i>	<i>Plagiomnium affine</i>
<i>Bupleurum falcatum</i>	<i>Pleurozium schreberi</i>
<i>Calamagrostis arundinacea</i>	<i>Pteridium aquilinum</i>
<i>Festuca ovina</i>	<i>Vaccinium myrtillus</i>
<i>Genista germanica</i>	<i>Vaccinium vitis-idaea</i>
<i>Genista pilosa</i>	

Forest site types:

- (1) *Vaccinium myrtillus* + *Calamagrostis arundinacea*
- (2) stagnic (gleyed) (*variohumidum*)
- (3) *Festuca ovina*
- (4) *Brachypodium pinnatum* (smaller impoverish degree)
- (6) *Pteridium aquilinum*

Natural tree species composition:

Generally: *Pinus sylvestris* 100 %; *Abies alba* 0.5 %; *Quercus petraea* 0.5 %; (*Picea abies* 0.5 %)

Extreme areas: *Pinus sylvestris* 20 - 70 %; *Quercus petraea* agg. 20 %; *Fagus sylvatica* 0 - 20 %; *Carpinus betulus* 0.1 %; *Betula pendula* 0 - 10 %; *Sorbus torminalis* 0.1 %; *Sorbus aria* 0.1 %; *Tilia cordata* + *Tilia platyphyllos* 0.1 %; thermiphylous shrubs disjunctly

Absolut height yield class:

*Pinus sylvestris* (12) 16 - 20 (24) m; *Picea abies* (14) 16 - 20 (22) m

Hazards: predominantly heavy snowpack, and desiccation; significant soil impoverish (toxic environment for tree species)

**2.3.1.4 *Categoria lapidosa mesotrophica* (F-category)**

This category is characterized by significant presence of tall ferns, especially *Dryopteris filix-mas* and *Athyrium filix-femina*. *Athyrium distentifolium* dominates in the mountain vegetation zones and *Dryopteris dilatata* dominates in transition to N category (*lapidosa acidophila*). *Oxalis acetosella*, *Prenanthes purpurea*, *Gymnocarpium dryopteris* and several acidophilous species are often present in this category.

Stony shady slopes and ridges are typical sites. Ravines and deep gulches (e.g., gullies on colluvial slopes) are rare. They are less stony but function like steep slopes. Favourable humidity and deterioration decomposition are relevant attribute. Skeletal Cambisols with transition to Cambic Leptosols are dominant soil types. Mesotrophic Dystric Cambisols occur in loamy ravines.

Absolute height yield class is above standard and than forests have a wood-producing function. Tree species natural regeneration is moderate for broadleaves and low for conifers due to potential weed competition risk. Serious erosion potential restricts larger clear-cuts.

**Forest site type complexes**

Communities of 1<sup>st</sup> and 2<sup>nd</sup> vegetation zones does not exist in Czech Republic territory.

**3<sup>rd</sup> forest vegetation zone 3F - *Querceto-Fagetum lapidosum mesotrophicum***

Occurence: mostly in deep, shady terrain cuts in lower altitudes; exceptionally on ridges and stony extensive slopes

Soil: stony to rocky with a loamy-gravelly filler; mesotrophic (sometimes oligotrophic) Dystric Cambisols occur predominantly on lower slopes; Eutric Cambisols can occur on calcareous sites with; oligo- and mesotrophic Skeletic Cambisols occur on upper slopes and may integrate into Cambic Leptosols

Significant (often dominant or indicator) understory species:

*Athyrium filix-femina* *Oxalis acetosella*  
*Dryopteris filix-mas* *Senecio ovatus*  
*Melica uniflora*

Forest site types:

(1) ferny (*filices*)  
(3) *Oxalis acetosella*  
(9) ravine

Natural tree species composition:

3F1: *Fagus sylvatica* 60 %, *Quercus petraea* agg. 20 %, *Tilia cordata* + *Tilia platyphyllos* 10 %; *Abies alba* 10 %  
3F3 and 3F9: *Fagus sylvatica* 50 - 70 %; *Quercus petraea* agg. ± 30 %; *Abies alba* 10 - 20 %; *Acer platanoides* ± 20 %; *Tilia cordata* + *Tilia platyphyllos* ± 20 %; *Carpinus betulus* ± 0.1 %; *Ulmus laevis* + *Ulmus glabra* ± 0.1 %; *Fraxinus excelsior* ± 0.1 %; *Taxus baccata* 0.1 %

Absolute height yield class:

*Picea abies* (24) 26 - 32 (34) m; *Abies alba* 24 - 26 m; *Fagus sylvatica* (22) 24 - 28 (30) m; *Quercus petraea* agg. 20 - 24 (26) m; *Larix decidua* 28 - 34 m

Hazards: moderately to high erosion and brush hazards.

#### **4<sup>th</sup> forest vegetation zone 4F - *Fagetum lapidosum mesotrophicum***

Occurrence: predominantly stony slopes in shady valleys, occasionally deep gulches

Soil: stony to rocky with loamy and gravelly filler; Dystric Cambisols and Skeletic Cambisols both mesotrophic with patchy occurrence of Cambic Leptosols

Significant (often dominant or indicator) understory species:

<i>Asarum europaeum</i>	<i>Dentaria bulbifera</i>
<i>Athyrium filix-femina</i>	<i>Dryopteris filix-mas</i>
<i>Carex sylvatica</i>	<i>Festuca altissima</i>
<i>Circaea lutetiana</i>	<i>Senecio ovatus</i>
<i>Galeobdolon luteum</i>	<i>Melica uniflora</i>
<i>Galium odoratum</i>	<i>Oxalis acetosella</i>
<i>Geranium robertianum</i>	<i>Polypodium vulgare</i>
<i>Impatiens noli-tangere</i>	

Forest site types:

(1) ferny (*filices*)  
(2) *Oxalis acetosella*  
(9) ravine

Natural tree species composition:

Generally: *Fagus sylvatica* 70 %; *Abies alba* 20 %; *Tilia cordata* + *Tilia platyphyllos* 10 %

In dependence on site conditions: *Fagus sylvatica* 50 - 70 %; *Quercus petraea* agg.  $\pm$  30 %; *Abies alba* 10 - 20 %; *Acer platanoides*  $\pm$  20 %; *Tilia cordata* + *Tilia platyphyllos*  $\pm$  20 %; *Carpinus betulus*  $\pm$  0.1 %; *Ulmus laevis* + *Ulmus glabra*  $\pm$  0.1 %; *Fraxinus excelsior*  $\pm$  0.1 %; *Taxus baccata*  $\pm$  0.1 %

Absolute height yield class:

*Picea abies* (24) 26 - 30 (36) m; *Abies alba* (20) 26 - (22) 28 m; *Fagus sylvatica* (24) 26 - 30 (34) m

Hazards: moderate to high erosion and brush hazards

**5<sup>th</sup> forest vegetation zone 5F - *Abieto-Fagetum lapidosum mesotrophicum***

Occurrence: stony slopes in shady valleys in submontane landscapes; slopes and ravines in montane landscapes

Soil: stony to rocky (not well developed), on different, but mostly associated with base-medium soil parent materials; soil parent material; predominantly mesotrophic Dystric Cambisols and Skeletic Cambisols, on slope bases sometimes accumulated, eroded near upper slopes; where grading into Cambic Leptosols

Significant (often dominant or indicator) understory species:

<i>Athyrium filix-femina</i>	<i>Impatiens noli-tangere</i>
<i>Carex sylvatica</i>	<i>Maianthemum bifolium</i>
<i>Dentaria bulbifera</i>	<i>Oxalis acetosella</i>
<i>Dentaria glandulosa</i>	<i>Polygonatum verticillatum</i>
<i>Dryopteris carthusiana</i>	<i>Prenanthes purpurea</i>
<i>Dryopteris dilatata</i>	<i>Rubus hirtus</i>
<i>Dryopteris filix-mas</i>	<i>Senecio ovatus</i>
<i>Festuca altissima</i>	<i>Senecio nemorensis</i>
<i>Galeobdolon luteum</i>	<i>Urtica dioica</i>
<i>Galium odoratum</i>	( <i>Calamagrostis arundinacea</i> )
<i>Gymnocarpium dryopteris</i>	( <i>Milium effusum</i> )

Forest site types:

- (1) ferny (*filices*); (dominated by *Dryopteris dilatata*) - nutrient-poorer on granitic soils in the Krušné hory Mts.
- (2) ferny (*filices*); (dominated by *Athyrium filix-femina*) - nutrient-richer (on flysch and basalt)
- (3) *Oxalis acetosella*
- (9) ravine

Natural tree species composition:

5F1 and 5F2: *Fagus sylvatica* 60 %; *Abies alba* 40 %; *Acer pseudoplatanus* 0.5 %; *Ulmus glabra* 0.5 %; (*Taxus baccata* 0.5 %)

5F3 and 5F9: *Fagus sylvatica* 40 - 60 %; *Abies alba* 20 - 40 %; *Picea abies*  $\pm$  20 %; *Acer pseudoplatanus*  $\pm$  20 %; *Ulmus glabra*  $\pm$  10 %; *Tilia cordata* + *Tilia platyphyllos*  $\pm$  10 %; *Fraxinus excelsior*  $\pm$  0.1 %; *Taxus baccata*  $\pm$  0.5 %

Absolute height yield class:

*Picea abies* (22) 26 - 32 (38) m; *Abies alba* (20) 24 - 30 (38) m; *Fagus sylvatica* (22) 24 - 30 (36) m; *Acer pseudoplatanus* 24 - 26 m

Hazards: low windthrow,; moderately moderate damage by snowpack; by snow (breaks); moderate brush hazard; high erosion hazard

### **6<sup>th</sup> forest vegetation zone 6F - Piceeto-Fagetum lapidosum mesotrophicum**

Occurrence: cool-aspect slopes and ridges in foothills and submontane landscapes; ravines in lower vegetation zones (inverse climatic conditions); different soil parent materials

Soil: stony to rocky; Skeli-Cambic Podzols either oligotrophic or mesotrophic depending base status of soil parent materials, either accumulated or eroded depending on lower on upper slope position, respectively; Skeletal Cambisols could occur in transition to the 5th forest vegetation zone; patchy occurrence of Cambic Leptosols

Significant (often dominant or indicator) understory species:

<i>(Athyrium distendifolium)</i>	<i>Rubus fruticosus agg.</i>
<i>Athyrium filix-femina</i>	<i>Rubus idaeus</i>
<i>Dryopteris dilatata</i>	<i>(Calamagrostis arundinacea)</i>
<i>Dryopteris cartuhsiana</i>	<i>(Calamagrostis villosa)</i>
<i>Gymnocarpium dryopteris</i>	<i>(Avenella flexuosa)</i>
<i>Oxalis acetosella</i>	<i>(Festuca altissima)</i>
<i>Prenanthes purpurea</i>	<i>(Vaccinium myrtillus)</i>

Forest site types:

(1) ferny (*filices*)

(2) *Oxalis acetosella*

Both have variants:

- nutrient- richer - on basalts
- more productive - in Moravskoslezské Beskydy Mts.
- nutrient-poorer - in transitions to N-category (*lapidosa acidophila*) on granitic soils

Natural tree species composition:

6F1: *Fagus sylvatica* 50 %; *Picea abies* 20 %; *Abies alba* 30 %; *Acer pseudoplatanus* 0.5 %

6F2: *Fagus sylvatica* 40 - 60 %; *Abies alba* 20 - 40 %; *Picea abies* 10 - 30 %; *Acer pseudoplatanus* ± 20 %; *Ulmus glabra* ± 10 %; *Fraxinus excelsior* ± 0.1 %; *Taxus baccata* ± 0.1 %

Absolute height yield class:

*Picea abies* (24) 26 - 30 (32) m; *Abies alba* 26 m; *Fagus sylvatica* 24 (32) - 28 (28) m

Hazards: low windthrow; moderate breakage by snowpack; moderate brush hazard; high erosion hazard

### **7<sup>th</sup> forest vegetation zone 7F - Fageto-Piceetum lapidosum mesotrophicum**

Occurrence: stony, cool-aspect slopes and ridges in montane landscapes; different soil parent materials soil parent material

Soil: stony with a considerably slow decomposition and onset of mor humus formation due to cool and humid climate; depending on soil parent materials, either oligotrophic or mesotrophic Skeli-Cambic Podzols; eroded Podzols occur on upper slopes

Significant (often dominant or indicator) understory species:

*Athyrium distentifolium*      *Dryopteris dilatata*

*Gymnocarpium dryopteris*

*Blechnum spicant*                      *Homogyne alpina*  
*Calamagrostis villosa*              *Senecio ovatus*  
*Deschampsia caespitosa*          *Trientalis europaea*  
*Avenella flexuosa*                  *Vaccinium myrtillus*

Forest site types:

(1) ferny (*filices*) - with variants (according to dominant fern): either *Dryopteris dilatata* or *Athyrium distentifolium*

Natural tree species composition:

*Picea abies* 60 - 80 %; *Fagus sylvatica* 10 - 30 %; *Abies alba* ± 20 %; *Acer pseudoplatanus* 0.1 - 10 %; *Sorbus aucuparia* 0.5 %

Absolute height yields class:

*Picea abies* (22) 24 - 28 (30) m; *Fagus sylvatica* 22 - 24 m

Hazards: moderate windthrow and brush hazard; high snowpack, freezing rain, and erosion hazards

**8<sup>th</sup> forest vegetation zone 8F - *Piceetum lapidosum mesotrophicum***

Occurrence: sporadic in high mountain landscapes at climatically less-exposed (sheltered) sites; on slopes in deep valleys; medium base status soil parent material

Soil: stony to rocky; Skeletal Podzols with transitions to more more fertile Skeli-Cambic Podzols for tree growth

Significant (often dominant or indicator) understory species:

*Athyrium distentifolium*          *Gentiana asclepiadea*  
*Calamagrostis villosa*              *Homogyne alpina*  
*Avenella flexuosa*                  *Oxalis acetosella*  
*Dryopteris dilatata*              *Vaccinium myrtillus*  
*Galium saxatile*

Forest site types:

(1) ferny (*filices*)

Natural tree species composition:

*Picea abies* 90 - 100 %; *Abies alba* ± 0.1 %; *Fagus sylvatica* ± 0.1 %; *Acer pseudoplatanus* ± 10 %; *Sorbus aucuparia* ± 10 %

Absolute height yield class: *Picea abies* 20 - 24 m

Hazards: moderate windthrow, high snowpack, freezing rain, brush and soil erosion hazards

**2.3.1.5 Categoria calcaria (W-category)**

This category associates types on limestones and dolomites. Better soil development stage is striking feature in comparison of desiccated categories (X - *categoria xerothermica* and C - *categoria subxerothermica*) on these soil materials. Eutric Cambisols and Rendzic Leptosols are soil types. *Picea abies* hazards by rot is a significant production attribute.

Category is possible to specify to:

- 1) grass types on ridges,
- 2) herb types on slopes,

- 3) more productive types on colluvial soils,
- 4) maple types on stony slopes (exposed).

*Poa nemoralis*, *Brachypodium sylvaticum*, *Melica nutans*, *Bromus benekenii*, etc. determinate grass character of the ridges. *Hepatica nobilis*, *Asarum europaeum*, *Sanicula europaea* and especially dominance of the „beech associated“ species and admixture of heminitrophilous species make species combination. Ferns (*filices*), *Impatiens noli-tangere*, etc. appear on slope bases; slightly thermophilous species abundances are at lower elevations; calciphilous species are on limestone.

Forest function is productive; broad-leave tree yield class is standard to slightly above standard. Ecological effect is infiltration. Broad-leave tree natural regeneration is abundant. Natural regeneration of *Fraxinus excelsior* is often very progressive.

### Forest site type complexes

#### 1<sup>st</sup> forest vegetation zone 1W - (*Fagi*-) *Carpineto-Quercetum calcarium*

Occurrence: upper parts of the warm-slopes and desiccated small ridges; lowlands and low uplands on limestone with thermophilous species abundance.

Soils: often stony; medium deep; soils are often not completely developed; predominantly Rendzic Leptosols to Cambi-Rendzic Leptosols.

Significant (often dominant or indicator) understory species:

<i>Brachypodium pinnatum</i>	<i>Poa angustifolia</i>
<i>Campanula persicifolia</i>	<i>Poa nemoralis</i>
<i>Clinopodium vulgare</i>	<i>Primula veris</i>
<i>Coronilla varia</i>	<i>Pyrethrum corymbosum</i>
<i>Helianthemum nummularium</i>	<i>Silene nutans</i>
( <i>Festuca ovina</i> )	<i>Teucrium chamaedrys</i>
<i>Lathyrus vernus</i>	<i>Trifolium alpestre</i>
<i>Lembotropis nigricans</i>	<i>Vincetoxicum hirundinaria</i>
<i>Adonis vernalis</i>	<i>Viola hirta</i>

Forest site types

(2) (nutrient-) rich

Natural tree species composition: *Quercus petraea* agg. + *Quercus pubescens* 60 - 70 %; *Carpinus betulus* ± 20 %; *Tilia cordata* ± 20 %; *Acer platanoides* ± 10 %; *Sorbus torminalis* ± 0.1 %; *Cerasus avium* ± 0.1 %; *Acer campestre* ± 0.1 %

Absolute height yield class: *Quercus petraea* agg. 18 m; *Quercus pubescens* 18 m

Hazards: considerably by desiccation; mostly by soil erosion; tendencies to nutrient degradation

#### 2<sup>nd</sup> forest vegetation zone 2W - *Fageto-Quercetum calcarium*

Occurrence: sporadic in the areas of Czech and Moravian Karsts

Soils: shallower on ridges, deep on slope bases; predominantly Cambi-Rendzic Leptosols transiting to Eutric Cambisols.

Significant (often dominant or indicator) understory species:

<i>Convallaria majalis</i>	<i>Genista tinctoria</i>
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<i>Adonis vernalis</i>	<i>Helianthemum nummularium</i>
<i>Ajuga genevensis</i>	<i>Lathyrus niger</i>
<i>Astragalus glycyphyllos</i>	<i>Lathyrus vernus</i>
<i>Brachypodium pinnatum</i>	<i>Lembotropis nigricans</i>
<i>Bupleurum falcatum</i>	<i>Melica nutans</i>
<i>Campanula persicifolia</i>	<i>Poa angustifolia</i>
<i>Campanula rapunculoides</i>	<i>Poa nemoralis</i>
<i>Carex digitata</i>	<i>Primula veris</i>
<i>Carex michelii</i>	<i>Pyrethrum corymbosum</i>
<i>Carex montana</i>	<i>Scabiosa columbaria</i>
<i>Clinopodium vulgare</i>	<i>Stellaria holostea</i>
<i>Coronilla varia</i>	<i>Teucrium chamaedrys</i>
<i>Cruciata glabra</i>	<i>Trifolium alpestre</i>
<i>Festuca heterophylla</i>	<i>Vincetoxicum hirundinaria</i>
<i>Galim sylvaticum</i>	<i>Viola hirta</i>
<i>Galium odoratum</i>	

Forest site types:

- (1) grassy (graminae) - *Poa nemoralis*, *Galium odoratum*
- (2) herbaceous (herbaceum)- *Galium odoratum*, *Mercurialis perennis*
- (3) on colluvials - *Mercurialis perennis*, *Impatiens noli-tangere*
- (4) aceric (maple) (*acerosum*)

Natural tree species composition:

Generally: *Quercus petraea* agg. 60 %; *Fagus sylvatica* 30 %; (*Tilia cordata* + *Carpinus betulus*) 10 %; *Sorbus torminalis* 0.5 %; *Acer platanoides* 0.5 %; *Fraxinus excelsior* 0.5 %  
desiccated sites: *Quercus petraea* agg. (+ *Quercus pubescens*) 60 - 70 %; *Fagus sylvatica* ± 30 %; *Carpinus betulus* ± 20 %; *Acer platanoides* ± 10 %; *Fraxinus excelsior* ± 0.5 %; *Tilia cordata* ±10 %, *Sorbus torminalis* + *Cerasus avium* + *Acer campestre* ± 0.5 %

Absolute height yield class: *Quercus petraea* agg. (16) 18 - 22 (26) m, *Pinus sylvestris* (16) 18 - 22 m, *Acer platanoides* 24 m

Hazards: slightly by desiccation; considerably by brush; *Picea abies* plantations by rot

**3<sup>rd</sup> forest vegetation zone 3W - *Querceto-Fagetum calcarium***

Occurrence: Czech and Moravian Karsts and limestone area in Šumava Mts. headland; calcareous clays and sandy limestones (Podbeskydská foothills); ridged and slopes.

Soils: deep, slightly stony; predominantly (mull) Cambi-Rendzic Leptosols to Eutric Cambisols; eutric Dystric Cambisols sometimes

Significant (often dominant or indicator) understory species:

<i>Actaea spicata</i>	<i>Fragaria viridis</i>
<i>Aegopodium podagraria</i>	<i>Galium odoratum</i>
<i>Agrostis capillaris</i>	<i>Galium sylvaticum</i>
<i>Asarum europaeum</i>	<i>Hepatica nobilis</i>
<i>Brachypodium pinnatum</i>	<i>Hieracium pilosella</i>
<i>Campanula trachelium</i>	<i>Lathyrus vernus</i>
<i>Campanula persicifolia</i>	<i>Melica nutans</i>
<i>Campanula rapunculoides</i>	<i>Mercurialis perennis</i>
<i>Carex digitata</i>	<i>Mycelis muralis</i>

<i>Carex montana</i>	<i>Poa angustifolia</i>
<i>Carex pilosa</i>	<i>Poa nemoralis</i>
<i>Convallaria majalis</i>	<i>Pulmonaria officinalis</i>
<i>Dentaria bulbifera</i>	<i>Sanicula europaea</i>
<i>Dentaria enneaphyllos</i>	<i>Senecio nemorensis</i>
<i>Dryopteris filix-mas</i>	<i>Stelleria holostea</i>
<i>Festuca gigantea</i>	<i>Vinca minor</i>
<i>Fragaria moschata</i>	<i>Viola hirta</i>
<i>Fragaria vesca</i>	<i>Viola reichenbachiana</i>

Forest site types:

- (1) *Poa nemoralis*, *Galium odoratum*
- (2) *Brachypodium pinnatum*
- (3) *Mercurialis perennis*
- (4) *Acer platanoides*
- (9) steep slopes

Natural tree species composition:

Generally: *Fagus sylvatica* 60 %; *Quercus petraea* agg. 30 %; *Tilia cordata* 10 %; *Carpinus betulus* 0.5 %; *Acer platanoides* 0.5 %; *Abies alba* 0.1 %; *Fraxinus excelsior* 0.5 %  
 3W3, 3W4 and 3W9: *Fagus sylvatica* 50-90 %; *Quercus petraea* ± 30 %; *Abies alba* ± 10 %; *Carpinus betulus* ± 10 %; *Acer platanoides* ± 10 %; *Fraxinus excelsior* ± 10 %; *Ulmus minor* + *Ulmus laevis* 0.5 %, *Tilia cordata* + *Tilia platyphyllos* 0 - 10 %; *Sorbus torminalis* ± 0.5 %, *Taxus baccata* 0.5 %

Absolute height yield class: *Fagus sylvatica* (20) 24 - 30 (34) m, *Larix decidua* 30 - 34 m, *Acer pseudoplatanus* (18) 30 - (24) 34 m, *Tilia* spp. 20 - 26 m, *Picea abies* 22 - 28 (34) m, *Pinus sylvestris* 20 - 26 m.

Hazards: considerably by brush and *Picea abies* plantations heavy by rot

**4<sup>th</sup> vegetation zone 4W - *Fagetum calcarium***

Occurrence: limestone areas (Šumava Mts. headland, Moravian Karst, Podkrkonoší highland); slopes and flat ridges

Soils: mostly fresh, deep, developed; predominantly eutrofic Dystric Cambisols and Eutric Cambisols; Cambi-Rendzic Leptosols on more stony localities

Significant (often dominant or indicator) understory species:

<i>Actaea spicata</i>	<i>Galium odoratum</i>
<i>Ajuga reptans</i>	<i>Impatiens noli-tangere</i>
<i>Asarum europaeum</i>	<i>Mycelis muralis</i>
<i>Brachypodium pinnatum</i>	<i>Poa nemoralis</i>
<i>Campanula persicifolia</i>	<i>Sanicula europaea</i>
<i>Carex muricata</i>	<i>Senecio ovatus</i>
<i>Carex digitata</i>	<i>Stachys sylvatica</i>
<i>Carex sylvatica</i>	<i>Viola hirta</i>
<i>Dentaria bulbifera</i>	<i>Viola mirabilis</i>
<i>Galeobdolon luteum</i>	<i>Viola reichenbachiana</i>

Forest site types:

- (1) grassy (*graminae*) - *Poa nemoralis*, *Galium odoratum*

- (2) herbaceous (*herbaceum*)- *Galium odoratum*, *Mercurialis perennis*
- (3) *Mercurialis perennis*, *Impatiens noli-tangere* - on colluvial soils
- (4) aceric – maple; (*acerosum*) (dominantly with *Acer platanoides*)
- (9) stepp slopes

Natural tree species composition:

Generally: *Fagus sylvatica* 90 %; *Abies alba* 10 %; *Tilia cordata* 0.5 %; *Acer platanoides* 0.5 %; *Fraxinus excelsior* 0.5 %; (*Quercus petraea* agg. 0.5 %)

4W3, 4W4 and 4W9: *Fagus sylvatica* 50 - 90 %; *Quercus petraea* agg. ± 30 %; *Abies alba* ± 10 %, *Carpinus betulus* ± 10 %, *Acer platanoides* ± 10 %; *Fraxinus excelsior* ± 10 %; *Tilia cordata* + *Tilia platyphyllos* 0 - 10 %; *Ulmus* spp. 0.5 %; *Sorbus torminalis* ± 0.5 %; *Sorbus torminalis* 0.1 - 0.5 %; *Taxus baccata* 0.5 %

Absolute height yield class: *Fagus sylvatica* 24 - 28 (34) m, *Picea abies* 24 - 28 (30) m, *Pinus sylvestris* 22 - 26 m, *Tilia* spp. 32 - 34 m.

Hazards: dominantly by brush; *Picea abies* plantations moderately by rot

**5<sup>th</sup> forest vegetation zone 5W - *Abieto-Fagetum calcarium***

Occurrence: slopes and slope bases in the crystalline limestone area (Ještěd Mt. 460 - 650 m; Šumava Mts. headland; Českomoravská highlands; Podkrkonoší highlands)

Soils: mostly deep, fresh, often stony; dominantly eutrofic Dystric Cambisols and Eutric Cambisols to Skeletic Cambisols; sporadic Cambi-Rendzic Leptosols.

Significant (often dominant or indicator) understory species:

<i>Dentaria enneaphyllos</i>	<i>Mercurialis perennis</i>
<i>Athyrium filix-femina</i>	<i>Mycelis muralis</i>
<i>Brachypodium pinnatum</i>	<i>Oxalis acetosella</i>
<i>Campanula persicifolia</i>	<i>Poa nemoralis</i>
<i>Carex digitata</i>	<i>Prenanthes purpurea</i>
<i>Dentaria bulbifera</i>	<i>Rubus idaeus</i>
<i>Dryopteris filix-mas</i>	<i>Sanicula europaea</i>
<i>Festuca altissima</i>	<i>Senecio jacquinianus</i>
<i>Galium odoratum</i>	<i>Senecio ovatus</i>
<i>Galium rotundifolium</i>	<i>Veronica officinalis</i>

Forest site types:

- (1) *Poa nemoralis*, (*Galium odoratum*) - on ridges
- (2) *Galium odoratum*, *Mercurialis perennis* - on slopes
- (3) *Mercurialis perennis* + *Impatiens noli-tangere* - on colluvisols
- (4) aceric - maple; (*acerosum*)(dominantly with *Acer pseudoplatanus*) - on stony slopes

Natural tree species composition: *Fagus sylvatica* 70 %; *Abies alba* 20 %; *Acer pseudoplatanus* 10 %; *Taxus baccata* 0.5 %; (*Fraxinus excelsior* + *Ulmus glabra* + *Sorbus torminalis*) 0.1 - 0.5 %

Absolute height yield class: *Fagus sylvatica* 24 - 26 (30) m, *Picea abies* (24) 26 - 30 (32) m.

Hazards: considerably to strongly by brush (aceric types); *Picea abies* by rot moderately.

### 2.3.1.6 Categoria oligo-mesotrophica (S – category)

The S-category represents transition between nutrient-medium and acidic series. Mesotrophic and oligotrophic Dystric Cambisols with moder humus forms are dominant soil types. Cambic Podzols grading to Haplic Podzols with mor humus forms occur at montane altitudes. *Carex digitata*, *Festuca altissima*, *Galium rotundifolium*, *Gymnocarpium dryopteris*, *Oxalis acetosella*, *Prenanthes purpurea* and *Luzula sylvatica* are important indicators of these sites. Mesotrophic species are present only in a combination with oxylophytic species (e.g., the combination of *Galium odoratum* with *Luzula luzuloides*); otherwise they are rare.

Forest functions are for timber production and watershed (hydrological). Absolute height yield class is slightly higher than average. Natural regeneration of *Picea abies* can be expected only on nutrient poorer sites, and *Fagus sylvatica* regenerates well in stands without the herb layer. Natural regeneration of *Pinus sylvestris* occurs only in (*Carpineto*)-*Quercetum oligo-mesotrophicum* (forest site complex 1S). It is possible to plant *Pseudotsuga menziesii* only in commercial forests from the 2nd to 5th forest vegetation zones.

Natural stand reconstruction is very difficult in this category, since species combinations are very similar to the *Picea abies* sucesional stages of B-category (*categoria mesotrophica*).

#### Forest site type complexes

##### 1<sup>st</sup> vegetation zone 1S - (*Carpineto*-) *Quercetum oligo-mesotrophicum*

Occurrence: on sands, gravelly sands and sandy sediments in wide river valleys (in areas of Polabi and South Moravia); undulating plateaus; sometimes on short slopes.

Soils: sandy and dried; sometimes soils are stratified (marls and clays can be in the lower soil solum), than soils are slightly stagnic in this case the soils become slightly stagnic.

Types: Cambic Arenosols are dominant, they are either mesotrophic or oligotrophic depending on the nutrient conditions of substrate; Dystric Cambisols are on habitats dominated by *Pinus sylvestris* stands; Arenic-Haplic Luvisols can be on sites with a higher amount of loess; Calcaric Arenosols occur in areas with a higher amount of calcium.; stratified soils are mostly represented by slightly stagnic oligotrophic Cambic Arenosols

##### Significant often dominant or indicator species:

<i>Anthericum ramosum</i>	<i>Rumex acetosa</i>
<i>Anthoxantum odoratum</i>	<i>Silene nutans</i>
<i>Aristolochia clematitis</i>	<i>Stellaria holostea</i>
<i>Armeria vulgaris</i>	<i>Steris viscaria</i>
<i>Ballota nigra</i>	<i>Teucrium chamaedrys</i>
<i>Betonica officinalis</i>	<i>Veronica officinalis</i>
<i>Carex michelii</i>	<i>Vincetoxicum hirundinaria</i>
<i>Carex montana</i>	<i>Viola odorata</i>
<i>Clinopodium vulgare</i>	( <i>Avenella flexuosa</i> )
<i>Coronilla varia</i>	( <i>Brachypodium pinnatum</i> )
<i>Dactylis glomerata</i>	( <i>Brachypodium sylvaticum</i> )
<i>Euphorbia cyparissias</i>	( <i>Dactylis polygama</i> )
<i>Festuca ovina</i> agg.	( <i>Calamagrostis arundinacea</i> )
<i>Geraniumsanguineum</i>	( <i>Galeopsis pubescens</i> )
<i>Geum urbanum</i>	( <i>Galeopsis tetrahit</i> )
<i>Hypericum perforatum</i>	( <i>Chelidonium majus</i> )
<i>Luzula campestris</i>	( <i>Lamium maculatum</i> )
<i>Melica nutans</i>	( <i>Luzula luzuloides</i> )
<i>Melica uniflora</i>	( <i>Urtica dioica</i> )
<i>Hieracium pillosela</i>	( <i>Veronica chamaedrys</i> )

*Poa angustifolia* (Viola canina)  
*Poa nemoralis* (Viola hirta)

Forest sites types:

- (1) *Poa angustifolia* (sulphate variation)
- (2) *Brachypodium pinnatum*
- (3) *Carex montana*
- (4) *Melica nutans*
- (5) impoverished: with *Calamagrostis arundinacea* and *Vincetoxicum hirundinaria*
- (6) secondary with *Festuca ovina* agg.
- (7) on drift sands (with *Poa angustifolia*)
- (8) *Rubus fruticosus* agg. (Polabí area)

Natural tree species composition:

Predominantly: *Quercus petraea* agg. 80 %; *Carpinus betulus* 10 %; *Pinus sylvestris* 10 %; *Betula pendula* 0.5 %; *Tilia cordata* 0.5 %

Occasionally (depending on sites): *Quercus petraea* agg. 50 - 70 %; *Fagus sylvatica* 0 - 30 %; *Carpinus betulus* 0 - 20 %; *Pinus sylvestris* 0 - 10 %; *Acer platanoides* 0 - 10 %; *Tilia cordata* to 20 %; *Abies alba* 0.1 %; *Fraxinus excelsior* 0.1 %; *Ulmus* spp. 0.1 %; *Populus tremula* + *Betula pendula* + *Acer campestre* + *Cerasus avium* 0.1 %

1S7: *Quercus petraea* agg. 50 - 70 % (in Panonian flora geoelement of the South Moravia *Quercus cerris* also); *Carpinus betulus* to 20 %; *Pinus sylvestris* 0 - 10 %; *Tilia cordata* to 20 %; *Betula pendula* 0.1 %

Absolute height yield class: *Pinus sylvestris* (18) 22 - 24 (26) m; *Quercus petraea* agg. (*Quercus cerris*) (16) 22 - 24 m; *Tilia cordata* 24 m; stem height decreases with increasing of the drift sands thickness.

Hazards: considerable desiccation;; soils inclined to nutrient degradation.

**2<sup>nd</sup> forest vegetation zone 2S - *Fageto-Quercetum oligo-mesotrophicum***

Occurrence: plateaus, slopes and flat ridges on different soil parent materials from lowlands and uplands; often covered by loamy loess; lowlands and uplands.

Soil: deep, summer-dry

Types: predominantly Dystric Cambisols, which are either oligotrophic or mesotrophic - depending on the soil parent material; Cambic Arenosols are found on sands; Eutric Cambisols and Calcaric Cambisols can occur on weakly to moderately calcareous habitats.

Significant often dominant or indicator species:

<i>Avenella flexuosa</i>	<i>Mycelis muralis</i>
<i>Calamagrostis arundinacea</i>	<i>Oxalis acetosella</i>
<i>Carex digitata</i>	<i>Poa nemoralis</i>
<i>Dryopteris dilatata</i>	<i>Polytrichum formosum</i>
<i>Dryopteris filix mas</i>	<i>Stellaria holostea</i>
<i>Festuca ovina</i> agg.	( <i>Dryopteris filix-mas</i> )
<i>Galium rotundifolium</i>	( <i>Convallaria majalis</i> )
<i>Hieracium murorum</i>	( <i>Galium odoratum</i> )
<i>Hylocomium splendens</i>	( <i>Melica nutans</i> )
<i>Luzula luzuloides</i>	( <i>Rubus fruticosus</i> agg.)
<i>Maianthemum bifolium</i>	( <i>Vaccinium myrtillus</i> )
<i>Melampyrum nemorosum</i>	

Forest sites types:

- (1) ferny (*filices*)
- (2) *Luzula luzuloides* + *Carex digitata*
- (3) *Luzula luzuloides* + *Galium odoratum*
- (4) *Luzula luzuloides* + *Poa nemoralis*
- (5) *Oxalis acetosella* (transition to 3S - *Querceto-Fagetum oligo-mesotrophicum*)
- (6) impoverished
- (7) *Calamagrostis arundinacea* (transition to 2C - *Fageto-Quercetum subxerothermicum*)
- (8) *Stellaria holostea* (with a small admixture of *Rubus fruticosus* agg.)
- (9) steep slopes

Natural tree species composition:

Predominantly: *Quercus petraea* agg. 60 %; *Fagus sylvatica* 30 %; *Carpinus betulus* 10 %

Occasionally (depending on site conditions): *Quercus petraea* agg. 50 - 70 %; *Fagus sylvatica* 0 - 30 %; *Carpinus betulus* 0 - 20 %; *Pinus sylvestris* 0 - 10 %; *Tilia cordata* 20 %; *Acer platanoides* 0 - 10 %; *Abies alba* 0.1 %; *Fraxinus excelsior* 0.1 %; *Ulmus* spp. 0.1 %; *Populus tremula* + *Betula pendula* + *Acer campestre* + *Cerasus avium* 0.1 %; (*Taxus baccata* 0.1 %)

2S6: *Quercus petraea* agg. 50 - 70 % (incl. *Q. cerris* in Pálava Mts.); *Fagus sylvatica* 10 - 30 %; *Carpinus betulus* 20 %; *Tilia cordata* 20 %; *Pinus sylvestris* 0.1 %

2S9: *Quercus petraea* agg. 40 - 60 %; *Fagus sylvatica* 30 %; *Acer platanoides* 30 %; *Pinus sylvestris* 0.1 %; *Tilia cordata* 20 %; *Ulmus* spp. 10 %; *Betula pendula* + *Acer campestre* + *Taxus baccata* 0 - 10 %

Absolute height yield class: *Pinus sylvestris* (18) 20 - 24 (26) m; *Quercus petraea* agg. (18) 20 - 24 (28) m; *Fagus sylvatica* (20) 22 - 24 (26) m; *Carpinus betulus* 18 - 20 m; *Picea abies* 22 (28) - 24 (30) m

Hazards: moderate desiccation; soils inclined to nutrient degradation.

**3<sup>rd</sup> forest vegetation zone 3S - *Querceto-Fagetum oligo-mesotrophicum***

Occurrence: slopes, table-lands and flat ridges on different soil parent materials (algonkian schists, friable rocks, paragneisses, less sandstones and siltstones) often with sandy or shallow loamy cover; on hilly landscapes

Soil: deep, fresh moist, loamy-sand to sandy-loam, sometimes with a low gravel content;

Types: predominantly Dystric Cambisols either oligotrophic or mesotrophic depending on soil parent material trophism; Cambic Arenosols occur on sandy sites; Albic Luvisols stagnic occur quite rarely, especially on sandstones.

Significant often dominant or indicator species:

<i>(Dentaria bulbifera)*</i>	<i>Luzula luzuloides</i>
<i>Ajuga reptans</i>	<i>Melica nutans</i>
<i>(Dryopteris filix-mas)</i>	<i>Mycelis muralis</i>
<i>Avenella flexuosa</i>	<i>Oxalis acetosella</i>
<i>Calamagrostis arundinacea</i>	<i>Plagiomnium affine</i>
<i>Carex digitata</i>	<i>Pleurozium schreberi</i>
<i>Carex montana</i>	<i>Poa nemoralis</i>
<i>Carex pilosa</i>	<i>Polytrichum formosum</i>
<i>Carex sylvatica</i>	<i>Rubus idaeus</i>
<i>Dicranum scoparium</i>	<i>Senecio jacquinianus</i>
<i>Dryopteris dilatata</i>	<i>Senecio ovatus</i>
<i>Festuca ovina</i>	<i>Vaccinium myrtillus</i>

*Galium odoratum*                      *Veronica chamaedrys*  
*Galium rotundifolium*              *Veronica officinalis*  
*Hieracium murorum*                *Viola rechenbachiana*  
*Lathyrus vernus*

\*facultative occurrence during springs

Forest site types:

- (1) *Oxalis acetosella*
- (2) *Galium rotundifolium*
- (3) *Carex digitata*
- (4) ferny (*filices*)
- (5) *Luzula luzuloides* + *Carex digitata*
- (6) *Luzula luzuloides* + *Galium odoratum*
- (7) *Luzula luzuloides* + *Carex pilosa*
- (8) nutrient impoverished - on sandstones, gneisses, etc.
- (9) steep slopes

Natural tree species composition:

Generally: *Fagus sylvatica* 60 %, *Quercus petraea* agg. 30 %, *Tilia cordata* + *Tilia platyphyllos* 10 %, *Abies alba* 0.5 %, *Carpinus betulus* 0.5 %

3S1 and 3S4 to 3S7: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* agg. 30 %, *Abies alba* 20 %, *Tilia cordata* + *Tilia platyphyllos* 20 %, *Carpinus betulus* 0 - 10 %, *Acer platanoides* 0 - 10 %, *Fraxinus excelsior* 0.5 %, *Ulmus* spp. 0.5%, *Cerasus avium* 0.1 %, *Populus tremula* 0.1 %, *Taxus baccata* 0.1 %

3S8: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* agg. 30 %, *Abies alba* 20 %, *Tilia cordata* + *Tilia platyphyllos* 10 %, *Pinus sylvestris* 0.1 %, *Betula pendula* 0.1 %, *Carpinus betulus* 0.1 %

3S9: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* agg. 30 %, *Abies alba* 10 - 20 %, *Acer platanoides* 20 %, *Tilia cordata* + *Tilia platyphyllos* 20 %, *Ulmus* spp. 0.1 %, *Fraxinus excelsior* 0.1 %, *Taxus baccata* 0.1 %

Absolute height yield class: *Picea abies* (22) 24 - 28 (32) m, *Abies alba* (20) 22 - 24 (26) m, *Fagus sylvatica* (22) 24 - 28 (30) m, *Pseudotsuga menziesii* 30 m, *Larix decidua* (24) 26 - 28 (32) m, *Quercus petraea* agg. (22) 24 - 26 (28) m, *Pinus sylvestris* (20) 22 - 26 m

Hazards: negligible; *Picea abies* may be infected by red rot

**4<sup>th</sup> forest vegetation zone 4S - *Fagetum oligo-mesotrophicum***

Occurrence: plateaus, slopes, gulleys; on different soil parent materials in hilly and montane landscapes, often with a thin loamy cover

Soil: deep, fresh moist, predominantly sandy-loam and loamy-sand; sometimes slightly gravelly

Types: entirely Dystric Cambisols, either oligotrophic or mesotrophic depending on soil parent material trophism

Significant often dominant or indicator species:

*nudum* - without a ground vegetation layer sometimes

(*Dryopteris filix-mas*)                      *Hieracium murorum*

*Calamagrostis arundinacea*              *Luzula luzuloides*

*Carex digitata*                              *Luzula pilosa*

(*Carex pilosa*)                                *Mycelis muralis*

<i>Carex pilulifera</i>	<i>Oxalis acetosella</i>
<i>Carex sylvatica</i>	<i>Poa nemoralis</i>
<i>Epilobium montanum</i>	<i>Polytrichum formosum</i>
<i>Epipactis heleborine</i>	<i>Senecio ovatus</i>
<i>Galium odoratum</i>	<i>Viola reichenbachiana</i>
<i>Galium rotundifolium</i>	
<i>Gymnocarpium dryopteris</i>	<i>(Dentaria bulbifera)*</i>

\*facultative occurrence during springs

Forest site types:

- (1) *Oxalis acetosella*
- (2) *Galium rotundifolium*
- (3) *Carex digitata*
- (4) *Luzula luzuloides* + *Galium odoratum*
- (5) *Luzula luzuloides* + *Carex pilosa* (nutrient impoverished)
- (6) ferny (*filices*) (slope bases and gills)
- (7) nudum + *Carex sylvatica*
- (8) nudum + *Galium odoratum* (predominantly nudum with a very rare *Galium odoratum* cover)
- (9) steep slopes

Natural tree species composition:

Generally: *Fagus sylvatica* 80 %, *Abies alba* 20 % (resp. *Fagus sylvatica* 100 %, *Abies alba* 0.1 %)

4S8: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* 30 %, *Abies alba* 20 %, *Tilia cordata* + *Tilia platyphyllos* 20 %, *Pinus sylvestris* 0.1 %, *Betula pendula* 0.1 %, *Carpinus betulus* 0.1 %

4S9: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* agg. 30 %, *Abies alba* 10 - 20 %, *Acer platanoides* 20 %, *Tilia coradata* + *Tilia platyphyllos* 20 %, *Carpinus betulus* 0.1 %, *Ulmus* spp. 0.1 %, *Fraxinus excelsior* 0.1 %, *Taxus baccata* 0.1 %

In dependence on site conditions: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* agg. 30 %, *Abies alba* 20 %, *Tilia coradata* + *Tilia platyphyllos* 20 %, *Carpinus betulus* 0 - 10 %, *Acer platanoides* 0 - 10 %, (*Fraxinus excelsior* + *Ulmus* spp.) 0.5 %, (*Cerasus avium* + *Populus tremula* + *Taxus baccata*) 0.1 %

Absolute height yield class:

*Picea abies* (22) 24 - 30 (36) m, *Fagus sylvatica* (20) 22 - 30 (32) m, *Larix decidua* 28 - 34 m, *Abies alba* (24) 26 - 30 m, *Quercus petraea* agg. (20) 24 - (24) 26 m, *Pinus sylvestris* 22 - 26 m

Hazards: negligible

**5<sup>th</sup> forest vegetation zone 5S - Abieto-Fagetum oligo-mesotrophicum**

Occurrence: on the upper slopes part and on slope bases, mostly fresh, gulleys different soil substrates in the base poor rocks; submontane landscapes

Soil: deep, fresh moist, well-aerated

Types: entirely Dystric Cambisols, either oligotrophic or mesotrophic depending on the soil parent material trophism; they could occur as eroded on slopes (and stagnic on slope bases)

Significant often dominant or indicator species:



<i>(Dentaria bulbifera)*</i>	<i>Luzula pilosa</i>
<i>(Dryopteris filix-mas)</i>	<i>Maianthemum bifolium</i>
<i>Avenella flexuosa</i>	<i>Milium effusum</i>
<i>Calamagrostis arundinacea</i>	<i>Mycelis muralis</i>
<i>Carex digitata</i>	<i>Oxalis acetosella</i>
<i>Carex pilulifera</i>	<i>Pleurozium schreberi</i>
<i>Dicranum scoparium</i>	<i>Polytrichum formosum</i>
<i>Dryopteris dilatata</i>	<i>Prenanthes purpurea</i>
<i>Festuca altissima</i>	<i>Rubus fruticosus</i> agg.
<i>Galium odoratum</i>	<i>Rubus idaeus</i>
<i>Galium rotundifolium</i>	<i>Senecio ovatus</i>
<i>Gymnocarpium dryopteris</i>	<i>Vaccinium myrtillus</i>
<i>Hieracium murorum</i>	<i>Viola reichenbachiana</i>

\*facultative occurrence during springs

#### Forest site types:

- (1) *Oxalis acetosella* with a s variant on terrace plateaus
- (2) *Galium rotundifolium*
- (3) *Carex digitata*
- (4) *Gymnocarpium dryopteris* - on stony soils
- (5) *Festuca altissima* - on gravelly soils
- (6) *Calamagrostis arundinacea*
- (7) nude (*nudum*)
- (8) *Dryopteris filix-mas* - slope bases and lower slopes in Českomoravská highlands
- (9) steep slopes

#### Natural tree species composition:

Generally: *Abies alba* 50 %, *Fagus sylvatica* 50 %, *Acer pseudoplatanus* 0.5 %

5S1 to 5S5: *Fagus sylvatica* 40 - 70 %, *Abies alba* 30 - 40 %, *Picea abies* 10 %, *Tilia cordata* + *Tilia platyphyllos* 10 %, (*Fraxinus excelsior* + *Ulmus* spp.) 0.5 %, *Taxus baccata* 0.5 %

5S9: *Fagus sylvatica* 40 - 60 %, *Abies alba* 20 - 40 %, *Picea abies* 20 %, *Ulmus* spp. 10 %, *Tilia cordata* + *Tilia platyphyllos* 10 %, *Fraxinus excelsior* 0.1 %

#### Absolute height yield class:

*Picea abies* (22) 24 - 30 (36) m, *Abies alba* (22) 24 - 28 m, *Fagus sylvatica* (22) 24 - 28 (34) m, *Pinus sylvestris* (22) 24 - (26) 28 m, *Acer pseudoplatanus* 26 m

*Hazards*: considerable windthrow and snowpack (*Picea abies*); moderate brush hazards

### **6<sup>th</sup> forest vegetation zone 6S - *Piceeto-Fagetum oligo-mesotrophicum***

Occurrence: slopes, ridges, and ravines; submontane and montane landscapes

Soils: different soil parent materials; deep, fresh moist, freely drained; predominantly meso- or oligotrophic Cambic Podzols, occasionally they can be slightly stagnic on moist habitats; Cambic Podzols can integrate to slightly gleyed mesotrophic Dystric Cambisols close to the boundary of the 5th forest vegetation zone; Skeli-Cambic Podzols occur on stony sites

#### Significant often dominant or indicator species:

<i>Dryopteris filix-mas</i>	<i>Luzula luzuloides</i>
<i>Calamagrostis arundinacea</i>	<i>Luzula pilosa</i>
<i>Calamagrostis villosa</i>	<i>Maianthemum bifolium</i>
<i>Carex pilulifera</i>	<i>Melica nutans</i>

<i>Avenella flexuosa</i>	<i>Milium effusum</i>
<i>Dryopteris dilatata</i>	<i>Mycelis muralis</i>
<i>Festuca altissima</i>	<i>Oxalis acetosella</i>
( <i>Galeobdolon luteum</i> )	<i>Plagiomnium affine</i>
<i>Galium rotundifolium</i>	<i>Prenanthes purpurea</i>
<i>Galium saxatile</i>	<i>Rubus idaeus</i>
<i>Gymnocarpium dryopteris</i>	<i>Senecio jacquinianus</i>
<i>Hieracium murorum</i>	<i>Vaccinium myrtillus</i>

Forest site types:

- (1) *Oxalis acetosella*
- (2) *Gymnocarpium dryopteris*
- (3) *Festuca altissima*
- (4) impoverished with *Calamagrostis arundinacea* and *Calamagrostis villosa* on granite and gneiss
- (8) *Dryopteris filix-mas* - enriched on the lower slopes and slope bases in Českomoravská highland, also on basalt ash rock in Karlovarská highland
- (9) steep slopes

Natural tree species composition:

Generally: *Picea abies* 30 %; *Fagus sylvatica* 40 %; *Abies alba* 30 %

6S1 and 6S2: *Fagus sylvatica* 30 - 70 %; *Picea abies* 20 - 40 %; *Abies alba* 20 - 40 %; *Acer pseudoplatanus* ± 10 %; *Fraxinus excelsior* + *Ulmus glabra* 0.5 %

6S9: *Fagus sylvatica* 40 - 60 %; *Abies alba* 20 - 40 %; *Picea abies* 10 - 30 %; *Acer pseudoplatanus* ± 20 %; *Ulmus glabra* ± 10 %; *Fraxinus excelsior* 0.1 %; *Taxus baccata* 0.5 %

Absolute height yield class: *Picea abies* (22) 24 - 30 (32) m, *Abies alba* (22) 24 - 26 (28) m, *Fagus sylvatica* (22) 24 - 28 (30) m

Hazards: moderate brush hazard; significant windthrow and snowpack

**7<sup>th</sup> forest vegetation zone 7S - *Fageto-Piceetum oligo-mesotrophicum***

Occurrence: mostly on slopes, less on plateaus; in the mountains; on different soil parent materials

Soils: on different soil parent materials; deep, fresh moist, well drained; predominantly Cambic Podzols; depending on soil parent material either oligo- or mesotrophic; Stagni-Cambic Podzols occur occasionally on wetter sites; Haplic Podzols in upper elevations mountain

Significant often dominant or indicator species:

<i>Dryopteris filix-mas</i>	<i>Maianthemum bifolium</i>
<i>Calamagrostis arundinacea</i>	<i>Oxalis acetosella</i>
<i>Calamagrostis villosa</i>	<i>Polytrichum formosum</i>
<i>Avenella flexuosa</i>	<i>Prenanthes purpurea</i>
<i>Dicranum scoparium</i>	<i>Rubus idaeus</i>
<i>Dryopteris dilatata</i>	<i>Senecio jacquinianus</i>
<i>Festuca altissima</i>	<i>Vaccinium myrtillus</i>
<i>Homogyne alpina</i>	( <i>Athyrium distentifolium</i> )
<i>Luzula sylvatica</i>	( <i>Gentiana asclepiadea</i> )
<i>Lycopodium annotinum</i>	( <i>Huperzia selago</i> )

Forest site types:

- (1) *Oxalis acetosella*
- (2) *Luzula sylvatica*
- (3) (small) reed grass
- nutrient poorer with *Calamagrostis villosa*
- nutrient richer with *Calamagrostis arundinacea*
- (9) steep slopes

Natural tree species composition:

Generally: *Picea abies* 70 %; *Fagus sylvatica* 20 %; *Abies alba* ; *Acer pseudoplatanus* 0.5 %  
7S1, 7S2 and 7S3 on slopes with *Calamagrostis arundinacea*: *Picea abies* 60 - 80 %; *Abies alba* ± 20 %; *Fagus sylvatica* 10 - 30 %; *Acer pseudoplatanus* 0.1 %; *Sorbus aucuparia* 0.5 %  
7S9: *Picea abies* 60 - 80 %; *Abies alba* ± 20 %; *Fagus sylvatica* 10 - 30 %; *Acer pseudoplatanus* up to 10 %; *Sorbus aucuparia* 0.5 %

Absolute height yield class: *Picea abies* (22) 24 - 28 (32) m, *Fagus sylvatica* (16) 22 - (18) 24 (26) m

Hazards: high windthrow and snowpack; moderate brush hazard, on clearcut plots by *Calamagrostis villosa*

**8<sup>th</sup> forest vegetation zone 8S - *Piceetum oligo-mesotrophicum***

Occurences: protected localities on gentle and moderate, warm-aspect slopes or associated with richer soil parent materials (hornblende, basalt, richer gneiss, etc.) at the natural (altitudinal) *Picea abies* zones; in Krušné Mts. (920 - 1020 m.), Krkonoše Mts. (1050 - 1150 m), Jeseníky Mts. (1000 - 1200 m), and especially, Šumava Mts. (above 1000 m)

Soils: with favourable physical properties; predominantly mountain Haplic Podzols; locally Histi-Haplic Podzols; on nutrient richer sites Cambic Podzols

Significant often dominant or indicator species:

<i>Avenella flexuosa</i>	<i>Oxalis acetosella</i>
<i>Luzula sylvatica</i>	<i>Polytrichum commune</i>
<i>Calamagrostis villosa</i>	<i>Polytrichum formosum</i>
<i>Homogyne alpina</i>	<i>Sphagnum</i> spp.
<i>Dryopteris dilatata</i>	<i>Vaccinium myrtillus</i>
<i>Dicranum scoparium</i>	<i>Plagiothecium</i> spp.

Forest site types:

- (1) *Oxalis acetosella* with an abundant *Luzula sylvatica* presence (in transition to *Piceetum acidophilum* (8K) and *Mughetum acidophilum* (9K) with increased *Vaccinium myrtillus* presence; magnoherbaceum increases in transition to *Acereto-Piceetum lapidosum* (8A))

Natural tree species composition:

Generally: *Picea abies* 100 %; *Abies alba* 0.5 %; *Fagus sylvatica* 0.1 %; *Sorbus aucuparia* 0.5 %

On slopes: *Picea abies* 90 - 100 %; *Acer pseudoplatanus* ± 10 %; *Sorbus aucuparia* ± 10 %; *Abies alba* ± 0.1 %; *Fagus sylvatica* ± 0.1 %

Absolute height yield class: *Picea abies* (18) 20 - 24 (26) m, (stunted *Fagus sylvatica*)

Hazards: considerable windthrow and freezing rain; moderate brush hazard.

**2.3.2 Acid series (K) – series acidophilum**

These are series on mineral-poor, mature, well-aerated soils, with a poor decomposition (Mor-moders to Mors humus forms, exceptionally Moders). Rapid drainage results in a low water-holding capacity and growing-season desiccation. A poor mineral status results in a low sorption capacity and low cation exchange capacity.

Acidophilous species dominate, especially *Luzula luzuloides*, *Avenella flexuosa*, *Carex pilulifera*, *Festuca ovina* (at lower forest vegetation zones), *Calamagrostis villosa* (at higher forest vegetation zones), *Calamagrostis arundinacea*, *Dryopteris dilatata* and acidophilous mosses. *Vaccinium myrtillus*, *Vaccinium vitis-idaea*, *Calluna vulgaris*, and *Leucobryum glaucum* are characteristic of the poor category (M category - *categoria oligotrophica*).

In comparison to nutrient-rich category, reduced productivity and low brush hazard are typical for this series. The low brush hazards promote better natural natural regeneration. Extensive tree root development enhances stand stability.

**1<sup>st</sup> forest vegetation zone** *Querceta acidophila* (acidic oak forests) are connected to acidic, nutrient-poor soil parent materials in the 1st forest vegetation zone. The soils are shallow, mostly permeable, that result in desiccation and raw humus (mor) formation considering high temperature, low air humidity, and high evapotranspiration. Tree composition is reduced to a mix of *Quercus petraea* agg., *Pinus sylvestris*, and *Betula pendula*. *Carpinus betulus* or *Fagus sylvatica* admixtures are in transition to other edaphic series. Grassy-like vegetation dominates in the understory, especially *Festuca ovina*, *Agrostis capillaris*, *Avenella flexuosa*, *Poa nemoralis* are abundant, *Poa angustifolia* is less abundant: *Carex digitata*, *Luzula pilosa*, *Carex pallescens*, *C. humilis*, *C. pilulifera*, *Sieglingia decumbens*. *Rubus fruticosus* (resp. *Rubus hirtus* in Moravskoslezské Beskydy Mts.), *Genista pilosa*, *Melampyrum pratense* (*Vaccinium myrtillus*, *Vaccinium vitis-idaea*), may also be dominating. *Silene nutans*, *Genista tinctoria*, *Lathyrus niger*, *Anthericum ramosum* are also present. The shrub layer is poorly developed including *Quercus petraea* agg., *Sorbus aucuparia*, *Betula pendula*, *Carpinus betulus*, *Populus tremula*, and *Alnus frangula*.

*Pineto-Quercetum* (pine-oak forest) has a **separate position in the 1st and 2nd forest vegetation zones**. It is characteristic of a relatively large pine region of the *Hercynicum* as manifested by the original composition of *Quercus petraea* agg. and *Pinus sylvestris* (i.e., in the transition between acidophilous oak and azonal pine stands). Some individuals of *Quercus petraea* agg. reach the *Pinus sylvestris* layer owing to the soil and climatic conditions.

A grassy-like understory vegetation includes herbs (*Festuca ovina*, *Avenella flexuosa*, *Sieglingia decumbens*), and mosses (*Pleurozium schreberi*, *Dicranum scoparium*, *Pohlia nutans*), belong to the characteristic feature. *Pteridium aquilinum* is present on fresh sites. *Vaccinium vitis-idaea*, *Calluna vulgaris*, and *Dicranum scoparium* with increasing lichens abundance are present on in drier and poorer transitions to pine stands.

**2<sup>nd</sup> forest vegetation zone** *Fageto-Querceta acidophila* (acidic beech-oak forests) prevail at lower uplands and basins on nutrient-poorer soil parent materials. In nutrient richer localities, these types occur on shallow and desiccation-prone soils, which evoke transition to stunted growth types (series extremum, Z-category). In comparison to acidic oak stands, the soils are deeper, favouring an admixture of *Fagus sylvatica* and *Carpinus betulus*. The main understory species are *Luzula luzuloides*, *Mycelis muralis*, *Carex pilulifera*, *Vaccinium myrtillus*, *Calamagrostis arundinacea* and *Maianthemum bifolium*. Some thermophilous species may be still present, e.g., *Genista pilosa*, *Genista germanica*, *Genista tinctoria*, *Silene nutans*, and *Steris viscaria*.

**3<sup>rd</sup> forest vegetation zone** *Querceto-Fageta acidophila* (acidic oak-beech forests) are communities of the the Hercynian uplands on mostly acidic soil parent materials. Climatic conditions of the 3rd forest vegetation zones enable *Fagus sylvatica* dominate over an admixture of *Quercus petraea* agg. and even *Tilia* sp., and *Abies alba* in some area.. In

contrast to the communities of the 2nd forest vegetation zones, thermophilous species are either missing or rare. These differ from the communities of the 4th forest vegetation zones by the absence of submontane species, e.g., *Prenanthes purpurea* and *Polygonatum verticillatum*. **4<sup>th</sup> forest vegetation zone** *Fageta acidophila* (acidic beech forests) differ somewhat from above mentioned acidiphila oak-beech stands. The boundary between the 3rd and 4th forest vegetation zones is very difficult to determine and they are often included in the the 4th forest vegetation zone.

The original tree species composition, from lowlands to highlands features dominating *Fagus sylvatica* and, more significantly, a higher proportion of *Abies alba*, while *Quercus petraea* agg. is absent. The oak accompanying herb species are very rare. *Luzula luzuloides*, *Avenella flexuosa*, *Calamagrostis arundinacea*, *Carex pilulifera*, *Luzula pilosa*, *Melampyrum pratense*, *Vaccinium myrtillus*, *Maianthemum bifolium*, *Veronica officinalis*, *Galium rotundifolium* and acidiphilous mosses predominate. *Dryopteris dilatata* occurs on stony soils.

**5<sup>th</sup> forest vegetation zone** *Abieto-Fageta acidophila* (acidic fir-beech forests) are the most common communities in *Hercynicum*. They cover continuous areas especially in submontane and montane landscapes with a humid climate and favourable soil moisture conditions. *Prenanthes purpurea* and *Polygonatum verticillatum* are differential species, oak accompanying species are absent and some submontane species occur occasionally. Markedly, *Quercus petraea* is missing in the original tree species composition and *Picea abies* occurs only in mixed-species stands

**6<sup>th</sup> forest vegetation zone** *Piceeto-Fageta acidophila* (acidic spruce-beech forests) are communities of the submontane altitudes. More inclement and more humid climate determines the presence of *Picea abies*, a slightly decreased vitality of *Fagus sylvatica*, and a lower proportion of *Abies alba*. The shrub layer is not developed and the herb layer has low species diversity. *Avenella flexuosa* and *Calamagrostis villosa* dominate. *Calamagrostis villosa*, *Luzula sylvatica*, and *Athyrium distentifolium* are differential species. *Vaccinium myrtillus* dominates in the nutrient-poorer types. *Dryopteris dilatata* and *Oxalis acetosella* are often abundant. *Prenanthes purpurea*, *Polygonatum verticillatum* and other submontane species from lower forest vegetation zone are also present. Spruce companions from the higher elevations can be often present.

**7<sup>th</sup> forest vegetation zone** *Fageto-Piceeta acidophila* (acidic beech-spruce forests) are significant for forestry, even they lack their own characteristic understory species. *Fagus sylvatica* lags as it does not reach the *Picea abies* vitality. Horizontal (e.g. fog) precipitation plays a great role for silviculture. From the phytosociological viewpoint these communities grade into pure spruce stands. In some region, they represent a continuous zone of high mountain transitional communities. In other regions they represent a distinct vegetation zone as defined by their relief, climate, and soil.

**8<sup>th</sup> forest vegetation zone** *Piceeta acidophila* (acidic spruce forests) belong to climatic dependent subalpine communities. The dominant *Picea abies* (with an admixture of *Sorbus aucuparia*) determines the structure of the tree layer. *Fagus sylvatica* and *Acer pseudoplatanus* appear rarely and only individually at the lower part of this forest vegetation zone and in transition to stony maple-spruce stands (8A - *Acereto-Piceetum lapidosum*). The shrub layer is poorly developed. *Calamagrostis villosa* or *Vaccinium myrtillus* dominate the herb layer. *Homogyne alpina*, *Melampyrum sylvaticum*, *Luzula sylvatica*, *Blechnum spicant*, *Oxalis acetosella*, *Streptopus amplexifolius*, *Trientalis europaea*, *Ranunculus platanifolius*, *Athyrium distentifolium*, *Polygonatum verticillatum*, and *Dryopteris dilatata* are present. The moss layer includes *Plagiothecium undulatum*, *Bazzania trilobata*, and *Sphagnum* sp. Altitude of these stands increases with increasing continentality, from west to east.

**9<sup>th</sup> forest vegetation zone** *Mugheta acidophila* (acidic dwarf pine forests) are small island-like inclusions only at the alpine landscapes (highest peaks and ridges). *Pinus mugo* is a

natural dominant; very stunted *Picea abies* is an admixture in the lower parts of this forest vegetation zone. These communities are strongly related to climate.

### 2.3.2.1 *Categoria acidophila* (K – category)

This is a basic category of the acid series (K) and most common category of the forests in Czech Republic. The range of site conditions rank is rather wide but it is possible to describe general conditions of this category:

- 1) unexposed relief
- 2) dominantly acid (base-poor) soil parent materials
- 3) oligotrophic Dystric Cambisols; Cambic Podzols in the 6th and 7th forest vegetation zones; mountain Haplic Podzols in the 8th forest vegetation zone and partly in the 7th forest vegetation zone.
- 4) soils are already partly developed sometimes only.
- 5) Mor-moder and Mor humus forms

Forest function is mainly timber production Yield class is above standard. Stands have an infiltration ecological effect. There are a very good natural regeneration of *Picea abies* from the 4th to 7th forest vegetation zone, and that of *Pinus sylvestris* from the 1st to 3rd forest vegetation zones. The 5 - 10 % inclusion of *Pseudotsuga menziesii* from the 3rd to 5th forest vegetation zones is viable.

### Forest site type complexes

#### 1<sup>st</sup> forest vegetation zone 1K - *Quercetum acidophilum*

Occurrence: lowlands, plateaus, gentle slopes; uplands on sunny slopes and ridges; different base-poor soil parent materials.

Soil: moderately deep, permeable, water-deficient, Mor humus form formation. Predominantly oligotrophic, occasionally podzolized, Dystric Cambisols, (oligotrophic) Skeletic Cambisols can occur on stony sites; Haplic Podzols can occur occasionally

#### Significant, often dominant or indicator species:

<i>Agrostis capillaris</i>	<i>Hieracium pilosella</i>
<i>Calluna vulgaris</i>	<i>Leucobryum glaucum</i>
<i>Campanula rotundifolia</i>	<i>Luzula campestris</i>
<i>Coronilla varia</i>	<i>Luzula luzuloides</i>
<i>Avenella flexuosa</i>	<i>Melica transsilvanica</i>
<i>Euphorbia cyparissias</i>	<i>Pimpinella saxifraga</i>
<i>Festuca ovina</i>	<i>Pleurozium schreberi</i>
<i>Genista germanica</i>	<i>Poa nemoralis</i>
<i>Genista pilosa</i>	( <i>Seseli osseum</i> )
<i>Genista tinctoria</i>	<i>Sieglingia decumbens</i>
<i>Hieracium lachenalii</i>	<i>Steris viscaria</i>
<i>Hieracium murorum</i>	<i>Vaccinium myrtillus</i>

#### Forest site types:

- (1) *Festuca ovina* - sands and gravelly sands
- (3) *Festuca ovina* + *Poa nemoralis*
- (4) *Avenella flexuosa* - deeper soils
- (5) *Agrostis capillaris*
- (7) *Luzula luzuloides* - on transition to 2K (*Fageto-Quercetum acidophilum*)
- (8) *Vaccinium myrtillus*
- (9) steep slopes

Natural tree species composition:

Generally: *Quercus petraea* agg. 90 %, *Betula pendula* 10 %, *Sorbus aucuparia* 0.5 %, *Carpinus betulus* 0.5 %, *Pinus sylvestris* 0.5 %

1K1 and 1K4: *Quercus petraea* agg. 50 - 70 %, *Fagus sylvatica* 0 - 30 %, *Pinus sylvestris* 20 %, *Carpinus betulus* 0 - 10 %, *Tilia cordata* 20 %, *Betula pendula* 10%

Absolute height yield class: *Pinus sylvestris* (12) 16 - 18 (24) m, *Quercus petraea* agg. (12) 16 - 18 (24) m

Hazards: desiccation, soil erosion and soil impoverishment hazards

**2<sup>nd</sup> forest vegetation zone 2K - *Fageto-Quercetum acidophilum***

Occurrence: uplands on different base-poor soil parent materials; slopes and plateaus

Soil: moderately deep, more or less gravelly, water-deficient. Predominantly oligotrophic Dystric Cambisols mostly podzolized; on sandy soils oligotrophic Cambic Arenosols, they may be podzolized especially under *Pinus sylvestris* stands

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Hieracium pilosella</i>
<i>Carex pilulifera</i>	<i>Luzula luzuloides</i>
<i>Cruciata glabra</i>	<i>Melampyrum pratense</i>
<i>Avenella flexuosa</i>	<i>Mycelis muralis</i>
<i>Dicranum scoparium</i>	<i>Poa nemoralis</i>
<i>Festuca ovina</i>	<i>Polytrichum formosum</i>
<i>Galium rotundifolium</i>	<i>Vaccinium myrtillus</i>
<i>Genista germanica</i>	<i>Veronica officinalis</i>
<i>Genista pilosa</i>	( <i>Lembotropis nigricans</i> )
<i>Genista tinctoria</i>	( <i>Silene nutans</i> )
<i>Hieracium murorum</i>	( <i>Steris viscaria</i> )

Forest site types:

- (1) *Avenella flexuosa*
- (2) *Carex pilulifera*
- (3) *Luzula luzuloides*
- (4) *Festuca ovina*
- (5) *Vaccinium myrtillus*
- (8) *Calamagrostis arundinacea*
- (9) steep slopes

Natural tree species composition:

Generally: *Quercus petraea* agg. 70 %, *Fagus sylvatica* 30 %, *Sorbus aucuparia* 0.5 %

2K1, 2K3 and 2K4: *Quercus petraea* agg. 50 - 70 %, *Fagus sylvatica* 0 - 30 %, *Carpinus betulus* 0 - 10 %, *Tilia cordata* 20 %, *Betula pendula* 10 %, *Pinus sylvestris* 0.1 - 0.5 %

2K9: *Quercus petraea* 50 - 80 %, *Fagus sylvatica* 0 - 30 %, *Pinus sylvestris* 20 %, *Carpinus betulus* 0 - 10 %, *Tilia cordata* 10 %, *Betula pendula* 10 %

Absolute height yield class: *Pinus sylvestris* (16) 18 - 22 (24) m, *Fagus sylvatica* 18 - 20 (22) m, *Quercus petraea* (14) 18 - 22 (24) m, *Carpinus betulus* 16 m, *Picea abies* 14 (22) - 16 (26) m

Hazards: growing-season water deficit, acid soils are predisposed to nutrient-degradation.

### **3<sup>rd</sup> forest vegetation zone 3K - *Querceto-Fagetum acidophilum***

Occurrence: predominantly associated with base-poor soil parent materials; different slopes in uplands; sunny slopes, infrequently on plateaus in higher elevations.

Soils: moderately deep, dry to fresh; dominantly oligotrophic Dystric Cambisols, occasionally podzolized under *Pinus sylvestris* stands; oligotrophic Cambic Arenosols and Arenic Podzols on sandy substrates; Haplic Podzols moderately.

#### Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Luzula pilosa</i>
<i>Carex pilulifera</i>	<i>Maianthemum bifolium</i>
<i>Avenella flexuosa</i>	<i>Melampyrum pratense</i>
<i>Dryopteris dilatata</i>	<i>Oxalis acetosella</i>
<i>Festuca ovina</i>	<i>Polytrichum formosum</i>
<i>Hieracium murorum</i>	<i>Vaccinium myrtillus</i>
<i>Luzula luzuloides</i>	<i>Veronica officinalis</i>

#### Forest site types:

- (1) *Avenella flexuosa*
- (2) *Carex pilulifera*
- (3) *Luzula luzuloides*
- (4) *Festuca ovina* - drier transition to 2K (*Fageto-Quercetum acidophilum*)
- (5) *Vaccinium myrtillus*
- (6) moss (*musci*) - poorest soil parent materials
- (7) *Luzula pilosa*
- (8) *Calamagrostis arundinacea*
- (9) steep slopes

#### Natural tree species composition:

Generally: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* agg.  $\pm$  30 %, *Abies alba*  $\pm$  20 %, *Tilia cordata* + *Tilia platyphyllos*  $\pm$  10 %, *Pinus sylvestris* 0.1 - 0.5 %, *Betula pendula* + *Carpinus betulus* 0.1 - 0.5 %

3K5 and 3K6: *Fagus sylvatica* 30 - 60 %, *Quercus petraea* 20 - 40 %, *Abies alba* 0 - 10 %, *Pinus sylvestris* 0 - 10 %, *Tilia cordata* + *Tilia platyphyllos*  $\pm$  10 %, *Betula pendula*  $\pm$  10 %

3K9: *Fagus sylvatica* 60 - 70 %, *Quercus petraea* 10 - 30 %, *Pinus sylvestris* 0.1 - 0.5 %, *Abies alba* 10 - 20 %, *Tilia cordata*  $\pm$  10 %, *Betula pendula* + *Acer platanoides* 0.1  $\pm$  0.5 %

Absolute height yield class: *Pinus sylvestris* (16) 20 - 24 (30) m, *Picea abies* (18) 22 - 26 (30) m, *Fagus sylvatica* (18) 22 - 24 (26) m, *Quercus petraea* (16) 22 - 24 (26) m

Hazards: low desiccation and brush hazard, moderate soil nutrient degradation hazard.

### **4<sup>th</sup> forest vegetation zone 4K - *Fagetum acidophilum***

Occurrence: undulating plateaus, slopes, ridges at higher uplands and highlands.

Soil: moderately deep, fresh moist; dominantly oligotrophic Dystric Cambisols, often podzolized under *Pinus sylvestris* stands; Haplic Podzols increase in comparison to *Querceto-Fagetum acidophilum* (3K)

#### Significant often dominant or indicator species:

<i>Carex pilulifera</i>	<i>Moehringia trinervia</i>
<i>Avenella flexuosa</i>	<i>Oxalis acetosella</i>
<i>Dicranum scoparium</i>	<i>Polytrichum formosum</i>



<i>Dicranum undulatum</i>	<i>Vaccinium myrtillus</i>
<i>Dryopteris dilatata</i>	<i>Veronica officinalis</i>
<i>Hieracium murorum</i>	( <i>Mycelis muralis</i> )
<i>Leucobryum glaucum</i>	( <i>Carex digitata</i> )
<i>Luzula luzuloides</i>	( <i>Carex sylvatica</i> )
<i>Luzula pilosa</i>	( <i>Galium rotundifolium</i> )

Forest site types:

- (1) *Avenella flexuosa*
- (2) *Carex pilulifera*
- (3) *Luzula luzuloides* - on gentle slopes and plateaus
- (4) *Luzula luzuloides* - on ridges
- (5) moss (*musci*) - in base-poorest soils
- (6) *Vaccinium myrtillus*
- (7) *Oxalis acetosella* - in transition to *Fagetum oligo-mesotrophicum* (4S)
- (8) *Luzula pilosa*
- (9) steep slopes

Natural tree species composition:

Generally: *Fagus sylvatica* 70 %, *Quercus petraea* agg. 10 %, *Abies alba* 20 %

In dependence on site conditions: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* ± 30 %, *Abies alba* ± 20 %, *Tilia cordata* + *Tilia platyphyllos* ± 10 %, *Pinus sylvastris* 0.1 ± 0.5 %, *Betula pendula* + *Carpinus betulus* 0.1 ± 0.5 %, (*Taxus baccata* ± 0.1 % especially for 4K7)

4K5 and 4K6: *Fagus sylvatica* 50 - 80 %, *Quercus petraea* agg. 0 - 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 10 %, *Betula pendula* ± 10 %, *Picea abies* + *Abies alba* + *Pinus sylvestris* ± 0.1 %

4K9: *Fagus sylvatica* 60 - 70 %, *Quercus petraea* 10 - 30 %, *Abies alba* 10 - 20 %, *Tilia cordata* ± 10 %, *Pinus sylvestris* 0.1 ± 0.5 %, *Betula pendula* + *Acer platanoides* 0.1 ± 0.5 %

Absolute height yield class: *Picea abies* (18) 22 - 28 (30) m, *Fagus sylvatica* (18) 22 - 26 (28) m, *Larix decidua* 28 - 30 m, *Pinus sylvestris* (18) 22 - 24 (30) m, *Quercus petraea* agg. (16) 20 - 24 (26) m, *Abies alba* 20 - 22 m

Hazards: of minor concern

**5<sup>th</sup> forest vegetation zone 5K - *Abieto-Fagetum acidophilum***

Occurrence: the most widespread group of forest sites in the *Hercynicum*; on undulating plateaus, slopes, and flat ridges in submontane landscapes (about 450 - 650 m).

Soil: moderately deep, fresh moist often gravelly. Dominantly oligotrophic Dystric Cambisols often podzolized under *Pinus sylvestris* stands; Haplic Podzols moderately increase; Cambic Fluvisols have extraordinary occurrence on terrace-like grounds in western Bohemia.

Significant often dominant or indicator species:

<i>Carex pilulifera</i>	<i>Polytrichum formosum</i>
<i>Avenella flexuosa</i>	<i>Prenanthes purpurea</i>
<i>Dicranum scoparium</i>	<i>Vaccinium myrtillus</i>
<i>Dicranum undulatum</i>	<i>Veronica officinalis</i>
<i>Galium rotundifolium</i>	( <i>Agrostis capillaris</i> )
<i>Hieracium murorum</i>	( <i>Calamagrostis arundinacea</i> )
<i>Luzula luzuloides</i>	( <i>Dryopteris dilatata</i> )
<i>Maianthemum bifolium</i>	( <i>Mycelis muralis</i> )

*Melampyrum pratense* ( *Rubus fruticosus* agg.)  
*Pleurozium schreberi* ( *Rubus hirtus*)  
*Pohlia nutans* ( *Rubus idaeus*)  
( *Senecio ovatus*)

Forest site types:

- (1) *Avenella flexuosa*
- (2) *Carex pilulifera*
- (3) *Luzula luzuloides*
- (5) moss (*musci*) - very base-poor soils
- (6) *Vaccinium myrtillus* - base-poor soils
- (7) *Oxalis acetosella* - nutrient-richer transition to *Abieto-Fagetum oligo-mesotrophicum* (5S)
- (8) terraced - on stony alluvia with undeveloped Cambisols (transition to *Abieto-Fagetum lapidosum acidophilum* - 5N)
- (9) steep slopes

Natural tree species composition:

Generally: *Abies alba* 30 - 40 %, *Fagus sylvatica* 50 - 60 %, *Picea abies* 10 %

In dependence on site conditions: *Fagus sylvatica* 40 - 70 %, *Abies alba* 20 - 40 %, *Picea abies* ±20 %, *Pinus sylvestris* 0 - 10 %, (*Taxus baccata* 0.1 mainly on 5K7 - 5K9)

5K5 and 5K6: *Fagus sylvatica* 50 - 80 %, *Quercus petraea* agg. 0 - 10 %, *Tilia cordata* + *Tilia platyphyllos* ±10 %, *Betula pendula* ±10 %, *Picea abies* + *Abies alba* + *Pinus sylvestris* ±10 %

Absolute height yield class: *Picea abies* (20) 22 - 26 (30) m, *Fagus sylvatica* (20) 22 - 24 (30) m, *Abies alba* (18) 22 - 24 (30) m *Pinus sylvestris* (18) 22 - 24 (28) m, *Larix decidua* 24 - 26 m

Hazards: moderate windthrow and snowpack hazards; low brush hazard

**6<sup>th</sup> forest vegetation zone 6K - *Piceeto-Fagetum acidophilum***

Occurrence: on base-poor soil parent materials (sandstones) in submontane and montane landscapes from 650 (on sandstones from 500) to 900 m; on slopes, less on undulating plateaus or ridges and valley bottoms (climate inversion)..

Soils: moderately deep, fresh moist. Oligotrophic Cambic Podzols; eroded Cambic Podzols can grade into Skeli-Cambic Podzols on skeletal soils; Histi-Cambic Podzols are rare in depressions; Dystric Cambisols oligotrophic, podzolized variations are associated with on nutrient-richer soil parent materials close to the 5th forest vegetation zone; Haplic Podzols are more often at regions with nutrient-poorer soil parent materials

Significant often dominant or indicator species:

<i>Arnica montana</i>	<i>Luzula pilosa</i>
<i>Bazzania trilobata</i>	<i>Maianthemum bifolium</i>
<i>Calamagrostis arundinacea</i>	<i>Oxalis acetosella</i>
<i>Calamagrostis villosa</i>	<i>Pleurozium schreberi</i>
<i>Calluna vulgaris</i>	<i>Polytrichum formosum</i>
<i>Carex pilulifera</i>	<i>Vaccinium myrtillus</i>
<i>Avenella flexuosa</i>	<i>Vaccinium vitis-idaea</i>
<i>Dicranum scoparium</i>	( <i>Leucobryum glaucum</i> )
<i>Dryopteris carthusiana</i>	( <i>Melampyrum sylvaticum</i> )
<i>Galium saxatile</i>	( <i>Prenanthes purpurea</i> )

*Hieracium murorum*                      (*Pteridium aquilinum*)  
*Luzula luzuloides*                      (*Rubus idaeus*)  
(*Trientalis europaea*)

Forest site types:

- (1) *Avenella flexuosa* - variants: mountain peaks(a) and with *Pinus sylvestris* on sandstone(b)
- (2) *Carex pilulifera*
- (3) *Vaccinium myrtillus*
- (4) *Calamagrostis villosa* - variety: mountain peaks on granodiorite(a) and with *Pinus sylvestris* on sandstone(b)
- (5) *Dryopteris dilatata*
- (6) *Oxalis acetosella* - transition to *Piceeto-Fagetum oligo-mesotrophicum* (6S) with a very good natural regeneration of *Picea abies*
- (7) *Calamagrostis arundinacea*, *Oxalis acetosella*
- (8) terraced-like - elevated gravelly alluvia with undeveloped soil and with transitions to Cambic Podzols or Haplic Podzols
- (9) steep slopes

Natural tree species composition:

Generally: *Picea abies* 40 %, *Fagus sylvatica* 40 %, *Abies alba* 20 %, *Sorbus aucuparia* 0.5 %  
6K1, 6K3 and 6K4: *Fagus sylvatica* 40 - 70 %, *Picea abies* 20 - 40 %, *Abies alba* 10 - 30 %, *Pinus sylvestris* 0 - 10 %

6K9: *Fagus sylvatica* 30 - 50 %, *Picea abies* 20 - 40 %, *Abies alba* 10 - 30 %, *Pinus sylvestris* ± 10 %, *Betula pendula* ± 10 %, *Acer pseudoplatanus* + *Sorbus aucuparia* 0.5 %, (*Taxus baccata* 0.1, more on 6K6)

Absolute height yield class: *Picea abies* (18) 22 - 26 (34) m, *Fagus sylvatica* (20) 22 - 24 (28) m, *Abies alba* 20 - 22 (28) m, *Pinus sylvestris* (18) 22 - 24 m

Hazards: moderate snowpack (hoarfrost) and windthrow; low brush hazard (medium in the *Calamagrostis villosa* type).

**7<sup>th</sup> vegetation zone 7K - *Fageto-Piceetum acidophilum***

Occurrence: middle and upper slopes and flat ridges in montane landscapes, climate inversion localities (sandstones valleys) at lower elevations.

Soil: year around adequate soil moisture supply, permeable, often histic on plateaus and terraces; dominantly (mountain) Haplic Podzols; less often oligotrophic Cambic Podzols; oligotrophic Skeli-Cambic Podzols occur on stony and gravel substrates

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	<i>Pleurozium schreberi</i>
<i>Carex pilulifera</i>	<i>Polytrichum formosum</i>
<i>Avenella flexuosa</i>	<i>Polytrichum juniperinum</i>
<i>Dicranum scoparium</i>	<i>Sphagnum</i> sp.
<i>Dryopteris dilatata</i>	<i>Vaccinium myrtillus</i>
<i>Homogyne alpina</i>	<i>Vaccinium vitis-idaea</i>
<i>Maianthemum bifolium</i>	( <i>Calamagrostis arundinacea</i> )
<i>Oxalis acetosella</i>	( <i>Rubus idaeus</i> )

Forest site types:

- (1) *Avenella flexuosa*

- (2) *Vaccinium myrtillus*
- (3) *Calamagrostis villosa*
- (4) *Dryopteris dilatata*
- (5) *Oxalis acetosella* - on nutrient enriched sites; mostly subalpine species are present in transition to *Piceetum oligo-mesotrophicum* (8S)
- (8) terraced-like - on undeveloped soils
- (9) steep slopes

Natural tree species composition:

Generally: *Picea abies* 70 %, *Fagus sylvatica* 20 %, *Abies alba* 10 %, *Sorbus aucuparia* 0.5 %  
 7K1, 7K2, 7K3 and 7K5: *Picea abies* 70 - 80 %, *Fagus sylvatica* 10 - 30%, *Abies alba* 10 %, *Pinus sylvestris* 0.1 %, (*Betula pendula* + *Sorbus aucuparia* 0.5 %), (*Taxus baccata* 0.1 % on 7K5)

7K9: *Picea abies* 70 - 80 %, *Fagus sylvatica* 10 - 30 %, *Abies alba* 10 %, *Pinus sylvestris* 0.1 %, *Acer pseudoplatanus* 0.5 %, *Betula pendula* + *Sorbus aucuparia* 0.5 %

Absolute height yield class: *Picea abies* (20) 22 - 26 (30) m, *Fagus sylvatica* (16) 18 - 20 (22) m, *Abies alba* (24) 26 (28) m.

Hazards: high snowpack (hoarfrost) and windthrow; inherent excessive moisture and low temperature.

**8<sup>th</sup> forest vegetation zone 8K - *Piceetum acidophilum***

Occurrence: on slopes and plateaus; predominantly associated with crystalline bedrocks soil parent material;

Soil: moderately deep (deeper in the *Calamagrostis villosa* type), often gravelly and and stony; frequently (mountain) Haplic Podzols and Histi-Haplic Podzols; extraordinarily oligotrophic Cambic Podzols on base-richer soil parent materials.

Significant often dominant or indicator species:

<i>Athyrium distentifolium</i>	<i>Homogyne alpina</i>
<i>Bazzania trilobata</i>	<i>Luzula sylvatica</i>
<i>Blechnum spicant</i>	<i>Oxalis acetosella</i>
<i>Calamagrostis villosa</i>	<i>Polytrichum commune</i>
<i>Avenella flexuosa</i>	<i>Polytrichum formosum</i>
<i>Dicranum scoparium</i>	<i>Sphagnum</i> sp.
<i>Dryopteris dilatata</i>	<i>Trientalis europaea</i>
<i>Galium saxatile</i>	<i>Vaccinium myrtillus</i>
<i>Gentiana asclepiadea</i>	

Forest site types:

- (1) *Avenella flexuosa*
- (2) *Calamagrostis villosa*
- (3) *Athyrium distentifolium*
- (4) *Sphagnum* spp.
- (5) *Dryopteris dilatata*
- (6) *Vaccinium myrtillus*
- (7) *Oxalis acetosella* - nutrient-enriched (in the Šumava Mts.)
- (9) steep slopes

Natural tree species composition: *Picea abies* 100 %, *Sorbus aucuparia* + *Fagus sylvatica* + *Abies alba* + *Acer pseudoplatanus* 0.5 %; *Picea abies* natural regeneration is negligible.

Absolute height yield class: *Picea abies* (16) 20 - 24 (26) m

Hazards: high snowpack (hoarfrost) and windthrow

**9<sup>th</sup> forest vegetation zone 9K - *Mughetum acidophilum***

Occurrence: in transition between the Norway spruce (*Picea abies*) and dwarf pine (*Pinus mugo*) zones, at the timberline (Krkonoše Mts. 1200 - 1500 m, Hrubý Jeseník Mts. over 1350 m); on flat ridges, slopes; crystalline silicate slates.

Soil: predominantly sandy-and clayey with a variable gravel and stone content and a thick Mor humus forms. Frequently Skeletic Leptosols and Skeli-Dystric Leptosols; mostly turf mountain Haplic Podzols occur on flat ridges with a low soil skeleton proportion.

Significant often dominant or indicator species:

<i>Athyrium distentifolium</i>	<i>Potentilla erecta</i>
<i>Calamagrostis villosa</i>	<i>Swertia perennis</i>
<i>Avenella flexuosa</i>	<i>Trientalis europaea</i>
<i>Homogyne alpina</i>	<i>Vaccinium myrtillus</i>
<i>Nardus stricta</i>	<i>Vaccinium vitis-idaea</i>

Forest site types:

(1) skeletal

(2) *Calamagrostis villosa*

Natural tree species composition:

Generally: *Picea abies* 50 - 80 %, *Pinus mugo* 20 - 50 %, *Sorbus aucuparia* 0.5 %

9K1: *Picea abies* 50 - 80 %, *Pinus mugo* 20 - 50 %, *Sorbus aucuparia* 10 %, *Betula pendula* 0.1 %; (groups of canopy opened *Picea abies* are 6 - 12 m high; *Pinus mugo* admixture does not exceed 50 %; natural woody species regeneration is rare, on putrefied wood only).

Absolute height yield class: *Picea abies* 14 m

Hazards: very high windthrow

**Azonal 0K - (*Querceto-Fagi-*) *Pinetum acidophilum***

Occurrence: on sandy sediments and weathered sandy rocks; at foothills in the 3rd and 4th forest vegetation zones; on sunny slopes in the 5th forest vegetation zone.

Soil: sandy, permeable, subjected to desiccation; dominantly Arenic Podzols, slightly Stagnic at a higher ground water table; Haplic Podzols are associated with broadleaf stands and clayed soils; often podzolized Dystric Cambisols occurring on base-richer parent materials bases are rare.

Significant often dominant or indicator species:

<i>Calluna vulgaris</i>	<i>Leucobryum glaucum</i>
<i>Cladonia sp.</i>	<i>Pleurozium schreberi</i>
<i>Avenella flexuosa</i>	<i>Vaccinium myrtillus</i>
<i>Dicranum scoparium</i>	<i>Vaccinium vitis-idaea</i>
<i>Dicranum undulatum</i>	( <i>Calamagrostis arundinacea</i> )
<i>Festuca ovina</i>	( <i>Rubus fruticosus</i> agg.)

Forest site types:

(1) *Querceto-Pinetum acidophilum* - *Vaccinium myrtillus* - on Dystric Cambisols

(2) *Querceto-Pinetum acidophilum* on Podzols

- (3) *Querceto-Fagi-Pinetum acidophilum* - *Vaccinium myrtillus* - on Dystric Cambisols
- (4) *Querceto-Fagi-Pinetum acidophilum* on Podzols
- (5) *Fageto-Pinetum acidophilum* - *Vaccinium myrtillus* - on Dystric Cambisols
- (6) *Fageto-Pinetum acidophilum* on Podzols
- (7) *Querceto-Pinetum acidophilum* - *Pteridium aquilinum*
- (8) *Querceto-Pinetum acidophilum* - *Avenella flexuosa*
- (9) *Querceto-Pinetum acidophilum* on steep slopes

Natural tree species composition:

on Podzols: *Pinus sylvestris* 80 %, *Quercus petraea* agg. 10 %, *Fagus sylvatica* 10 %, *Betula pendula* 0.5 %

on Dystric Cambisols: *Pinus sylvestris* 80 - 90 %, *Quercus petraea* agg. 20 %, *Fagus sylvatica* 0 - 10 %, *Betula pendula* 10 %, *Picea abies* 0.1 %

Absolute height yield class: *Pinus sylvestris* (16) 18 - 22 (28) m, *Quercus petraea* agg. (14) 16 - 18 m

Hazards: desiccation, soil nutrient degradation, and erosion on slopes.

### 2.3.2.2 *Categoria illimerosa acidophila* (I – category)

This category is a soil variety of K - category (*Categoria acidophila*) on nutrient-poorer loamy soils. The characteristic feature is deep Luvisols, occasionally Stagnic (gleaed), derived from loess or other quarternary deposits. These soils occur predominantly on flats, lower slope parts, and in depressions, in lowlands and uplands, less frequently at highlands where they are transitional to Luvic Cambisols. They are prone to compaction and humus form deterioration.

Forest function is mainly timber production, however, the stands have an infiltration ecological effect. Yield class is the standard to slightly under the standard. The productivity of *Pseudotsuga menziesii* may be comparable to that of the 3rd to 5th forest vegetation zones over the stand area of 5 - 10 %.

### Forest site type complexes

#### 1<sup>st</sup> forest vegetation zone II - (*Carpineto*-) *Quercetum illimerosum acidophilum*

Occurrence: predominantly on plateaus and gentle slopes; on different parent soil material with a variable cover of loess and loamy loess capping.

Soil: loamy (sand-loam to clay-loam), less permeable, subjected to desiccation; frequently oligotrophic Stagnic Glossisols and oligotrophic Luvic Cambisols; occasionally Albi Luvisols and Stagni-Dystric Cambisols; Albi-Luvic Arenosols occur on loess overlying sandstones; the occurrence of Eutric Cambisols on carbonate-silicate substrates is exceptional.

Significant often dominant or indicator species:

<i>Leucobryum glaucum</i>	
<i>Calamagrostis arundinacea</i>	<i>Luzula luzuloides</i>
<i>Calluna vulgaris</i>	<i>Luzula pilosa</i>
<i>Carex montana</i>	<i>Melampyrum pratense</i>
( <i>Convallaria majalis</i> )	( <i>Molinia arundinacea</i> )
<i>Avenella flexuosa</i>	<i>Polytrichum formosum</i>
<i>Festuca heterophylla</i>	<i>Pteridium aquilinum</i>
<i>Festuca ovina</i>	<i>Vaccinium myrtillus</i>
<i>Genista tinctoria</i>	( <i>Anthericum ramosum</i> )
<i>Lembotropis nigricans</i>	( <i>Vincetoxicum hirundinaria</i> )

Forest site types:

- (1) acidified on sands (*acidophilum*)
- (2) *Brachypodium pinnatum* – transition to *Carpineto-Quercetum illimerosum mesotrophicum* (1H)
- (3) *Molinia arundinacea* + *Pteridium aquilinum* - acidified on loess at the Polabí lowland
- (4) *Melampyrum pratense*
- (5) *Festuca heterophylla*

Natural tree species composition:

Generally: *Quercus petraea* agg. 80 %, *Carpinus betulus* 10 %, *Tilia cordata* (*Betula pendula* resp.) 10 %, *Pinus sylvestris* 0.5 %

1I1 to 1I3: *Quercus petraea* agg. 50 - 70 %, *Fagus sylvatica* 0 - 30 %, *Tilia cordata* ±20 %, *Carpinus betulus* 0 - 10 %, *Betula pendula* ± 10 %;

Natural regeneration is insignificant.

Absolute height yield class: *Pinus sylvestris* (18) 20 - 22 m, *Quercus petraea* agg. (18) 20 - 22 m, *Tilia cordata* 20 - 22 m

Hazards: desiccation and soil degradation.

**2<sup>nd</sup> forest vegetation zone 2I - *Fageto-Quercetum illimerosum acidophilum***

Occurrence: plateaus and gentle slopes at lowlands and uplands; predominantly on the loamy loess of variable thickness.

Soils: generally deep but subjected to slight desiccation, compacted; frequently Albic Luvisols; Albi-Luvic Arenosols occur on sandstones with loess capping; slightly Stagnic Albic Luvisols to Stagnic Glossisols are found on very gentle slopes and flats; podzolized Albic Luvisols occur under *Pinus sylvestris* stands; oligotrophic Luvic Cambisols, occasionally Stagnic (gleyed), are also common; Stagni-Haplic Luvisols on loess are exceptional; Eutric Cambisols are associated with carbonate substrates.

Significant often dominant or indicator species:

<i>Brachypodium pinnatum</i>	<i>Luzula luzuloides</i>
<i>Calamagrostis arundinacea</i>	<i>Luzula pilosa</i>
<i>Carex montana</i>	<i>Melampyrum pratense</i>
<i>Carex pilulifera</i>	<i>Pleurozium schreberi</i>
<i>Convallaria majalis</i>	<i>Polytrichum formosum</i>
<i>Avenella flexuosa</i>	( <i>Rubus fruticosus</i> agg.)
<i>Festuca heterophylla</i>	<i>Vaccinium myrtillus</i>
<i>Festuca ovina</i>	( <i>Agrostis capillaris</i> )
<i>Galium rotundifolium</i>	
<i>Genista tinctoria</i>	( <i>Campanula persicifolia</i> )
<i>Hieracium murorum</i>	( <i>Cruciata glabra</i> )
<i>Hylocomium splendens</i>	( <i>Dactylis glomerata</i> )
<i>Leucobryum glaucum</i>	( <i>Poa nemoralis</i> )
<i>Pteridium aquilinum</i>	( <i>Veronica chamaedrys</i> )

Forest site types:

- (1) *Luzula pilosa*
- (2) *Brachypodium pinnatum* + *Carex montana* - on transition to *Fageto-Quercetum illimerosum mesotrophicum* (2H)
- (3) *Convallaria majalis* – on transition to (Abieti-) *Fageto-Quercetum variohumidum mesotrophicum* - 2O

- (4) *Melampyrum pratense* - nutrient-poorer
- (5) *Calamagrostis arundinacea*, or *Vaccinium myrtillus* (secondary)
- (6) *Rubus fruticosus* agg. - transition to *Fageto-Quercetum oligo-mesotrophicum* (2S)
- (7) *Pteridium aquilinum*

Natural tree species composition:

Generally: *Quercus petraea* 70 %, *Fagus sylvatica* 30 %, *Pinus sylvestris* 0.5 %, *Betula pendula* 0.5 %

2I1, 2I3 and 2I6: *Quercus petraea* 50 - 70 %, *Fagus sylvatica* 0 - 30 %, *Carpinus betulus* 0 - 10 %, *Tilia cordata* ± 20 %, *Betula pendula* ± 10 %, *Pinus sylvestris* ± 0.1 %

Absolute height yield class: *Pinus sylvestris* (14) 18 - 22 (28) m, *Quercus petraea* agg. (14) 18 - 22 (26) m, *Fagus sylvatica* 18 - 22 m, *Picea abies* (24) 26 - 28 m, *Tilia cordata* (20) 22 m, *Carpinus betulus* 18 - 20 m

Hazards: low desiccation; considerable soil degradation.

**3<sup>rd</sup> forest vegetation zone 3I - *Querceto-Fagetum illimerosum acidophilum***

Occurrence: in uplands, on plateaus, and on lower, long, gentle slopes with variable cover of loess and slope loams on different substrates (e.g. on clays in the Podkrušnohorská basin).

Soils: deep, compacted, mostly clay-loamy at depth; dominantly Luvisols, less Cambisols; Albi-Luvic Arenosols are associated with underlying sandstone. Albic Luvisols slightly Stagnic (gleyed) to Stagnic Glossisols occur on very gentle slopes and flats, Albic Luvisols podzoled are found under *Pinus sylvestris* stands; oligotrophic Luvic Cambisols are frequently Stagnic (gleyed); Cambic Stagnosols can occur in patches in base-richer depressions on plateaus

Significant often dominant or indicator species:

<i>(Brachypodium pinnatum)</i>	<i>Maianthemum bifolium</i>
<i>Calamagrostis arundinacea</i>	<i>Melampyrum pratense</i>
<i>Carex montana</i>	<i>Mycelis muralis</i>
<i>Convallaria majalis</i>	<i>Polytrichum formosum</i>
<i>Euphorbia cyparissias</i>	<i>Vaccinium myrtillus</i>
<i>Genista germanica</i>	<i>Veronica officinalis</i>
<i>Genista pilosa</i>	<i>(Dactylis glomerata)</i>
<i>Genista tinctoria</i>	<i>(Galium rotundifolium)</i>
<i>Hieracium murorum</i>	<i>(Poa nemoralis)</i>
<i>Leucobryum glaucum</i>	<i>(Rubus fruticosus agg.)</i>
<i>Luzula luzuloides</i>	<i>(Senecio fuchsii)</i>
<i>Luzula pilosa</i>	<i>(Viola reichenbachiana)</i>
<i>Pteridium aquilinum</i>	<i>Leucobryum glaucum</i>

Forest site types:

- (1) *Luzula pilosa*
- (3) *Convallaria majalis*
- (4) *Melampyrum pratense*
- (5) *Vaccinium myrtillus* + *Leucobryum glaucum*
- (6) *Rubus fruticosus* agg.
- (7) *Pteridium aquilinum*

Natural tree species composition:



Generally: *Fagus sylvatica* 60 %, *Quercus petraea* agg. 30 %, *Abies alba* 10 %, (*Pinus sylvestris* 0.5 %)

In dependence on site conditions: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* 20 - 40 %, *Tilia cordata* ± 10 %, *Abies alba* ± 20 %, *Pinus sylvestris* ± 0.1 %, *Betula pendula* + *Carpinus betulus* ± 0.1 %

3I5: *Fagus sylvatica* 30 - 60 %, *Quercus petraea* agg. 20 - 40 %, *Abies alba* 0 - 10 %, *Pinus sylvestris* 0 - 10 %, *Tilia cordata* ± 10 %, *Betula pendula* ± 10 %

Absolute height yield class: *Picea abies* (18) 22 - 26 (30) m, *Pinus sylvestris* (18) 22 - 26 (28) m, *Fagus sylvatica* (18) 22 - 26 (28) m, *Quercus petraea* agg. (18) 22 - 24 (26) m.

Hazards: low desiccation and brush hazard; high soil degradation hazard.

#### **4<sup>th</sup> forest vegetation zone 4I - *Fagetum illimerosum acidophilum***

Occurrence: plateaus and gentle slopes in uplands and highlands; different substrates with loamy capping.

Soils: deep, compacted; dominantly Albic Luvisols often slightly Stagnic (gleyed) and transitional to Stagnic Glossisols; Luvic Cambisols are frequent, Cambic Vertisols are rare, both are slightly Stagnic (=gleyed) and oligotrophic.

Significant often dominant or indicator species:

<i>Leucobryum glaucum</i>	<i>Vaccinium myrtillus</i>
<i>Luzula luzuloides</i>	( <i>Carex pilulifera</i> )
<i>Luzula pilosa</i>	( <i>Galium rotundifolium</i> )
<i>Melampyrum pratense</i>	( <i>Maianthemum bifolium</i> )
<i>Oxalis acetosella</i>	( <i>Melampyrum sylvaticum</i> )

Forest site types:

- (1) *Luzula pilosa*
- (2) *Vaccinium myrtillus*
- (3) Stagnic (*variohumidum*)
- (4) *Melampyrum pratense*, but even *Melampyrum sylvaticum*

Natural tree species composition:

Generally: *Fagus sylvatica* 70 %, *Quercus petraea* agg. 10 %, *Abies alba* 20 %

4I1: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* agg. ± 30 %, *Abies alba* ± 20 %, *Tilia cordata* + *Tilia platyphyllos* ± 10 %, *Pinus sylvestris* ± 0.1 %, *Betula pendula* + *Carpinus betulus* ± 0.1 %

4I2: *Fagus sylvatica* 50 - 80 %, *Quercus petraea* agg. 0 - 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 10 %, *Betula pendula* ± 10 %, *Picea abies* + *Abies alba* + *Pinus sylvestris* ± 10 %

Absolute height yield class: *Picea abies* (20) 22 - 26 (30) m, *Abies alba* 24 m, *Fagus sylvatica* (18) 22 - 24 (26) m, *Larix decidua* 26 - 28 m, *Pinus sylvestris* (18) 22 - 26 (30) m

Hazards: moderate soil degradation (compaction) and windthrow in Norway spruce stands.

#### **5<sup>th</sup> forest vegetation zone 5I - *Abieto-Fagetum illimerosum acidophilum***

Occurrence: at highlands and submontane landscapes on plateaus and long, gentle tall slopes with loamy capping over different soil parent materials.

Soil: deep, compacted, mostly with Stagnic (gleyed) features; predominantly Albic Luvisols (often oligotrophic) with a lower clay content; Luvic Cambisols and Dystric Cambisols are also frequent and can be oligotrophic and slightly Stagnic, they both can transit to Stagni-Dystric Cambisols; slightly Stagnic (gleyed) and Stagnic Glossisols can occur.

Significant often dominant or indicator species:

*Calamagrostis arundinacea*    *Luzula pilosa*  
*Carex pilulifera*                *Maianthemum bifolium*  
*Avenella flexuosa*                *Vaccinium myrtillus*  
*Luzula luzuloides*                (*Carex brizoides*)  
(*Luzula pallescens*)

Forest site types:

- (1) *Luzula pilosa*
- (3) Stagnic with *Carex pilulifera* (*variohumidum*)
- (4) *Vaccinium myrtillus* with a long succession period (light) of *Calamagrostis arundinacea*

Natural tree species composition:

Generally: *Abies alba* 40 %, *Fagus sylvatica* 50 %, *Picea abies* 10 %

5I1 and 5I3: *Fagus sylvatica* 40 - 70 %, *Abies alba* 20 - 40 %, *Picea abies* ± 20 %, *Pinus sylvestris* 0 - 10 %

5I4: bk 5 - 8, lpm+v ±1, bř ±1, dbz 0 - 1, sm, jd, bo ±1

Absolute height yield class: *Picea abies* 22 - 26 (30) m, *Abies alba* 20 - 24 m, *Fagus sylvatica* (20) 22 - 24 (26) m, *Larix decidua* 28 - 30 m, *Pinus sylvestris* 22 - 24 (30) m

Hazards: high windthrow hazard; moderate snowpack and low brush hazards.

**6<sup>th</sup> vegetation zona 6I - *Piceeto-Fagetum illimerosum acidophilum***

Occurrence: at highlands and submontane landscapes on plateaus and long, gentle slopes with loamy capping over different soil parent materials.

Soils: deep, compacted, poorer loamy; predominantly oligotrophic Cambic Podzols, often slightly Stagnic transitional to Stagni-Cambic Podzols (their nutrient-accumulated variety are at toeslopes)

Significant often dominant or indicator species:

*Calamagrostis arundinacea*    *Luzula luzuloides*  
*Calamagrostis villosa*                *Luzula pilosa*  
*Carex pilulifera*                *Maianthemum bifolium*  
*Avenella flexuosa*                *Sphagnum* spp.  
*Homogyne alpina*                *Vaccinium myrtillus*

Forest site types:

- (1) *Luzula pilosa*
- (3) reed grass (*Calamagrostis* sp.)-nutrient-poorer with *Calamagrostis villosa* (in Podkrkonoší highlands)-nutrient-richer with *Calamagrostis arundinacea* (in Beskydy Mts.)
- (4) *Avenella flexuosa* - (in Šumava Mts.)

Natural tree species composition: *Fagus sylvatica* 40 - 70 %, *Picea abies* 20 - 40 %, *Abies alba* 10 - 30 %, *Pinus sylvestris* 0 - 10 %

Absolute height yield class: *Picea abies* (22) 24 - 28 (30) m, *Abies alba* 22 - 26 m, *Fagus sylvatica* 22 - 24 (28) m

Hazards: considerable snowpack, windthrow, and brush (reed grass type only).

**2.3.2.3 *Categoria lapidosa acidophila* (N – category)**

This category is characterized by exposed, base-poor, stony soils, on slopes and ridges, where natural soil development is limited. Soils are moderately deep, well permeable, with a high

content of coarse fragments. The dominant soil types are undeveloped oligotrophic Skeletic Cambisols, eroded oligotrophic Skeletic Cambisols and their transitions to Skeletic Leptosols, resp. They are all prone to erosion; hence, the forest has partly a protection function.

Forest function is in part, wood production; soil conservation may prevail on extreme types. Yield class is standard to slightly under standard. Stands stability is high (trees root in debris). Forest stands prevent erosion.

Natural tree species regeneration is poor, but it is possible to regenerate *Picea abies* from the 4th to 6th forest vegetation zones. The 5 - 10 % inclusion of *Pseudotsuga menziesii* from the 3rd to 5th forest vegetation zones is viable.

### **Forest site type complexes**

#### **1<sup>st</sup> forest vegetation zone 1N - (*Carpineto*-) *Quercetum lapidosum acidophilum***

Occurrence: slight; at warm-aspect slopes a low elevation ridges; on poorer or nutrient deprived parent soil material.

Soil: slightly dry, moderately deep, stony, and permeable; depending on the soil depth, transitions from Cambi-Dystric Leptosols to Skeletic Cambisols dominate; silicate Lithic Leptosols can be present in patches.

Significant often dominant or indicator species:

<i>Anthericum ramosum</i>	<i>Carex montana</i>
<i>Calamagrostis arundinacea</i>	<i>Convallaria majalis</i>
<i>Carex michelii</i> ( <i>filices</i> )	<i>Festuca ovina</i>

Forest site types:

- (2) *Calamagrostis arundinacea* on steep slopes
- (3) *Calamagrostis arundinacea* on ridges
- (4) *Festuca ovina*

Natural tree species composition:

Generally: *Quercus petraea* agg. 80 %, *Carpinus betulus* 10 %, *Betula pendula* (*Tilia cordata*) 10 %, *Pinus sylvestris* 0.5 %

1N2 and 1N3: *Quercus petraea* agg. 50 - 80 %, *Fagus sylvatica* 0 - 30 %, *Pinus sylvestris* ± 20 %, *Carpinus betulus* 0 - 10 %, *Tilia cordata* ± 10 %, *Betula pendula* ± 10 %

Absolute height yield class: *Pinus sylvestris* (18) 20 - 24 m, *Quercus petraea* agg. (16) 20 - 22 m, *Carpinus betulus* 14 - 16 (18) m

Hazards: predominantly desiccation in permeable, warm-aspect soil, and erosion.

#### **2<sup>nd</sup> forest vegetation zone 2N - *Fageto-Quercetum lapidosum acidophilum***

Occurrence: stony slopes and ridges in submontane landscapes; warm-aspect slopes in higher elevations, base-poorer soil parent materials.

Soil: moderately deep, slightly dry, and permeable; depending on the soil depth, transitions from Cambi-Dystric Leptosols to Skeletic Cambisols dominate; silicate Lithic Leptosols can be present in patches.

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	( <i>Galium rotundifolium</i> )
<i>Luzula luzuloides</i>	( <i>Genista germanica</i> )
<i>Oxalis acetosella</i>	( <i>Luzula pilosa</i> )
<i>Vaccinium myrtillus</i>	( <i>Mycelis muralis</i> )

(*Campanula persicifolia*)      (*Vaccinium myrtillus*)  
(*Avenella flexuosa*)          (*Veronica officinalis*)

Forest site types:

- (1) *Calamagrostis arundinacea*
- (2) *Vaccinium myrtillus* - nutrient-poorer
- (3) *Oxalis acetosella* - nutrient-richer transition to *Querceto-Fagetum lapidosum acidophilum* (3N)

Natural tree species composition:

Generally: *Quercus petraea* agg. 70 %, *Fagus sylvatica* 30 %, *Tilia cordata* 0.5 %, *Betula pendula* 0.5 %, *Pinus sylvestris* 0.5 %

In dependence on site condotions: *Quercus petraea* agg. 50 - 80 %, *Fagus sylvatica* 0 - 30 %, *Pinus sylvestris* ± 20 %, *Carpinus betulus* 0 - 10 %, *Tilia cordata* ± 10 %, *Betula pendula* ± 10 %

Absolute height yield class: *Pinus sylvestris* 18 - 22 (24) m, *Quercus petraea* agg. (16) 18 - 22 (24) m, *Fagus sylvatica* (16) 20 - (20) 24 m, *Carpinus betulus* 16 - 18 m

Hazards: slight desiccation; high erosion.

**3<sup>rd</sup> forest vegetation zone 3N - *Querceto-Fagetum lapidosum acidophilum***

Occurence: stony to rocky slopes, warm-aspect slopes in higher elevations, deep ravines at lower altitudes (uplands); variable, base-poor soil parent materials.

Soil: moderately deep, permeable, slightly dry to fresh moist (moisture is in detritus); dominantly eroded and oligotrophic Skeletic Cambisols; ocassionally Dystric Cambisols, sometimes eroded; under coniferous stands podzolized Cambi-Dystric Leptosols; silicate Lithic Leptosols can be present in patches.

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Luzula luzuloides</i>
<i>Carex digitata</i>	<i>Oxalis acetosella</i>
<i>Avenella flexuosa</i>	<i>Polytrichum formosum</i>
<i>Dicranum scoparium</i>	<i>Vaccinium myrtillus</i>
<i>Dicranum undulatum</i>	( <i>Mycelis muralis</i> )
<i>Dryopteris dilatata</i>	( <i>Rubus fruticosus</i> agg.)
<i>Dryopteris carthusiana</i>	( <i>Rubus idaeus</i> )
<i>Hieracium murorum</i>	( <i>Veronica officinalis</i> )
<i>Hypnum cupressiforme</i>	

Forest site types:

- (1) *Dryopteris carthusiana* (also *Dryopteris dilatata*)
- (2) *Calamagrostis arundinacea* - mostly on sunny slopes
- (3) *Oxalis acetosella* – nutrient-richer sites
- (4) *Vaccinium myrtillus* - nutrient-poorer sites

Natural tree species composition:

Generally: *Fagus sylvatica* 60 %, *Quercus petraea* agg. 30 %, *Abies alba* 10 %, (*Pinus sylvestris* 0.5 %)

In dependence on site condotions: *Fagus sylvatica* 60 - 70 %, *Quercus petraea* 10 - 30 %, *Abies alba* 10 - 20 %, *Tilia cordata* ±10 %, *Pinus sylvestris* ± 0.1 %, *Betula pendula* + *Acer platanoides* ± 0.1 %

(3N1, 3N2 and 3N3: *Fagus sylvatica* 30 - 70 %, *Quercus petraea* agg. 20 - 40 %, *Pinus sylvestris* ± 20 %, *Abies alba* ± 10 %, *Tilia cordata* ± 10 %, *Betula pendula* ± 10 %, (*Taxus baccata* 0.1 at 3N1 only))

Absolute height yield class: *Pinus sylvestris* (16) 18 - 24 (26) m, *Picea abies* (20) 22 - 24 (28) m, *Fagus sylvatica* (18) 22 - 24 (26) m, *Quercus petraea* agg. (18) 20 - 22 (24) m, *Abies alba* 20 - 22 m

Hazards: high erosion and rot (in Norway spruce stands).

#### **4<sup>th</sup> forest vegetation zone 4N - *Fagetum lapidosum acidophilum***

Occurrence: from uplands to highlands; warm-aspect, stony slopes and ridges, variable soil parent materials.

Soil: moderately deep, fresh moist; frequently oligotrophic, rarely podzolized (mainly under Scotch pine and Norway spruce stands) Dystric Cambisols to Skeletic Cambisols; occasionally Cambi-Dystric Leptosols with rare transitions to Skeletic Podzols.

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Luzula luzuloides</i>
<i>Carex pilulifera</i>	<i>Oxalis acetosella</i>
<i>Avenella flexuosa</i>	<i>Vaccinium myrtillus</i>
<i>Dryopteris carthusiana</i>	<i>Mycelis muralis</i>
<i>Hieracium murorum</i>	( <i>Polytrichum formosum</i> )
<i>Dryopteris dilatata</i>	( <i>Veronica officinalis</i> )

Forest site types:

- (1) *Dryopteris carthusiana* (also *Dryopteris dilatata*)
- (2) *Calamagrostis arundinacea*
- (3) *Oxalis acetosella*
- (4) *Vaccinium myrtillus*

Natural tree species composition:

Generally: *Fagus sylvatica* 70 %, *Quercus petraea* agg. 10 %, *Abies alba* 20 %

4N1 and 4N3: *Fagus sylvatica* 60 - 70 %, *Quercus petraea* agg. 10 - 30 %, *Abies alba* 10 - 20 %, *Tilia cordata* + *Tilia platyphyllos* ± 10 %, *Pinus sylvestris* ± 0.1 %, *Betula pendula* + *Carpinus betulus* ± 0.1 %, (*Taxus baccata* 0.1 % at 4N3 only)

4N2 and 4N4: *Fagus sylvatica* 30 - 70 %, *Quercus petraea* agg. 20 - 40 %, *Pinus sylvestris* ± 20 %, *Abies alba* ± 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 10 %, *Betula pendula* ± 10 %

Absolute height yield class: *Picea abies* (18) 22 - 26 (30) m, *Abies alba* 20 - 22 m, *Fagus sylvatica* (18) 22 - 24 (30) m, *Quercus petraea* agg. 18 (22) - 20 (24) m, *Pinus sylvestris* (16) 20 - (20) 24 m

Hazards: moderate snowpack and high soil erosion.

#### **5<sup>th</sup> forest vegetation zone 5N - *Abieto-Fagetum lapidosum acidophilum***

Occurrence: submontane and montane landscapes; stony to rocky slopes, peaks and stony terraces; different soil parent materials

Soil: moderately deep, permeable, fresh moist; frequently oligotrophic Skeletic Cambisols; infrequently eroded oligotrophic Dystric Cambisols; occasionally Skeletic Podzols occur (especially under coniferous stands); rarely Cambi-Dystric Leptosols.

Significant often dominant or indicator species:

*Calamagrostis arundinacea* *Oxalis acetosella*

<i>Carex pilulifera</i>	<i>Vaccinium myrtillus</i>
<i>Avenella flexuosa</i>	( <i>Gymnocarpium dryopteris</i> )
<i>Dicranum scoparium</i>	( <i>Veronica officinalis</i> )
<i>Dicranum undulatum</i>	( <i>Mycelis muralis</i> )
<i>Dryopteris carthusiana</i>	( <i>Poa nemoralis</i> )
<i>Dryopteris dilatata</i>	( <i>Prenanthes purpurea</i> )
<i>Hieracium murorum</i>	( <i>Rubus fruticosus</i> agg.)
<i>Luzula luzuloides</i>	( <i>Rubus idaeus</i> )

Forest site types:

- (1) *Dryopteris carthusiana* (also *Dryopteris dilatata*)
- (2) *Calamagrostis arundinacea*
- (3) *Oxalis acetosella* - variety along stream and on river stony terraces, with slightly loamy soils
- (4) *Vaccinium myrtillus* - nutrient-poorer
- (6) *Avenella flexuosa* + *Luzula luzuloides* - detritus soils on granodiorite (Jizerské hory Mts.)

Natural tree species composition:

Generally: *Abies alba* 40 %, *Fagus sylvatica* 50 %, *Picea abies* 10 %, *Acer pseudoplatanus* 0.5 %

5N1, 5N2, 5N4 and 5N6: *Fagus sylvatica* 40 - 70 %, *Abies alba* 10 - 40 %, *Picea abies* ± 20 %, *Pinus sylvestris* ± 20 %, *Betula pendula* ± 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 0.1 %, *Acer platanoides* ± 0.1 %, (*Taxus baccata* 0.1 % on 5N3 only and 5N1 resp.)

Absolute height yield class: *Picea abies* (14) 22 - 26 (32) m, *Abies alba* (20) 22 - 24 (30) m, *Fagus sylvatica* (18) 22 - 24 (32) m, *Pinus sylvestris* (18) 22 - 24 (26) m

Hazards: moderate snowpack and brush; high soil erosion hazard; low windthrow wind.

**6<sup>th</sup> forest vegetation zone 6N - *Piceeto-Fagetum lapidosum acidophilum***

Occurrence: hilly and montane landscapes; stony and rocky slopes and ridges.

Soils: shallow to moderately deep, permeable; fresh moist, predominantly oligotrophic, sometimes eroded, Skeli-Cambic Podzols; occasionally podzolized Cambi-Dystric Leptosols are frequent; (mountain) Haplic Podzols and Skeli-Dystric Leptosols are rare; the occurrence of Skeletic Leptosols is exceptional; the occurrence of oligotrophic, podzolized Dystric Cambisols and podzolized Skeletic Cambisols diminish.

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Luzula pilosa</i>
<i>Calamagrostis villosa</i>	<i>Oxalis acetosella</i>
<i>Avenella flexuosa</i>	<i>Pleurozium schreberi</i>
<i>Dicranum scoparium</i>	<i>Polytrichum formosum</i>
<i>Dicranum undulatum</i>	<i>Vaccinium myrtillus</i>
<i>Dryopteris carthusiana</i>	( <i>Festuca altissima</i> )
<i>Dryopteris dilatata</i>	( <i>Galeobdolon montanum</i> )
<i>Hieracium murorum</i>	( <i>Maianthemum bifolium</i> )
<i>Luzula luzuloides</i>	( <i>Senecio nemorensis</i> )
	( <i>Soldanella montana</i> )

Forest site types:

- (1) *Dryopteris carthusiana* (also *Dryopteris dilatata*)
- (2) *Calamagrostis arundinacea*

- (3) *Oxalis acetosella*
- (4) *Vaccinium myrtillus*
- (5) *Avenella flexuosa* (+ *Luzula luzuloides*)

Natural tree species composition:

Generally: *Picea abies* 40 %, *Fagus sylvatica* 40 %, *Abies alba* 20 %, *Acer pseudoplatanus* 0.5 %

6N1, 6N3 and 6N4: *Fagus sylvatica* 30 - 50 %, *Picea abies* 20 - 40 %, *Abies alba* 10 - 30 %, *Pinus sylvestris* ± 10 %, *Betula pendula* ± 10 %, *Acer pseudoplatanus* + *Sorbus aucuparia* 0.5 % (*Taxus baccata* 0.5 % on 6N1 and 6N3)

Absolute height yield class: *Picea abies* (18) 22 - 26 (30) m, *Abies alba* 22 m, *Fagus sylvatica* (16) 22 - 26 (28) m

Hazards: high snowpack and soil erosion; slight to moderate brush and windthrow.

**7<sup>th</sup> forest vegetation zone 7N - *Fageto-Piceetum lapidosum acidophilum***

Occurrence: mountains; stony and rocky slopes and ridges; variable soil parent materials.

Soils: shallow to moderately deep, permeable, fresh moist; frequently Skeli-Cambic Podzols, sometimes eroded, Skeletic Podzols and Skeli-Dystric Leptosols.

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Galium saxatile</i>
<i>Calamagrostis villosa</i>	<i>Gentiana asclepiadea</i>
<i>Avenella flexuosa</i>	<i>Gymnocarpium dryopteris</i>
<i>Dicranum scoparium</i>	<i>Homogyne alpina</i>
<i>Dryopteris dilatata</i>	<i>Oxalis acetosella</i>
	<i>Vaccinium myrtillus</i>

Forest site types:

- (1) *Dryopteris dilatata*
- (2) *Calamagrostis arundinacea*
- (3) *Oxalis acetosella*
- (4) *Vaccinium myrtillus*

Natural tree species composition:

Generally: *Picea abies* 70 %, *Fagus sylvatica* 20 %, *Abies alba* 10 %, *Sorbus aucuparia* 0.5 %

Frequently: *Picea abies* 70 - 80 %, *Fagus sylvatica* 10 - 30 %, *Abies alba* ±10 %, *Sorbus aucuparia* ±0.1 %, *Acer pseudoplatanus* 0.5 %, *Betula pendula* + *Sorbus aucuparia*, 0.5 %, (*Taxus baccata* - on 7N3). Natural tree species regeneration is pure

Absolute height yield class: *Picea abies* (18) 22 - 24 (30) m, *Fagus sylvatica* (16) 18 - 22 m

Hazards: high windthrow, ice, and soil erosion; moderate brush.

**8th forest vegetation zone 8N - *Piceetum lapidosum acidophilum***

Occurrence: rare in montane area (all types of the 8th forest vegetation zone are more stony sites).

Soils: moderately deep, permeable, fresh moist; predominantly Skeletic Podzols (often eroded), they are transitional in patches to Histi-Haplic Podzols; Skeli-Dystric Leptosols are frequent; Skeli-Dystric Regosols can already occur; Cambi-Dystric Leptosols are very rare.

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Homogyne alpina</i>
<i>Calamagrostis villosa</i>	<i>Maianthemum bifolium</i>
<i>Avenella flexuosa</i>	<i>Plagiomnium undulatum</i>
<i>Dicranum scoparium</i>	<i>Polytrichum formosum</i>
<i>Dryopteris carthusiana</i>	<i>Sphagnum</i> spp.
<i>Dryopteris dilatata</i>	<i>Trientalis europaea</i>
<i>Vaccinium myrtillus</i>	

Forest site types:

- (1) *Dryopteris carthusiana* (also *Dryopteris dilatata*)
- (2) *Calamagrostis villosa*
- (3) *Vaccinium myrtillus*
- (4) mossy (musci: *Polytrichum formosum*, *Plagiomnium undulatum*, *Sphagnum* spp.)
- (5) *Oxalis acetosella*

Natural tree species composition:

Generally: *Picea abies* 100 %, *Sorbus aucuparia* + *Fagus sylvatica* + *Acer pseudoplatanus* 0.5 %

Frequently: *Picea abies* 90 - 100 %, *Abies alba* ± 0.1 %, *Fagus sylvatica* ± 0.1 %, *Acer pseudoplatanus* ± 10 %, *Sorbus aucuparia* ± 10 %; Natural tree species regeneration is very pure.

Absolute height yield class: *Picea abies* 18 - 22 (24) m

Hazards: high snowpack, ice, moisture excess, and soil erosion; moderate to high brush (on *Calamagrostis villosa* sites); windthrow, and frost on ridges.

**Azonal 0N - *Piceeto-Pinetum (lapidosum acidophilum)*, resp. (*Fagi-*) *Pineto-Piceetum (lapidosum acidophilum)***

This is the upper montane variety of (*Querceto-Fagi-*)*Pinetum acidophilum* (0K) at sites where sandy soils determine the natural range of *Pinus sylvestris* and mesoclimate of *Picea abies*.

Occurrence: slopes and valleys; generally on sandstones, extraordinarily on serpentine (Slavkovský les highland).

Soil: sandy, permeable, fresh moist; predominantly oligotrophic Dystric Cambisols; Arenic Podzols are frequent and they can be transitional in patches to Histi-Haplic Podzols due to climatic and terrain conditions; Skeli-Lithic Leptosols to Lithic Leptosols occur in patches, when terrain is stony; Podzolic Cambisols, Skeletic Cambisols, Cambic Arenosols and Dystric Arenosols are rare.

Significant often dominant or indicator species:

<i>Atrichum undulatum</i>	<i>Luzula luzuloides</i>
<i>Calamagrostis arundinacea</i>	<i>Molinia arundinacea</i>
<i>Calamagrostis villosa</i>	<i>Pleurozium schreberi</i>
<i>Calluna vulgaris</i>	<i>Polytrichum formosum</i>
<i>Avenella flexuosa</i>	<i>Sphagnum</i> spp.
<i>Dicranum scoparium</i>	<i>Trientalis europaea</i>
<i>Dryopteris carthusiana</i>	<i>Vaccinium myrtillus</i>
<i>Dryopteris dilatata</i>	<i>Vaccinium vitis-idaea</i>
<i>Hieracium murorum</i>	( <i>Erica herbacea</i> )

Forest site types:



- (1) steep slopes - *Vaccinium myrtillus*, resp. *Sphagnum* spp.
- (2) valley (inversion) - *Vaccinium myrtillus*
- (3) valley - *Avenella flexuosa*
- (4) valley - *Dryopteris carthusiana* (also *Dryopteris dilatata*)
- (5) serpentine (*serpentinicum*)
- (6) (Fagi-)Pineto-Piceetum inversum - *Vaccinium myrtillus*
- (7) (Fagi-)Pineto-Piceetum inversum - *Avenella flexuosa*
- (8) (Fagi-)Pineto-Piceetum inversum - *Calamagrostis villosa*
- (9) (Fagi-)Pineto-Piceetum inversum - *Dryopteris carthusiana*

#### Natural tree species composition:

Generally: *Pinus sylvestris* 50%, *Picea abies* 40 %, *Betula pendula* 10 %, *Fagus sylvatica* 0.5 %

ON1, ON2 and ON4: *Pinus sylvestris* 20 - 80 %, *Picea abies* 20 - 80 %, *Fagus sylvatica* ± 30 %, *Betula pendula* ± 10 %

ON6 - ON9: *Picea abies* 0 - 70 %, *Pinus sylvestris* 20 - 100 %, *Fagus sylvatica* 0 - 20 %, *Abies alba* ± 0.1 %, *Quercus petraea* agg. ± 0.1 %, *Betula pendula* ± 10 %

ON5: *Pinus sylvestris* 60 %, *Picea abies* 30 %, *Betula pendula* 10 %, *Fagus sylvatica* ± 0.1 %

Absolute height yield class: *Pinus sylvestris* (14) 18 - 22 (24) m, *Picea abies* (16) 22 - 24 (26) m.

Hazards: high nutrient degradation and soil erosion.

#### **2.3.2.4 Categoria oligotrophica (M – category)**

Category covers poorest sites, mostly on nutrient poor soil parent materials (sandstones, granites, phyllite, mica schists etc). Soils are mostly shallow and moderately deep, permeable, and they need melioration for natural tree species regeneration. Production is lower of standard, with an exception of several forest site types of *Pineto-Querceta oligotrophica*.

Arenic Podzols on sandstones are the most dominant soil type. They are often with ortstein. Haplic Podzols and Dystric Cambisols are frequent. Mountain Haplic Podzols are characteristic for mountain sites. Morr or morr-moder is humus forms. *Pineto-Quercetum oligotrophicum* (1M) has a separate position by its higher yield class of *Pinus sylvestris* and by its better soil conditions.

Forest function is commercial and tree yield class is bellow standard. Stands have infiltration ecological effect. *Pinus sylvestris* natural regeneration is good for (*Querceto-*)*Pinetum oligotrophicum* (0M) and *Pineto-Quercetum oligotrophicum* (1M), and it is worse for the ranks from *Fageto-Quercetum oligotrophicum* (2M) to *Abieto-Fagetum oligotrophicum* (5M). *Picea abies* natural regeneration is worse in higher altitudes. Suitable tree provenience (especially at *Pineto-Quercetum oligotrophicum* (1M)) and additional fertilizing (impoverished stages especially) are necessary for successful silviculture management.

#### **Forest site type complexes**

##### **1<sup>st</sup> forest vegetation zone 1M - *Pineto-Quercetum oligotrophicum (arenosum)***

Occurence: warmest lowlands (Polabí lowland and Dolnomoravský basin); undulating plateaus with a thick layer of pleistocen and holocen sands and gravel-sands.

Soil: loose, uncohesive, permeable, desiccated; dominantly oligotrophic podzoled Cambic Arenosols, frequently Dystric Cambisols; they both often transit to Arenic Podzols; Dystric Arenosols can occur on sand dunes.

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Vaccinium vitis-idaea</i>
<i>Calluna vulgaris</i>	( <i>Anthericum ramosum</i> )
<i>Corynephorus canescens</i>	
<i>Avenella flexuosa</i>	( <i>Calamagrostis epigeios</i> )
<i>Dicranum scoparium</i>	( <i>Carex pilulifera</i> )
<i>Dicranum undulatum</i>	( <i>Cladonia</i> spp.)
<i>Festuca ovina</i>	( <i>Hieracium pilosella</i> )
<i>Hylocomium splendens</i>	( <i>Chamaebuxus alpestris</i> )
<i>Leucobryum glaucum</i>	( <i>Plagiomnium affine</i> )
<i>Pleurozium schreberi</i>	( <i>Poa nemoralis</i> )
<i>Thymus serpyllum</i>	( <i>Pseudoscleropodium purum</i> )
<i>Vaccinium myrtillus</i>	( <i>Sieglingia decumbens</i> )

Forest site types:

- (1) *Festuca ovina* - and its degradation stages with *Calluna vulgaris*
- (2) *Avenella flexuosa*
- (3) *Vaccinium myrtillus*
- (4) *Calamagrostis arundinacea*, resp. *Calamagrostis epigeios* - towards to mesotrophic soils
- (6) *Corynephorus canescens* - on sand dunes
- (7) *Vaccinium vitis-idaea* - strong site degradation (more typical for (*Querceto-*)*Pinetum oligotrophicum* (0M))
- (8) mossy (*musci* + *lichenes*)

Natural tree species composition: *Quercus petraea* agg. 60 - 100 %, *Pinus sylvestris* 0 - 30 %, *Betula pendula* 10 %, *Sorbus aucuparia* + *Carpinus betulus* ± 0.1 %

Absolute height yield class: *Pinus sylvestris* (14) 18 - 22 (26) m, *Quercus petraea* agg. (12) 18 - 20 (22) m, *Picea abies* 24 m

Hazards: predominantly by desiccation; soils are responsible to nutrient degradation and blown sands movement.

**2<sup>nd</sup> forest vegetation zone 2M - *Fageto-Quercetum oligotrophicum***

Location: lowlands and uplands (+ warm-slopes of higher uplands).

Soil: moderately deep, desiccated, predominantly sandy (sometimes gravely), permeably; dominantly Dystric Cambisols, frequently Cambic Arenosols podzoled; occasionally Haplic Podzols and Arenic Podzols.

Significant often dominant or indicator species:

<i>Calluna vulgaris</i>	<i>Pleurozium schreberi</i>
<i>Cetraria</i> spp.	<i>Pohlia nutans</i>
<i>Cladonia</i> spp.	<i>Polytrichum formosum</i>
<i>Avenella flexuosa</i>	<i>Vaccinium myrtillus</i>
<i>Dicranum scoparium</i>	<i>Vaccinium vitis-idaea</i>
<i>Festuca ovina</i>	( <i>Carex pilulifera</i> )
<i>Hypnum cupressiforme</i>	( <i>Genista germanica</i> )
<i>Leucobryum glaucum</i>	( <i>Luzula luzuloides</i> )

Forest site types:

- (1) mossy (*musci*) - very often with lichens
- (2) *Vaccinium vitis-idaea*

(3) *Vaccinium myrtillus*

(9) steep slopes - dominantly with grasses and *Vaccinium myrtillus*

Lichens and *Leucobryum glaucum* are on all nutrient-degraded types.

Natural tree species composition:

Generally: *Quercus petraea* 70 %, *Fagus sylvatica* 20 %, *Betula pendula* 10 %, *Pinus sylvestris* 0.5 %

2M1, 2M2 and 2M3: *Quercus petraea* agg. 50 - 70 %, *Fagus sylvatica* 0 - 30 %, *Carpinus betulus* 0 - 10 %, *Pinus sylvestris* ± 0.1 %, *Tilia cordata* ± 20 %, *Betula pendula* ± 10 %

2M9: *Quercus petraea* agg. 50 - 80 %, *Fagus sylvatica* 0 - 30 %, *Pinus sylvestris* ± 20 %, *Carpinus betulus* 0 - 10 %, *Tilia cordata* ± 10 %, *Betula pendula* ± 10 %

Absolute height yield class: *Pinus sylvestris* 14 - 18 (20) m, *Quercus petraea* agg. 14 - 18 (20) m, *Fagus sylvatica* 14 - 18 m, *Picea abies* 20 - 22 m

Hazards: soils are responsible to desiccation and often incline to nutrient degradation.

**3<sup>rd</sup> forest vegetation zone 3M - *Querceto-Fagetum oligotrophicum***

Location: uplands; plateaus and slopes (dominantly sunny).

Soil: rather desiccated, moderately deep, permeably, undeveloped sometimes; predominantly Dystric Cambisols oligotrophic podzoled and Haplic Podzols; Arenic Podzols are on sandstones.

Significant often dominant or indicator species:

<i>Calluna vulgaris</i>	<i>Leucobryum glaucum</i>
<i>Carex pilulifera</i>	<i>Pleurozium schreberi</i>
<i>Cetraria</i> spp.	<i>Pohlia nutans</i>
<i>Cladonia</i> spp.	<i>Polytrichum formosum</i>
<i>Avenella flexuosa</i>	<i>Pteridium aquilinum</i>
<i>Dicranella heteromalla</i>	<i>Vaccinium myrtillus</i>
<i>Dicranum scoparium</i>	<i>Vaccinium vitis-idaea</i>

Forest site types:

(1) mossy (*musci* + *lichenes*)

(2) *Vaccinium vitis-idaea*

(3) *Vaccinium myrtillus*

(4) *Pteridium aquilinum* - slightly Stagnic soils (transition to *Abieto-Quercetum variohumidum oligotrophicum* (3Q))

(9) steep slopes

Natural tree species composition:

Generally: *Fagus sylvatica* 50 %, *Quercus petraea* agg. 40 %, *Betula pendula* 10 %, *Pinus sylvestris* 0.5 %

3M1, 3M2, 3M3 and 3M4: *Fagus sylvatica* 20 - 40 %, *Quercus petraea* agg. 20 - 40 %, *Abies alba* 0 - 10 %, *Pinus sylvestris* 0 - 10 %, *Tilia cordata* ± 10 %, *Betula pendula* ± 10 %

3M9: *Fagus sylvatica* 30 - 70 %, *Quercus petraea* agg. 20 - 40 %, *Abies alba* ± 10 %, *Pinus sylvestris* ± 20 %, *Tilia cordata* ± 10 %, *Betula pendula* ± 10 %

Absolute height yield class: *Pinus sylvestris* (12) 16 - 20 (22) m, *Fagus sylvatica* (14) 16 - 20 (24) m, *Quercus petraea* agg. 14 - 16 (18) m, *Betula pendula* 14 - 18 m, *Picea abies* (14) 18 - 22 m

Hazards: soils are responsible to desiccation and to nutrient degradation.

#### **4<sup>th</sup> forest vegetation zone 4M - *Fagetum oligotrophicum***

Location: higher uplands and highlands on nutrient-poorest bases; lower mountain elevations at sunny slopes on different (but dominantly nutrient-poorer) bases.

Soil: moderately deep, mostly slightly desiccated; predominantly Dystric Cambisols oligotrophic podzoled and Haplic Podzols; Arenic Podzols are on sandstones, Stagni-Haplic Podzols kaolinic are on kaolined granite and gravel-sand.

##### Significant often dominant or indicator species:

<i>Calluna vulgaris</i>	<i>Pleurozium schreberi</i>
<i>Carex pilulifera</i>	<i>Pohlia nutans</i>
<i>Cetraria</i> spp.	<i>Polytrichum formosum</i>
<i>Cladonia</i> spp.	<i>Vaccinium myrtillus</i>
<i>Avenella flexuosa</i>	<i>Vaccinium vitis-idaea</i>
<i>Dicranella heteromalla</i>	( <i>Genista germanica</i> )
<i>Dicranum scoparium</i>	( <i>Genista pilosa</i> )
<i>Leucobryum glaucum</i>	( <i>Genista tinctoria</i> )
( <i>Lembotropis nigricans</i> )	

Forest site types:

- (1) mossy (*musci*)
- (2) *Vaccinium vitis-idaea*
- (3) *Vaccinium myrtillus*
- (4) on kaolinic Podzols (*caolinicum*)
- (9) steep slopes

Lichens and *Leucobryum glaucum* are on all nutrient-degraded types.

##### Natural tree species composition:

Generally: *Fagus sylvatica* 60 %, *Quercus petraea* agg. 20 %, *Abies alba* 10 %, *Petula pendula* 10 %, *Sorbus aucuparia* 0.5 %

4M1, 4M2 and 4M3: *Fagus sylvatica* 30 - 60 %, *Quercus petraea* agg. 20 - 40 %, *Abies alba* 0 - 10 %, *Pinus sylvestris* 0 - 10 %, *Tilia cordata* + *Tilia platyphyllos* ±10 %, *Betula pendula* ±10 %

4M4: *Fagus sylvatica* 60 %, *Quercus petraea* 20 %, *Abies alba* 10 %, *Betula pendula* 10 %, *Sorbus aucuparia* 0.5 %, *Pinus sylvestris* 0.5 %

4M9: *Fagus sylvatica* 30 - 70 %, *Quercus petraea* 20 - 40 %, *Abies alba* ± 10 %, *Pinus sylvestris* ± 20 %, *Tilia cordata* + *Tilia platyphyllos* ± 10 %, *Betula pendula* ± 10 %

Absolute height yield class: *Pinus sylvestris* 16 - 18 (20) m, *Fagus sylvatica* (16) 18 - 20 (24) m, *Picea abies* (14) 20 - 24 (26) m, *Quercus petraea* agg. 12 - 18 m

Hazards: soils are responsible to desiccation on warm-slopes and they incline to nutrient-degradation.

#### **5<sup>th</sup> forest vegetation zone 5M - *Abieto-Fagetum oligotrophicum***

Location: highlands and lower mountain elevations on different oriented slopes; ridges and sandstone plateaus; sandstone valleys;

Soil: moderately deep, loamy-sandy, slightly stony; Dystric Cambisols oligotrophic and podzoled and Skeli-Dystric Cambisols (always oligotrophic) are on more gravelly bases; Cambic Podzols are on nutrient richer-bases, Arenic Podzols sometimes with ortstein use to be on sandstones.

##### Significant often dominant or indicator species:

<i>Atrichum undulatum</i>	<i>Hieracium murorum</i>
<i>Calluna vulgaris</i>	<i>Leucobryum glaucum</i>
<i>Carex pilulifera</i>	<i>Luzula luzuloides</i>
<i>Cetraria</i> spp.	<i>Melampyrum pratense</i>
<i>Cladonia</i> spp.	<i>Pleurozium schreberi</i>
<i>Avenella flexuosa</i>	<i>Polytrichum formosum</i>
<i>Dicranella heteromalla</i>	<i>Polytrichum juniperinum</i>
<i>Dicranum scoparium</i>	<i>Pteridium aquilinum</i>
<i>Dicranum undulatum</i>	<i>Vaccinium myrtillus</i>
<i>Vaccinium vitis-idaea</i>	

Forest site types:

- (1) mossy (*musci*)
- (2) *Vaccinium vitis-idaea*
- (3) *Vaccinium myrtillus*
- (5) *Pteridium aquilinum*
- (9) steep slopes

Nutrient-degraded stages are with *Vaccinium vitis-idaea* (with exception of 5M2), *Calluna vulgaris* and lichens (*Cladonia* spp. and *Cetraria* spp.).

Natural tree species composition:

Generally: *Fagus sylvatica* 65 %, *Abies alba* 15 %, *Betula pendula* 10 %, *Pinus sylvestris* + *Picea abies* 10 %, (with Scotch pine wood ecotype)

5M1, 5M2 and 5M3: *Fagus sylvatica* 50 - 80 %, *Quercus petraea* 0 - 10 %, *Picea abies* + *Abies alba* + *Pinus sylvestris* ± 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 10 %, *Betula pendula* ± 10 %

5M9: *Fagus sylvatica* 40 - 70 %, *Abies alba* 10 - 40 %, *Pinus sylvestris* ± 20 %, *Picea abies* ± 20 %, *Betula pendula* ± 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 0.1 %, *Acer platanoides* ± 0.1 %

Absolute height yield class: *Pinus sylvestris* (14) 18 - 22 m, *Fagus sylvatica* (14) 18 - 22 (24) m, *Picea abies* (14) 18 - 22 (26) m, *Abies alba* 18 - 22 m

Hazards: slightly by snowpack (hoarfrost); soils incline to nutrient degradation.

### **6<sup>th</sup> forest vegetation zone 6M - *Piceeto-Fagetum oligotrophicum***

Location: highlands and lower mountain elevations; plateaus, ridges and slopes; nutrient-poor bases.

Soil: moderately deep, sandy and loamy-sandy, even often stony; predominantly (mountain) Haplic Podzols, frequently oligotrophic Cambic Podzols; both types are eroded on slopes.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	<i>Pleurozium schreberi</i>
<i>Cladonia</i> spp.	<i>Polytrichum formosum</i>
<i>Avenella flexuosa</i>	<i>Vaccinium myrtillus</i>
<i>Dicranella heteromalla</i>	<i>Vaccinium vitis idaea</i>
<i>Dicranum scoparium</i>	( <i>Carex pilulifera</i> )
<i>Leucobryum glaucum</i>	( <i>Pteridium aquilinum</i> )
( <i>Sphagnum</i> spp.)	

Forest site types:

- (1) mossy (*musci*)

- (2) *Vaccinium vitis-idaea* (*Pinus sylvestris*, resp. - Jeseníky Mts., Brdy highlands, Lužická vrchovina highlands and Krušné hory Mts.)  
 (3) *Vaccinium myrtillus*  
 (4) *Calamagrostis villosa*  
 (9) steep slopes

Natural tree species composition:

Generally: *Picea abies* 40 %, *Fagus sylvatica* 40 %, *Abies alba* 10 %, *Betula pendula* 10 %, *Sorbus aucuparia* 0.5 %

6M1, 6M2, 6M3 and 6M4: *Fagus sylvatica* 40 - 70 %, *Picea abies* 20 - 40 %, *Abies alba* 10 - 30 %, *Pinus sylvestris* 0 - 10 %

6M9: *Fagus sylvatica* 30 - 50 %, *Picea abies* 20 - 40 %, *Abies alba* 10 - 30 %, *Pinus sylvestris* ± 10 %, *Betula pendula* ± 10 %, *Acer pseudoplatanus* + *Sorbus aucuparia* 0.5 %

Absolute height yield class: *Picea abies* (16) 18 - 22 (24) m, *Pinus sylvestris* (16) 18 - 20 (22) m, *Fagus sylvatica* (16) 18 - 22 m

Hazards: considerably by snowpack (hoarfrost) (it is necessary pay attention to *Pinus sylvestris* mountain ecotype for silviculture); less by windthrow (*Picea abies* falls) and brush density (*Calamagrostis villosa* type especially); soils incline to nutrient degradation.

**7<sup>th</sup> forest vegetation zone 7M - *Fageto-Piceetum oligotrophicum***

Location: rare at *Hercynicum* mountains; slopes, peaks and plateaus; different nutrient poor bases.

Soil: slightly to fresh humid, moderately deep, often stony; dominantly (mountain) Haplic Podzols with transitions to Histi-Haplic Podzols; frequently oligotrophic Cambic Podzols; erosion-degraded types could be on slopes.

Significant often dominant or indicator species:

<i>Bazzania trilobata</i>	<i>Melampyrum sylvaticum</i>
<i>Calamagrostis villosa</i>	<i>Pleurozium schreberi</i>
<i>Calluna vulgaris</i>	<i>Polytrichum commune</i>
<i>Cetraria</i> spp.	<i>Polytrichum formosum</i>
<i>Cladonia</i> spp.	<i>Polytrichum juniperinum</i>
<i>Avenella flexuosa</i>	<i>Trientalis europaea</i>
<i>Dicranella heteromalla</i>	<i>Vaccinium myrtillus</i>
<i>Dicranum scoparium</i>	<i>Vaccinium vitis-idaea</i>
<i>Dicranum undulatum</i>	( <i>Molinia coerulea</i> )
<i>Galium saxatile</i>	( <i>Sphagnum</i> spp.)
<i>Leucobryum glaucum</i>	( <i>Vaccinium uliginosum</i> )

Forest site types:

- (1) mossy (*musci*)  
 (3) *Vaccinium myrtillus*  
 (9) steep slopes

Degraded stages are with *Leucobryum glaucum*, *Calluna vulgaris* and sometimes *Vaccinium vitis-idaea* „plantations“ are made; succession stage with *Calamagrostis villosa* dominates after open the canopy (*Calamagrostis arundinacea* at Moravskoslezské Beskydy Mts.).

Natural tree species composition:

Generally: *Picea abies* 70 %, *Fagus sylvatica* 20 %, *Abies alba* (*Betula pendula*, *Sorbus aucuparia*) 10 %

In dependence on site conditions: *Picea abies* 70 - 80 %, *Fagus sylvatica* 10 - 30 %, *Abies alba* ± 10 %, *Pinus sylvestris* ± 0.1 %, *Betula pendula* + *Sorbus aucuparia* 0.5 %

7M9: *Picea abies* 70 - 80 %, *Abies alba* ± 10 %, *Pinus sylvestris* ± 0.1 %, *Fagus sylvatica* 10 - 30 %, *Acer pseudoplatanus* 0.5 %, *Betula pendula* + *Sorbus aucuparia* 0.5 %

Absolute height yield class: *Picea abies* (16) 18 - 22 (24) m, *Fagus sylvatica* 18 - 22 m

Hazards: considerably by snowpack (hoarfrost), moderately by brush canopy (especially *Calamagrostis villosa*, resp. *Calamagrostis arundinacea*).

### **8<sup>th</sup> forest vegetation zone 8M - *Piceetum oligotrophicum***

Location: rare at mountains (Krušné hory, Jeseníky and Krkonoše Mts.).

Soil: moderately deep, frequently stony and with raw humus turning to peatbog; predominantly (mountain) Haplic Podzols eroded on slopes; Histi-Haplic Podzols are locally; Skeli-Dystric Leptosols can occur patchy.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	<i>Polytrichum commune</i>
<i>Avenella flexuosa</i>	<i>Polytrichum formosum</i>
<i>Dryopteris dilatata</i>	<i>Sphagnum</i> spp.
<i>Homogyne alpina</i>	<i>Trientalis europaea</i>
<i>Lophozia</i> spp.	<i>Vaccinium myrtillus</i>
<i>Plagiothecium</i> spp.	<i>Vaccinium vitis-idaea</i>

Forest site types:

(1) mossy - with *Sphagnum* spp. on more humid sites (transitions to *Piceetum variohumidum acidophilum* (8P))

(3) *Vaccinium myrtillus*

(9) steep slopes

Almost *Calamagrostis villosa* monocoenoses are made after open the canopy.

Natural tree species composition:

Generally: *Picea abies* 90 %, *Sorbus aucuparia* 10 %

In dependence on site conditions: *Picea abies* 90 - 100 %, *Abies alba* ± 0.1 %, *Fagus sylvatica* ± 0.1 %, *Acer pseudoplatanus* ± 10 %, *Sorbus aucuparia* ± 10 %

Absolute height yield class: *Picea abies* (14) 18 - 20 (24) m

Hazards: strongly by snowpack (hoarfrost), moderately by windthrow and brush hazards.

### **Azonal 0M - (*Querceto-*) *Pinetum oligotrophicum***

Location: nutrient poor sandy soils (sandstone, granite, conglomerate) up to 550 - 600 m

Soil: sandy sometimes gravely, permeable, desiccated, strongly acid; predominantly Arenic Podzols with ortstein sometimes; frequently Haplic Podzols; Dystric Arenosols are on sand dunes frequently; patchy Stagni-Haplic Podzols kaolinic.

Significant often dominant or indicator species:

<i>Antennaria dioica</i>	<i>Leucobryum glaucum</i>
<i>Calluna vulgaris</i>	<i>Pleurozium schreberi</i>
<i>Cetraria</i> spp.	<i>Sedum acre</i>
<i>Cladonia</i> spp.	<i>Thymus serpyllum</i>
<i>Corynephorus canescens</i>	<i>Vaccinium myrtillus</i>
<i>Avenella flexuosa</i>	<i>Vaccinium vitis idaea</i>
<i>Dicranum scoparium</i>	( <i>Erica herbacea</i> )

*Dicranum undulatum*                    (*Hypericum perforatum*)  
*Festuca ovina*                            (*Rumex acetosa*)  
(*Viola tricolor*)

#### Forest site types:

- (1) *Calluna vulgaris* - stony soils of sandstones
- (2) *Vaccinium vitis idaea*
- (3) *Vaccinium myrtillus* - frequent; special area variety with *Erica herbacea*
- (5) lichens (*lichenes*) - grossly desiccated
- (6) *Corynephorus canescens* - sand dunes

„Dune“ type transits to *Pineto-Quercetum oligotrophicum (arenosum)* (1M), when *Pteridium aquilinum* occurs. *Vaccinium myrtillus* types with admixtures of *Oxycoccus palustris* and *Empetrum hermaphroditum* transit to *Pinetum quercino-abietinum variohumidum oligotrophicum* (0Q) in more humid sites.

#### Natural tree species composition:

Generally: *Pinus sylvestris* 80 %, *Quercus petraea* agg. 10 %, *Betula pendula* 10 %

0M1, 0M2 and 0M5: *Pinus sylvestris* 90 - 100 %, *Betula pendula* ±10 %

0M6: *Betula pendula* 80 - 90 %, *Quercus petraea* agg. ± 20 %, *Fagus sylvatica* 0 - 10 %, *Betula pendula* ± 10 %, *Picea abies* ± 0.1 %

Absolute height yield class: *Pinus sylvestris* (12) 14 - 18 (20) m, *Quercus petraea* agg. 12 - 14 m, *Betula pendula* 12 - 16 m, *Picea abies* (10) 14 - (14) 16 m

Hazards: strongly by desiccation and soil nutrient degradation.

### **2.3.3 Extreme series (Z) – series extremum**

Extreme (stunted) series covers forest stands on extreme sites. This extreme conditions - exposed sites (ridges, peaks, steep slopes), undeveloped soil (shallow „rocky soils“) and climatic (warm) conditions - result to stands stunted tree growth and natural open the canopy. Phytocoenologically clear-determined communities are made at climatic extreme forest vegetation zones - oak, spruce and dwarf pine. „Stunted“ site types complexes are extreme site of acid and partly nutrient-rich bases. Xerotherm communities on calcite and basic bases take special position of this series.

**1<sup>st</sup> forest vegetation zone** *Corneto-Querceta* (bunchberry-oak forests) connect communities of rocky and sward forest steppe and „own“ *Corneto-Querceta* (with *Quercus pubescens*), with these less exposed and on more developed soils (with *Carpinus betulus*, *Acer campestre* and *Acer platanoides*). They cover sparsely small sites at warmest and driest areas on nutrient-rich soil materials (loess, limestone, basalt etc.). Rocky forest steppe communities are out of *Quercus pubescens* natural area too. They occur extrazonally in exposed sites around rivers, mostly on more basic soil materials with thermophilous plant species.

„Own“ *Corneto-Querceta* are on loess bases in very rare residues (since all other loess area is agricultural land historically); they survive more on stony limestone Rendzinas or eruptive rock Leptosols. On deep soils, extreme terrain relief, who depend increased insolation, mesoclimate temperature extremes and drying wind influence, limits them. Tree layer is built mostly by canopy-opened stand of low and tortuous Sessile oak (*Quercus petraea* agg.) and Pubescent oaks (*Quercus pubescens*), frequently shrubby-grown only. Wild service tree (*Sorbus torminalis*), Whitebeam (*Sorbus aria*), Wild pear (*Pyrus communis*), Field maple (*Acer campestre*), on debris soils than Small-leaved linden (*Tilia cordata*), Pubescent linden (*Tilia tomentosa*), Norway maple (*Acer platanoides*), European ash (*Fraxinus excelsior*) and Smooth elm (*Ulmus minor*) are admixed. Layer of thermophilous shrubs is very abundant.



Mesophilous shrubs are more frequent in less extreme conditions (2nd forest vegetation zone), where European beech (*Fagus sylvatica*) is admixed. *Dictamnus albus*, *Melampyrum cristatum*, *Lathyrus pannonicus*, *Euphorbia polychroma*, *Bupleurum falcatum*, *Asperula tinctoria*, *Inula ensifolia*, *Teucrium chamaedrys*, *Allium flavum*, *Stachys recta* etc. are characteristic for herb layer. Abundance of xerothermous species, as *Brachypodium pinnatum*, *Pseudolysimachion spicatum*, *Trifolium montanum*, *Festuca sulcata*, *Carex humilis*, *Anthericum ramosum*, *Centaurea triumfetti* etc. is significant. Species of subcontinental oak forests are presented too. Species of mesophilous forests are rare.

*Querceta extreme* (extreme oak forests) (1st forest vegetation zone) are verge on poorer form of forest steppe communities at the out of Pubescent oak (*Quercus pubescens*) natural area on slightly basic and acid soil materials. Considerable drought and extreme insolation have resulted to unmixed strongly canopy opened oak stands of dwarf growth.

**2<sup>nd</sup> forest vegetation zone** *Fageto-Querceta extrema* (extreme beech-oak forests), **3<sup>rd</sup> forest vegetation zone** *Querceto-Fageta extrema* (extreme oak-beech forests) and **4<sup>th</sup> forest vegetation zone** *Fageta extrema* (extreme beech forests) are site varieties of acidic series ((K)- series) and water-deficient category (C-category) of nutrient-rich series ((B) series) resp. They have similar phytocoenoses, *Calamagrostis arundinacea* dominancy is more frequent and presence of desiccated soils species at some types.

Beech stands have special position at middle European phytocoenoses and classification systems, which regard to importance of these limestone areas. Less exposed localities at the rank of 3rd to 5th forest vegetation zones with commercial forest are added to nutrient-rich series (W and C categories).

**5<sup>th</sup> forest vegetation zone** *Abieto-Fageta extrema* (extreme fir-beech forests), **6<sup>th</sup> forest vegetation zone** *Piceeto-Fageta extrema* (extreme spruce-beech forests) and **7<sup>th</sup> forest vegetation zone** *Fageto-Piceeta extrema* (extreme beech-spruce forests) are limited by extreme soil conditions, which together with exposed position (ridges with „top phenomena“) limit tree species growth. Forests have then protection function. They are phytocoenologically similar to those of acidic series. Tree species composition is similar too. Admixture of silver birch (*Betula pendula*) and rowan (*Sorbus aucuparia*) enable better natural open canopy increasing.

**8<sup>th</sup> forest vegetation zone** *Sorbeto-Piceeta extrema* (extreme rowan-spruce forests) make continuous Norway spruce (*Picea abies*) zone under timber line or they occupy extreme sites in zone of management Norway spruce (*Picea abies*) stands (acidic mainly). They make transition between canopy closed Norway spruce (*Picea abies*) stands and dwarf pine (*Pinus mugo*) zone. Canopy open of the stand, branchiness, stem gradeness, and tree deformation, transiting to scrub forms of Norway spruce (*Picea abies*) increase with elevation. Rowan (*Sorbus aucuparia*) and Silesian willow (*Salix silesiaca*) are admixed only. Dwarf pine (*Pinus mugo*) penetrates closely timberline.

Composition is similar to *Piceeta acidophila* (acidic spruce forests). Protection function is made by defending of timberline decreasing and by protection of management forest situated in lower elevations. These localities regulate water outflow, since soils are porous with a high absorption.

**9<sup>th</sup> forest vegetation zone** *Mugheta extrema* (extreme dwarf pine forests) make by non-forest communities sub-alpine zone below timberline. They are on steep slopes, ridges, frequently debris and rocky sites. Short vegetation period, extreme climate and often soil conditions eliminate arboreal growth of woody species. Rowan (*Sorbus aucuparia*), Silesian willow (*Salix silesiaca*), dwarf pine (*Pinus mugo*) and individual scrub Norway spruce (*Picea abies*) make discontinuous stands. Understory composition is similar to extreme rowan-spruce forest (*Sorbeto-Piceeta extrema*), than it is difficult to reconstruct natural Dwarf pine area somewhere.

### 2.3.3.1 *Categoria humilis* (Z – category)

This category connects acid and nutrient medium-rich (mesophilous) types of extreme sites. Yield class below standard (scrub grow) and protection function of the forest are typical for this category. Leptosols and Skeletic Cambisols oligotrophic to mesotrophic are the dominant soil types. Haplic Podzols are rare; mountain Haplic Podzols and Skeli-Dystric Leptosols are at 7th and 8th forest vegetation zones frequently. Extremity of these sites is mostly depended on relief, but climate influences and soil condition cooperate. There are strongly exposed slopes, peak and ridge sites with influence of „top phenomena“. Sometimes there are rocky soils in different elevations. Climate extremes influence at the highest and lowest forest vegetation zones.

Basic types of this category are similar to main types of K (*categoria acidophila*) and M (*categoria oligotrophica*) categories by phytocoenoses. Nutrient middle-rich types are on richer basis (basalt, clay slate), e.g. *Poa nemoralis* type at lower forest vegetation zones and „nutrient-rich“ type at higher forest vegetation zones. *Quercetum humile* (1Z) have a separate position. Skeletic types are significant subcategory, they make often patches with more developed types and they differ from Y category (*categoria saxatilis*) by scrub grow of the trees. Stands have anti-erosion function. Natural tree species regeneration is very pure.

### Forest site type complexes

#### 1<sup>st</sup> forest vegetation zone 1Z - *Quercetum humilis*

Occurrence: mosaic; small rocks, broken rock covers and more developed soils; uplands (on clinkstone and basalt up to 600 m).

Soil: strongly desiccated, shallow, stony; predominantly Cambi-Dystric Leptosols, frequently Skeletic Leptosols and Skeli-Lihic Leptosols; Skeletic Cambisols mostly oligotrophic less mesotrophic are frequent too; Lithic Leptosols (silicate) and Skeli-Dystric Regosols are on more extreme sites; Cambi-Rendzic Leptosols can be on strongly basic bases extraordinary (but sites transit to X category (*categoria xerothermica*) yet); Stagni-Haplic Vertisols are known from poor clays only; Calcaric Cambisols are on carbonate clay slates only.

#### Significant often dominant or indicator species:

<i>Achillea millefolium</i>	<i>Hieracium pilosella</i>
<i>Ajuga genevensis</i>	<i>Hypericum perforatum</i>
<i>Anthericum ramosum</i>	<i>Jasione montana</i>
<i>Asperula glauca</i>	<i>Lembotropis nigricans</i>
<i>Brachypodium pinnatum</i>	<i>Leucobryum glaucum</i>
<i>Calluna vulgaris</i>	<i>Luzula campestris</i>
<i>Cardaminopsis arenosa</i>	<i>Luzula luzuloides</i>
( <i>Carex humilis</i> )	<i>Poa angustifolia</i>
<i>Cetraria</i> spp.	<i>Poa nemoralis</i>
<i>Cladonia</i> spp.	<i>Sedum maximum</i>
<i>Clinopodium vulgare</i>	<i>Silene nutans</i>
<i>Avenella flexuosa</i>	<i>Steris viscaria</i>
<i>Dicranum scoparium</i>	<i>Thymus serpyllum</i>
<i>Euphorbia cyparissias</i>	<i>Vincetoxicum hirundinaria</i>
<i>Festuca ovina</i>	( <i>Calamagrostis arundinacea</i> )
<i>Genista</i> spp.	<i>Carex muricata</i> (= <i>Carex pairaei</i> )

#### Forest site types:

(1) *Vincetoxicum hirundinaria*

- (2) *Carex humilis*
  - (3) *Festuca ovina*
  - (5) *nudum* - on Tertiary clays
  - (7) *Brachypodium pinnatum* - with its soil variety on loess
  - (8) *Poa nemoralis*
  - (9) *Luzula luzuloides* - transition to *Fageto-Quercetum humile* (2Z)
- 1Z7 and 1Z8 types are sometimes known as scrub horn-oak forests (*Carpineto-Quercetum humile*) and they are on nutrient richer sites in comparison with the other types

Natural tree species composition:

Generally: *Quercus petraea* agg. 90 %, *Betula pendula* 10 %, *Carpinus betulus* 0.5 %, *Pinus sylvestris* 0.5 %

1Z1, 1Z2, 1Z3 and 1Z7: *Quercus petraea* agg. 40 - 90 %, *Fagus sylvatica* 0 - 30 %, *Carpinus betulus* 0 - 30 %, *Pinus sylvestris* ± 20 %, *Tilia cordata* ± 10 %, *Betula pendula* ± 20 %, *Sorbus aucuparia* + *Sorbus torminalis* + *Sorbus aria* 0.5 %

Absolute height yield class: *Quercus petraea* agg. (8) 12 - 14 (16) m, *Pinus sylvestris* 12 - 14 (16) m, *Carpinus betulus* 12 - 14 m

Hazards: strongly by desiccation and soil erosion (+ soil nutrient degradation).

**2<sup>nd</sup> forest vegetation zone 2Z - *Fageto-Quercetum humilis***

Occurrence: exposed terrains with soil material outcrops; uplands.

Soil: desiccated, stony; predominantly Skeletic Leptosols, Skeli-Lithic Leptosols and Cambi-Dystric Leptosols; Skeletic Cambisols and Dystric Cambisols (oligo and mesotrophic, podzoled) are frequent; Lithic Leptosols (mostly silicate) are less present; Calcaric Cambisols are on clay slates only; Skeli-Dystric Leptosols are rare.

Significant often dominant or indicator species:

<i>Ajuga genevensis</i>	<i>Hieracium murorum</i>
<i>Brachypodium pinnatum</i>	<i>Lembotropis nigricans</i>
<i>Calamagrostis arundinacea</i>	<i>Leucobryum glaucum</i>
<i>Cetraria</i> spp.	<i>Luzula luzuloides</i>
<i>Cladonia</i> spp.	<i>Pleurozium schreberi</i>
<i>Convallaria majalis</i>	<i>Poa nemoralis</i>
<i>Avenella flexuosa</i>	<i>Polytrichum formosum</i>
<i>Dicranum scoparium</i>	<i>Pyrethrum corymbosum</i>
<i>Digitalis grandiflora</i>	<i>Silene nutans</i>
<i>Galium sylvaticum</i>	<i>Vaccinium myrtillus</i>
<i>Genista tinctoria</i>	<i>Vaccinium vitis-idaea</i>

Forest site types:

- (1) *Vaccinium myrtillus*
- (2) *Luzula luzuloides*
- (3) *Calamagrostis arundinacea*
- (4) *Brachypodium pinnatum* -on basalt peaks
- (8) *Poa nemoralis* - Vltava river canyon
- (9) skeletal (*saxatilis*) - transition to *Querceto-Fagetum humile* (3Z)

Natural tree species composition:

Generally: *Quercus petraea* agg. 70 %, *Fagus sylvatica* 20 %, *Betula pendula* 10 %, *Pinus sylvestris* 0.5 %

2Z1, 2Z2 and 2Z3: *Quercus petraea* 40 - 90 %, *Fagus sylvatica* 0 - 30 %, *Carpinus betulus* 0 - 30 %, *Pinus sylvestris* ± 20 %, *Tilia cordata* ± 10 %, *Betula pendula* ± 20 %, *Sorbus aria* + *Sorbus aucuparia* + *Sorbus torminalis* 0.5 %

Absolute height yield class: *Pinus sylvestris* (10) 12 - 16 (18) m, *Fagus sylvatica* (14) 16 (18) m, *Quercus petraea* agg. (8) 12 - 14 (18) m, *Betula pendula* 14 - 16 (18) m, *Carpinus betulus* 10 - 12 m

Hazards: strongly by desiccation and erosion; frequently by soil nutrient degradation.

### **3<sup>rd</sup> forest vegetation zone 3Z - *Querceto-Fagetum humilis***

Occurrence: predominantly rocky slopes (warm for more developed soils), ridges and soil materials outcrops; uplands.

Soil: desiccated, stony to rocky; predominantly Skeli-Lithic Leptosols, Cambi-Dystric Leptosols, Skeli-Dystric Leptosols, Skeletic Cambisols (oligo- and mesotrophic, podzoled) and Lithic Leptosols (silicate) are less frequent; Skeli-Dystric Regosols are on extreme skeleton sites only; Calcaric Cambisols are on carbonate clay slates only.

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Luzula luzuloides</i>
<i>Calluna vulgaris</i>	<i>Melica nutans</i>
<i>Carex pilulifera</i>	<i>Pleurozium schreberi</i>
<i>Cladonia</i> spp.	<i>Poa nemoralis</i>
<i>Avenella flexuosa</i>	<i>Vaccinium myrtillus</i>
<i>Dicranum scoparium</i>	<i>Vaccinium vitis-idaea</i>
<i>Leucobryum glaucum</i>	<i>Vincetoxicum hirundinaria</i>

Forest site types:

- (1) *Vaccinium myrtillus* - on silicate schist with *Abies alba*
- (3) *Luzula luzuloides* mosses (*musci* (especially *Leucobryum glaucum*) + lichenes)
- (4) *Calamagrostis arundinacea* - with ferns admixture on transition to *Querceto-Fagetum lapidosum acidophilum* (3N)
- (8) *Poa nemoralis*
- (9) skeletal (*saxatilis*)

Natural tree species composition:

Generally: *Fagus sylvatica* 50 %, *Quercus petraea* agg. 40 %, *Betula pendula* 10 %, *Pinus sylvestris* 0.5 %

3Z1, 3Z3 and 3Z8: *Fagus sylvatica* 40 - 70 %, *Quercus petraea* ±40 %, *Pinus sylvestris* ±40 %, *Abies alba* 0 - 10 %, *Betula pendula* ±10 %, *Sorbus aucuparia* 0.5 %

Absolute height yield class: *Pinus sylvestris* (12) 14 - 16 (24) m, *Fagus sylvatica* (12) 16 - 18 (20) m, *Quercus petraea* agg. (10) 14 - 18 (22) m, *Abies alba* 18 m, *Betula pendula* (12) 14 - (14) 18 m, *Picea abies* 14 - 16 m

Hazards: considerably by desiccation, strongly by soil erosion, frequently by soil nutrient degradation.

### **4<sup>th</sup> forest vegetation zone 4Z - *Fagetum humilis***

Occurrence: very rare mapped up till now, probably bigger area.

Soil: desiccated, stony to rocky; Cambi-Dystric Leptosols, Skeli-Lithic Leptosols, Skeletic Cambisols mostly oligotrophic, sometimes podzoled and Lithic Leptosols are present frequently; Skeli-Dystric Regosols and Calcaric Cambisols are rare.

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Luzula luzuloides</i>
<i>Calluna vulgaris</i>	<i>Melica nutans</i>
<i>Carex pilulifera</i>	<i>Pleurozium schreberi</i>
<i>Cladonia</i> spp.	<i>Poa nemoralis</i>
<i>Avenella flexuosa</i>	<i>Vaccinium myrtillus</i>
<i>Dicranum scoparium</i>	<i>Vaccinium vitis-idaea</i>
<i>Leucobryum glaucum</i>	<i>Vincetoxicum hirundinaria</i>

Forest site types:

(3) *Luzula luzuloides*  
(4) *Calamagrostis arundinacea* - with ferns admixture on transition to *Querceto-Fagetum lapidosum acidophilum* (3N)  
(9) skeletal (*saxatilis*)

Natural tree species composition:

Generally: *Fagus sylvatica* 60 %, *Quercus petraea* agg. 20 %, *Abies alba* 10 %, *Betula pendula* 10 %, *Sorbus aucuparia* 0.5 %

In dependence on site condotions: *Fagus sylvatica* 40 - 70 %, *Quercus petraea* agg. ± 40 %, *Pinus sylvestris* ± 40 %, *Abies alba* 0 - 10 %, *Betula pendula* ± 10 %, *Sorbus aucuparia* 0.5 %

Absolute height yield class: *Pinus sylvestris* (12) 16 - 18 (20) m, *Fagus sylvatica* (14) 16 - 18 (22) m, *Quercus petraea* agg. 14 - 16 m

Hazards: moderately by desiccation, strongly by soil erosion and nutrient degradation.

In spite of the fact that this group is known and described, it isn't often mapped due to difficulties with ascertainability of *Fagus sylvatica* dominance (extreme desiccation), sites are often mapped as *Querceto-Fagetum humilis* (3Z).

**5<sup>th</sup> forest vegetation zone 5Z - *Abieto-Fagetum humilis***

Occurence: rocky slopes, ridges and peaks; patchy on sites with developed soil; highlands.

Soil: shallow to moderately deep, ± stony; predominantly Skeli-Lithic Leptosols oligotrophic; Skeletic Cambisols oligotrophic are frequent; Skeletic Leptosols oligotrophic are less frequent; Cambi-Dystric Leptosols and Dystric Cambisols podzoled are rare; Skeli-Dystric Regosols and silicate Lithic Leptosols are on extreme skeletal bases.

Significant often dominant or indicator species:

<i>Agrostis capillaris</i>	<i>Luzula luzuloides</i>
<i>Calluna vulgaris</i>	<i>Oxalis acetosella</i>
<i>Carex pilulifera</i>	<i>Poa nemoralis</i>
<i>Cetrariaspp.</i>	<i>Polytrichum formosum</i>
<i>Cladoniaspp.</i>	<i>Rubus idaeus</i>
<i>Avenella flexuosa</i>	<i>Vaccinium myrtillus</i>
<i>Dicranum scoparium</i>	( <i>Calamagrostis arundinacea</i> )
<i>Dryopteris dilatata</i>	( <i>Calluna vulgaris</i> )
<i>Hieracium murorum</i>	( <i>Prenanthes purpurea</i> )
<i>Leucobryum glaucum</i>	( <i>Senecio fuchsii</i> )
( <i>Vaccinium vitis-idaea</i> )	

Forest site types:

(1) *Vaccinium myrtillus*  
(2) mossy (*musci*) with soil degradation stages:- *Calluna vulgaris*- *Leucobryum glaucum*

- (3) *Avenella flexuosa*
- (4) nutrient-rich (*Oxalis acetosella*) - on basalt
- (9) skeletal (*saxatilis*) - on rocky peaks and stony ridges

Natural tree species composition:

Generally: *Fagus sylvatica* 70 %, *Abies alba* 20 %, *Betula pendula* 10 %, *Pinus sylvestris* 0.5 %, *Picea abies* 0.5 %

5Z1 and 5Z3: *Picea abies* ± 60 %, *Abies alba* ± 20 %, *Pinus sylvestris* ± 30 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, *Betula pendula* + *Sorbus aucuparia* ± 10 %, *Acer platanoides* 0 - 10 %

Absolute height yield class: *Pinus sylvestris* (10) 12 - 16 (18) m, *Fagus sylvatica* (10) 14 - 18 (24) m, *Picea abies* (12) 16 - 18 (22) m, *Abies alba* (16) 18 m

Hazards: strongly by soil erosion and nutrient degradation; moderately by snowpack; slightly by windthrow.

**6<sup>th</sup> forest vegetation zone 6Z - *Piceeto-Fagetum humilis***

Occurrence: strongly exposed slopes and peaks; frequently very stony; highlands and mountains.

Soil: shallow to moderately deep, stony; predominantly Skeli-Lithic Leptosols and Skeli-Dystric Leptosols; Cambic Podzols and Skeli-Cambic Podzols, both oligotrophic, are in the mountains only; Skeli-Dystric Regosols and silicate Lithic Leptosols are on extreme skeleton bases.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	<i>Prenanthes purpurea</i>
<i>Carex pilulifera</i>	
<i>Avenella flexuosa</i>	<i>Vaccinium myrtillus</i>
<i>Dicranella heteromalla</i>	<i>Vaccinium vitis-idaea</i>
<i>Gymnocarpium dryopteris</i>	( <i>Calamagrostis arundinacea</i> )
<i>Leucobryum glaucum</i>	( <i>Dryopteris dilatata</i> )
<i>Oxalis acetosella</i>	( <i>Galeobdolon montanum</i> )
<i>Pleurozium schreberi</i>	( <i>Rubus idaeus</i> )
<i>Polygonatum verticillatum</i>	( <i>Senecio fuchsii</i> )
<i>Polytrichum formosum</i>	( <i>Sphagnum</i> spp.)

Forest site types:

- (1) *Vaccinium myrtillus*
- (2) *Calamagrostis villosa*
- (3) *Avenella flexuosa*
- (6) "peak *Piceeto-Abietum* " - with limited abundance of *Fagus sylvatica* on silicate schists
- (8) nutrient-rich (*Oxalis acetosella*)
- (9) skeletal (*saxatilis*)

Natural tree species composition:

Generally: *Picea abies* 40 %, *Fagus sylvatica* 40 %, *Abies alba* 10 %, *Betula pendula* 10 %, *Sorbus aucuparia* 0.5 %

6Z1, 6Z2, 6Z3 and 6Z8 (6Z9 only in higher *Sphagnum* spp. abundance): *Picea abies* ± 60 %, *Abies alba* ± 20 %, *Pinus sylvestris* ± 30 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, *Betula pendula* + *Sorbus aucuparia* ± 10 %, *Acer platanoides* 0 - 10 %

Absolute height yield class: *Picea abies* (14) 16 - 18 (22) m, *Fagus sylvatica* (12) 16 - 18 (20) m, *Pinus sylvestris* (14) 16 - 18 m

Hazards: strongly by soil erosion and nutrient degradation, considerably by snowpack, moderately by windthrow.

### **7<sup>th</sup> forest vegetation zone 7Z - *Fageto-Piceetum humilis***

Occurrence: in *Hercynicum* mountains (800 - 1150 m) on exposed ridges and contiguous slopes.

Soil: moderately deep, stony, permeable; predominantly (mountain) Haplic Podzols; more sporadic Cambic Podzols oligotrophic; Skeli-Cambic Podzols, Skeli-Lithic Leptosols, Lithic Leptosols and Skeli-Dystric Regosols occur with soil skeleton increasing; Cambi-Dystric Leptosols can occur, but always podzoled.

Significant often dominant or indicator species:

<i>Athyrium distentifolium</i>	<i>Galeobdolon luteum</i>
<i>Athyrium filix-femina</i>	<i>Luzula sylvatica</i>
<i>Maianthemum bifolium</i>	<i>Blechnum spicant</i>
<i>Oxalis acetosella</i>	<i>Calamagrostis villosa</i>
<i>Plagiothecium undulatum</i>	<i>Avenella flexuosa</i>
<i>Pleurozium schreberi</i>	<i>Dicranum scoparium</i>
<i>Poa chaixii</i>	<i>Dryopteris dilatata</i>
<i>Polytrichum formosum</i>	<i>Gentiana asclepiadea</i>
<i>Trientalis europaea</i>	<i>Homogyne alpina</i>
<i>Vaccinium myrtillus</i>	<i>Leucobryum glaucum</i>
<i>Vaccinium vitis-idaea</i>	

Forest site types:

- (1) *Vaccinium myrtillus*
- (2) *Calamagrostis villosa* + *Luzula sylvatica*
- (4) *Athyrium distentifolium*
- (5) *Galeobdolon montanum*
- (6) *Oxalis acetosella*
- (8) nutrient-rich (*mesotrophicum*)
- (9) skeletal (*saxatilis*)

Natural tree species composition:

Generally: *Picea abies* 70 %, *Fagus sylvatica* 20 %, *Abies alba* (*Betula pendula* + *Sorbus aucuparia*) 10 %

7Z1, 7Z2 and 7Z4: *Picea abies* 70 - 100 %, *Abies alba* 0 - 10 %, *Fagus sylvatica* 0 - 30 %, *Betula pendula* ± 10 %, *Sorbus aucuparia* ± 10 %

Absolute height yield class: *Picea abies* (14) 16 - 20 (22) m, *Fagus sylvatica* (14) 16 - 20 (22) m

Hazards: strongly by soil erosion; considerably by snowpack, hoarfrost and windthrow.

### **8<sup>th</sup> forest vegetation zone 8Z - *Sorbeto-Piceetum (humilis)***

Occurrence: highest mountain areas; exposed peak plateaus, different exposed slopes; the most frequent on *crystallinum*.

Soil: stony, favourable by physical properties (porous in bottom); thick layer of raw humus (morr); almost dominantly (mountain) Haplic Podzols often transit to Histi-Haplic Podzols;

Stagni-Haplic Podzols are rare; Skeletic Podzols, Skeli-Lithic Leptosols, Lithic Leptosols and Skeli-Dystric Regosols can occur with soil skeleton increasing.

Significant often dominant or indicator species:

<i>Athyrium distentifolium</i>	<i>Plagiothecium undulatum</i>
<i>Bazzania trilobata</i>	<i>Pleurozium schreberi</i>
<i>Calamagrostis villosa</i>	<i>Polytrichum commune</i>
<i>Cladoniaspp.</i>	<i>Polytrichum formosum</i>
<i>Avenella flexuosa</i>	<i>Sphagnum</i> spp.
<i>Dicranum scoparium</i>	<i>Trientalis europaea</i>
<i>Dryopteris dilatata</i>	<i>Vaccinium vitis-idaea</i>
<i>Gentiana asclepiadea</i>	<i>Vaccinium myrtillus</i>
<i>Homogyne alpina</i>	( <i>Adenostyles alliariae</i> )
<i>Huperzia selago</i>	( <i>Calamagrostis arundinacea</i> )
<i>Luzula sylvatica</i>	( <i>Doronicum austriacum</i> )
<i>Nardus stricta</i>	( <i>Lophozia</i> spp.)
<i>Oxalis acetosella</i>	( <i>Streptopus amplexifolius</i> )

Forest site types:

- (2) *Vaccinium myrtillus*
- (3) *Sphagnum* spp.
- (4) *Calamagrostis villosa*; plateaus at Krkonoše Mts. are with *Nardus stricta*
- (5) *Oxalis acetosella*
- (6) *Athyrium distentifolium*
- (8) *Adenostyles alliariae*
- (9) skeletal (*saxatilis*)

Natural tree species composition:

Generally: *Picea abies* 80 %, *Sorbus aucuparia* 20 %

8Z2 and 8Z3: *Picea abies* 90 - 100 %, *Sorbus aucuparia* ± 10 %

Absolute height yield class: *Picea abies* (10) 16 - 20 (22) m

Hazards: strongly by soil erosion, hoarfrost, snowpack (rub off by avalanches), windthrow (crown flag types) and brush hazards (dominantly *Nardus stricta* and *Vaccinium myrtillus*).

**9<sup>th</sup> forest vegetation zone 9Z - *Mughetum (humilis)***

Occurrence: up timber line; slight and steep slopes, ravines, ridges, valleys, all over 1250 m (extreme sites already over 1100 m).

Soil: stony, shallow; dominantly (mountain) Hapic Podzols turfic sometimes stangic; occasionally Skeli-Dystric Leptosols, Skeli-Lithic Leptosols and Skeli-Dystric Regosols.

Significant often dominant or indicator species:

<i>Adenostyles alliariae</i>	<i>Huperzia selago</i>
<i>Athyrium distentifolium</i>	<i>Nardus stricta</i>
<i>Calamagrostis villosa</i>	<i>Petasites albus</i>
<i>Calluna vulgaris</i>	<i>Polygonum bistorta</i>
<i>Cetraria</i> spp.	<i>Potentilla aurea</i>
<i>Deschampsia caespitosa</i>	<i>Potentilla erecta</i>
<i>Avenella flexuosa</i>	<i>Rumex alpinus</i>
<i>Festuca airoides</i>	<i>Soldanella alpina</i>
<i>Galium saxatile</i>	<i>Stellaria nemorum</i>



*Gentiana asclepiadea*  
*Homogyne alpina*

*Vaccinium myrtillus*  
*Vaccinium vitis-idaea*

Lesní typy:

- (1) skeletal (*saxatilis*)
- (2) (*Piceeto-*)*Mughetum* - *Nardus stricta*
- (3) (*Piceeto-*)*Mughetum* - *Calamagrostis villosa*
- (4) (*Piceeto-*)*Mughetum* - *Adenostyles alliariae*

Natural tree species composition:

9Z1 to 9Z4: *Pinus mugo* 60 - 100 %, *Picea abies* ± 30 %, *Sorbus aucuparia* ± 10 %, *Betula pubescens* + *Salix silesiaca* + *Prunus padus* 0.5 %

Absolute height yield class: *Picea abies* 14 m

Hazards: strongly by soil erosion, hoarfrost, snowpack, windthrow and brush (especially *Nardus stricta*).

**Azonal 0Z - *Pinetum relictum***

Occurrence: heavy exposed sites; from uplands to mountains (it differs by tree species admixture); dominantly at sandstone areas.

Soil: undeveloped or rocky, shallow; dominantly Lithic Leptosols; Skeli-Lithic Leptosols are on sites with rather thicker soil layer; Skeli-Dystric Regosols are on extreme skeleton sites; Serpenti-Skeletal Leptosols and Serpenti-Lithic Leptosols are on serpentine.

Significant often dominant or indicator species:

On serpentine:

<i>Asplenium cuneifolium</i>	<i>Asperula cynanchica</i>
<i>Phleum phleoides</i>	( <i>Calluna vulgaris</i> )
<i>Stipa capillata</i>	<i>Teucrium chamaedrys</i>
<i>Dorycnium pentaphyllum</i>	<i>Festuca glauca</i>
<i>Genista pilosa</i>	

Others:

<i>Aurinia saxatilis</i>	<i>Pleurozium schreberi</i>
<i>Festuca glauca</i>	<i>Asperula cynanchica</i>
<i>Polytrichum formosum</i>	<i>Teucrium chamaedrys</i>
<i>Carex humilis</i>	<i>Polytrichum juniperinum</i>
<i>Cetraria</i> spp.	<i>Polytrichum piliferum</i>
<i>Cladonia</i> spp.	<i>Potentilla arenaria</i>
<i>Dicranum scoparium</i>	<i>Dicranum undulatum</i>
<i>Vaccinium myrtillus</i>	<i>Vaccinium vitis-idaea</i>
<i>Genista pilosa</i>	<i>Pseudolysimachion spicatum</i>

Forest site types:

- (1) rocky (-*Festuca glauca*) (-lichenes) (- in river canyons with *Aurinia saxatilis* with transition to *Quercetum humilis* (1Z))
- (2) serpentine - (*Stipa capillata*)
- (3) stony - (*Calluna vulgaris*)

*Quercus petraea* agg. is in all types at lower elevation; *Fagus sylvatica* and *Abies alba* are in all types at middle elevation; *Picea abies* is in all types at higher elevation.

Natural tree species composition:

Generally: *Pinus sylvestris* 90 %, *Betula pendula* 10 %, *Quercus petraea* agg. (*Fagus sylvatica* + *Picea abies*) 0.5 %

OZ1 and OZ3: *Picea abies* 0 - 70 %, *Abies alba* ± 0.1 %, *Pinus sylvestris* 20 - 100 %, *Quercus petraea* agg. ± 0.1 %, *Fagus sylvatica* 0 - 20 %, *Betula pendula* ± 10 %

Absolute height yield class: *Pinus sylvestris* (8) 12 - 14 (22) m, *Betula pendula* (10) 12 - 14 (20) m, *Quercus petraea* agg. (8) 12 - 14 m, *Picea abies* (2) 12 - (12) 14 m.

Hazards: soil erosion; forests are protected without any commercial movement.

### 2.3.3.2 *Categoria saxatilis* (Y – category)

Category has greatest territory at mountains and landscapes with heavy weathering soil materials. It associates protected forests on (middle) deep, acid, debris and rocky soils, stone seas and loose soil materials (anthropogenic heaps), where scrub growth of tree species is not yet. Soil types are similar to skeletal soil types of Z-category (*categoria humilis*). This category has deeper soils and more sheltered sites with a better yield tree class due to more favourable soil (and air) humidity. Morr-moder and morr are humus forms. Stands are naturally with opened canopy.

This category is analogy of J-category (*categoria acerosa saxatile*), but on acid base with oligotrophic understory species (*Avenella flexuosa*, *Luzula luzuloides*, *Dryopteris dilatata*, *Calamagrostis villosa* etc.).

Phytocoenoses with *Dryopteris dilatata*, *Calamagrostis arundinacea* - *Filices* are clearer-cut only. Often differentiation to forest site types is substituted by one (collected) site type.

Forest function is soil conservation. Valuable production is only at nutrient-richer types of 4th - 6th forest vegetation zones. Stands have anti-erosion ecological function. Natural tree species regeneration is rare.

### Forest site type complexes

#### 2<sup>nd</sup> forest vegetation zone 2Y - *Fageto-Quercetum saxatilis*

Occurrence: uplands and solitary hills (Středočeská uplands, Český ráj area) - rocky debris fields.

Soil: shallow, rocky (loose too), desiccated to slightly humid, porous; Lithic Leptosols (silicate); Cambi-Dystric Leptosols, Skeli-Dystric Regosols.

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Hieracium pilosella</i>
<i>Luzula luzuloides</i>	<i>Rubus fruticosus</i> agg.
<i>Carex pilulifera</i>	<i>Polytrichum formosum</i>
<i>Festuca ovina</i>	<i>Dicranum scoparium</i>
( <i>Avenella flexuosa</i> )	

Herb species abundance is sporadic; grasses are dominant.

Forest site types:

(1) rocky (*saxatilis*)

Natural tree species composition: *Quercus petraea* agg. 60 - 70 %, *Tilia cordata* ± 10 %, *Fagus sylvatica* ± 10 %, *Carpinus betulus* ± 10 %, *Pinus sylvestris* ± 10 %, *Betula pendula* 0.5 %

Absolute height yield class: *Quercus petraea* agg. 16 (to 20) m, *Pinus sylvestris* 16 - 20 m

Hazards: by desiccation, strongly by soil erosion.

#### 3<sup>rd</sup> forest vegetation zone 3Y - *Querceto-Fagetum saxatile*

Occurrence: uplands; slopes and ridges (rocky debris down the ridges).

Soil: desiccated, rocky (loose too); predominantly Cambi-Dystric Leptosols and Skeli-Lithic Leptosols both sometimes podzoled; Lithic Leptosols are frequent; Skeletic Cambisols either oligotrophic or podzoled are rare; Urbi-Anthropic Regosols are on heaps.

Significant often dominant or indicator species:

<i>Asplenium septentrionale</i>	<i>Avenella flexuosa</i>
<i>Dryopteris dilatata</i>	<i>Hieracium pilosella</i>
<i>Gymnocarpium dryopteris</i>	<i>Campanula persicifolia</i>
<i>Festuca ovina</i>	<i>Luzula luzuloides</i>
<i>Rubus fruticosus</i> agg.	<i>Steris viscaria</i>

Forest site types:

(0) collected – skeleton (*saxatilis*)

Natural tree species composition:

Generally: *Fagus sylvatica* 50 %, *Quercus petraea* agg. 40 %, *Betula pendula* 10 %, *Pinus sylvestris* 0.5 %

In dependence on site conditions (more suitable - recommended): *Fagus sylvatica* 40 - 70 %, *Quercus petraea* agg.  $\pm$  40 %, *Pinus sylvestris*  $\pm$  40 %, *Abies alba* 0 - 10 %, *Betula pendula*  $\pm$  10 %, *Sorbus aucuparia* 0.5 %

Absolute height yield class: *Pinus sylvestris* (12) 14 - 20 (22) m, *Fagus sylvatica* (16) 18 - 22 (24) m, *Quercus petraea* agg. (12) 16 - 20 (22) m, *Picea abies* (18) 20 - 22 (24) m, *Tilia cordata* 14 m

Hazards: considerably by desiccation, strongly by soil erosion and nutrient degradation.

#### **4<sup>th</sup> forest vegetation zone 4Y - *Fagetum saxatile***

Occurrence: uplands and warm slopes of highlands.

Soil: rocky, slightly desiccated, moderately deep; predominantly Skeletic Leptosols, Cambi-Dystric Leptosols and Skeli-Lithic Leptosols (depends on skeleton), they are sometimes podzoled; Lithic Leptosols are frequent; oligotrophic Skeletic Cambisols are rare; Urbi-Anthropic Regosols are on heaps.

Significant often dominant or indicator species:

<i>Avenella flexuosa</i>	<i>Oxalis acetosella</i>
<i>Luzula luzuloides</i>	<i>Veronica officinalis</i>
<i>Mycelis muralis</i>	

Forest site types

(0) collected - skeleton (*saxatilis*) - *Oxalis acetosella* a higher values of absolute height yield tree class - on heaps (*anthropicum*)

Natural tree species composition:

Generally: *Fagus sylvatica* 60 %, *Quercus petraea* agg. 20 %, *Abies alba* 10 %, (*Pinus sylvestris* + *Betula pendula*) 10 %

In dependence on site condotions (more suitable - recommended): *Fagus sylvatica* 40 - 70 %, *Quercus petraea* agg.  $\pm$  40 %, *Pinus sylvestris*  $\pm$  40 %, *Abies alba* 0 - 10 %, *Betula pendula*  $\pm$  10 %, *Sorbus aucuparia* 0.5 %

Absolute height yield class: *Pinus sylvestris* 18 - 20 m, *Fagus sylvatica* (14) 20 - 22 (24) m, *Picea abies* (18) 22 - 24 (26) m, *Abies alba* 18 - 20 m

Hazards: strongly by soil erosion, considerably by nutrient degradation, slightly by desiccation.

### **5<sup>th</sup> forest vegetation zone 5Y - *Abieto-Fagetum saxatile***

Occurrence: highlands, promontories, lower mountain elevations; on rocky and debris slopes, rocky outcrops and ridges.

Soil: undeveloped, rocky outcrops in mosaic with debris falls and loamed debris; predominantly Skeli-Lithic Leptosols, Lithic Leptosols are less frequent, they can patchy transit to Skeli-Dystric Leptosols; sometimes Cambi-Dystric Leptosols mostly podzoled; Skeletic Cambisols can occur sporadically (almost always oligotrophic); Urbi-Anthropic Regosols are on heaps and abandoned quarries (non limestone!!).

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Luzula luzuloides</i>
<i>Avenella flexuosa</i>	<i>Oxalis acetosella</i>
<i>Dicranum scoparium</i>	<i>Poa nemoralis</i>
<i>Dryopteris carthusiana</i>	<i>Polytrichum formosum</i>
<i>Dryopteris dilatata</i>	<i>Rubus fruticosus</i> agg.
<i>Vaccinium myrtillus</i>	

Forest site types:

(0) collected - skeleton (*saxatilis*)

(1) *Avenella flexuosa*

(2) *Oxalis acetosella*

(9) antropogennic (*anthropicum*)

It would be more suitable not differ individual types and all cover to collected type ((0) type due to their not so much clear determination (a), localities are small (b) and they are always protected forests (c).

Natural tree species composition:

Generally: *Fagus sylvatica* 70 %, *Abies alba* 20 %, *Betula pendula* 10 %, *Pinus sylvestris* 0.5 %, *Picea abies* 0.5 %

In dependence on site condotions (recommended): *Fagus sylvatica* 40 - 70 %, *Abies alba* 20 - 40 %, *Picea abies* 0 - 20 %, *Pinus sylvestris* ± 10 %, *Acer pseudoplatanus* 0 - 10 %, *Betula pendula* ± 10 %, *Sorbus aucuparia* ± 0.5 %, *Taxus baccata* 0.5 %

Absolute height yield class: *Picea abies* (14) 18 - 22 (26) m, *Abies alba* (16) 18 - 20 (22) m, *Fagus sylvatica* (14) 16 - 20 (24) m

Hazards: strongly by soil erosion, moderately by snowpack, slightly by nutrient degradation.

### **6<sup>th</sup> forest vegetation zone 6Y - *Piceeto-Fagetum saxatile***

Occurrence: highlands, mountains and promontories; *crystallinum* area; rocky slope debris (+ soil material outcrops), ridges and down slope stony falls.

Soil: undeveloped, moderately deep; predominantly Skeli-Lithic Leptosols, often podzoled; Lithic Leptosols are frequent; Skeli-Dystric Regosols are sporadic, Dystric Arenosols (as a fill material of sandstone rocks); Skeli-Cambic Podzols oligotrophic are rare on deeper soils; Urbi-Anthropic Regosols are on heaps and abandoned quarries (non limestone!!).

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Luzula luzuloides</i>
<i>Calamagrostis villosa</i>	<i>Oxalis acetosella</i>

<i>Avenella flexuosa</i>	<i>Pleurozium schreberi</i>
<i>Dicranum scoparium</i>	<i>Polytrichum formosum</i>
<i>Dryopteris dilatata</i>	<i>Rubus idaeus</i>
<i>Hieracium murorum</i>	<i>Sphagnum</i> spp.
<i>Hylocomium splendens</i> ( <i>Carex pilulifera</i> )	<i>Vaccinium myrtillus</i>

Forest site types:

(0) collected – skeleton (*saxatilis*)

(1) *Vaccinium myrtillus*

(2) *Oxalis acetosella*

(3) *Sphagnum* spp.

(4) *Avenella flexuosa*

(9) antropogenic (*anthropicum*)

Sites with a very low abundance of herb layer on rocks are covered to collected type (0).

Natural tree species composition:

Generally: *Picea abies* 40 %, *Fagus sylvatica* 40 %, *Abies alba* 10 %, *Betula pendula* 10 %, *Sorbus aucuparia* 0.5 %

6Y1 to 6Y4: *Picea abies* ± 60 %, *Abies alba* ± 20 %, *Pinus sylvestris* ± 30 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, *Acer pseudopatanus* 0 - 10 %, *Betula pendula* + *Sorbus aucuparia* ± 10 %, (*Taxus baccata* depends on site conditions!!)

Absolute height yield class: *Picea abies* (16) 18 - 22 (26) m, *Abies alba* (24) m, *Fagus sylvatica* (14) 16 - 18 (24) m

Hazards: strongly by soil erosion, considerably by snowpack.

**8<sup>th</sup> forest vegetation zone 8Y - *Piceetum saxatile***

Occurence: It is bellow the highest peaks to 850 m on stony slopes and rocky walls.

Soil: rocky debris, sometimes waterlogged; Lithic Leptosols silicate; Skeli-Dystric Regosols; Skeli-Lithic Leptosols.

Significant often dominant or indicator species:

<i>Blechnum spicant</i>	<i>Homogyne alpina</i>
<i>Calamagrostis arundinacea</i>	<i>Pleurozium schreberi</i>
<i>Calamagrostis villosa</i>	<i>Polytrichum formosum</i>
<i>Avenella flexuosa</i>	<i>Sphagnum</i> spp.
<i>Dryopteris dilatata</i>	<i>Vaccinium myrtillus</i>

Forest site types:

(0) collected – skeleton (*saxatilis*)

(1) *Vaccinium myrtillus*

Sites with a very low abundance of herb layer on rocks are covered to collected type (0).

Natural tree species composition:

Generally: *Picea abies* 100 %, *Betula pendula* + *Sorbus aucuparia* 0.5 %

In dependence on site conditions: *Picea abies* 70 - 100 %, *Abies alba* 0 - 10 %, *Fagus sylvatica* 0 - 30 %, *Betula pendula* ± 10 %, *Sorbus aucuparia* ± 10 %

Absolute height yield class: *Picea abies* 18 - 20 (22) m

Hazards: strongly by soil erosion, snowpack and hoarfrost; it is necessary to save suitable *Picea abies* ecotype.

### **9<sup>th</sup> forest vegetation zone 9Y - *Arctoalpinum***

Occurrence: exposed peaks and opened slopes; primary communities of stony cones in sheltered slopes of (sub-)alpine zone; rocks and terraces at glacier drift of High Sudety, snow depressions, avalanche lines.

Soil: gravel, frequently stony filled by sandy-and-clay material; dominantly Skeli-Dystric Leptosols and Skeli-Lithic Leptosols; Skeli-Dystric Regosols (silicate) are on strongly stony sites; (mountain) Haplic Podzols turfed are made by more loamy fills.

#### Significant often dominant or indicator species:

<i>Agrostis alpina</i>	<i>Hieracium alpinum</i>
<i>Agrostis rupestris</i>	<i>Huperzia selago</i> ;
<i>Avenella flexuosa</i>	<i>Juncus trifidus</i>
<i>Barbilophozia barbata</i>	<i>Nardus stricta</i>
<i>Bartsia alpina</i>	<i>Pohlia nutans</i>
<i>Betula carpatica</i>	<i>Polytrichum norvegicum</i>
<i>Campanula rotundifolia</i>	<i>Polytrichum piliferum</i>
<i>Carex bigelowii</i>	<i>Rhacomitrium canescaens</i>
<i>Cetraria</i> spp.	<i>Salix herbacea</i>
<i>Cladonia belidiflora</i>	<i>Salix silesiaca</i>
<i>Cryptogramma crista</i>	<i>Saxifraga paniculata</i>
<i>Festuca supina</i>	<i>Scabiosa lucida</i>
<i>Festuca versicolor</i>	<i>Sedum alpestre</i>
<i>Galium boreale</i>	<i>Selaginella selaginoides</i>
<i>Gnaphalium supinum</i>	<i>Silene vulgaris</i>
<i>Hedysarum hedysaroides</i>	<i>Thamnotia vermicularis</i>

#### Forest site types:

- (0) collected – skeleton (recommended) (*saxatilis*)
- (1) *Androsace obtusifolia* - avalanche debris
- (2) *Festuca versicolor*, *Agrostis alpina*
- (3) *Juncus trifidus*
- (4) *Salix herbacea* - depressions with longer snow cover
- (5) *Salix silesiaca*

#### Natural tree species composition:

Generally: *Pinus mugo* 100 %, *Picea abies* 0.5 %, *Sorbus aucuparia* 0.5 %, *Betula carpatica* 0.5 %, *Salix silesiaca* 0.5 %, *Salix caprea* 0.5 %

9Y2 and 9Y4: *Pinus mugo* 80 - 100 %, *Picea abies* ± 10 %, *Sorbus aucuparia* 0 - 20 %, *Salix caprea* ± 0.1 %

9Y1 and 9Y5: *Pinus mugo* 0 - 70 %, *Picea abies* ± 0.1 %, *Sorbus aucuparia* 30 - 80 %, *Betula carpatica* 0 - 10 %, *Salix silesiaca* ± 20 %

9Y3: *Pinus mugo* 90 - 100 %

All types can have rare tree species abundance. Area of this forest types group is negligible from the forestry point of view and it is often mapped as *Mughetum (humile)* (9Z).

Hazards: hoarfrost, brush density (*Nardus stricta*), heavy soil erosion.

### **Azonal 0Y - *Pinetum saxatile***

Occurrence: very broken topography with stone groups; edges of sandstone rocks (Broumov and Adršpach rocks, Děčín highland).

Soil: chalk cubic sandstones with morr; frequently Lithic Leptosols silicate; Skeli-Lithic Leptosols somewhere, less Skeli-Dystric Leptosols; Arenic Podzols occur patchy; Skeli-Dystric Regosols are on rocks bases (sandstone fall downs).

Significant often dominant or indicator species:

<i>Dicranodontium dennutatatum</i>	<i>Vaccinium vitis-idaea</i>
<i>Leucobryum glaucum</i>	<i>Calluna vulgaris</i>
<i>Bazzania trilobata</i>	( <i>Oxalis acetosella</i> )
<i>Cetraria islandica</i>	( <i>Rubus idaeus</i> )
<i>Cladonia</i> spp.	( <i>Avenella flexuosa</i> )
<i>Sphagnum</i> spp.	( <i>Dryopteris dilatata</i> )
<i>Vaccinium myrtillus</i>	

Forest site types:

- (1) *Picea abies*
- (3) skeletal, *Querceto-Fagi- Pinetum - saxatilis*
- (4) skeletal, *Fageto-Pinetum - saxatilis*

Natural tree species composition: *Pinus sylvestris* 20 % - 100 %, *Picea abies* 0 - 70 %, *Abies alba* ± 0.1 %, *Quercus petraea* agg. ± 0.1 %, *Fagus sylvatica* 0 - 20 %, *Betula pendula* ± 10 %

Absolute height yield class: *Pinus sylvestris* 18 - 20 (24) m, *Picea abies* 22 - 24 (25) m

Hazards: strongly by soil erosion and hoarfrost (local frost microclimate).

### 2.3.3.3 *Categoria xerothermica* (X – category)

This category belongs to thermophilous communities on limestone and basic bases. Smaller widespread of this category is concentrated to Southmoravian vales and closed warm uplands, to karst and basalt areas and Polabí lowland. They are only dispersed localities situated on sunny slopes and warmth bases extrazonaly.

Soils are basic-rich, but otherwise they are very heterogenous. Haplic Luvisols and Luvic Chernozems (or Arenic Haplic Chernozems) are on loess. Cambic Podzols mesotrophic and Eutric Cambisols are on clay slate. Rendzinas are on limestones, Leptosols on other bases. Forest site types separate soil differences.

Stands have anti-erosion and climatic function (protected by canopy). Natural tree species regeneration is pure, with an exception of *Fagus sylvatica* in 3rd and 4th forest vegetation zones.

### **Forest site type complexes**

#### **1<sup>st</sup> forest vegetation zone 1X - *Corneto-Quercetum xerothermicum***

Occurrence: dispersed at warmest and driest areas; dominantly warm, steep and convex slopes, less frequently slight slopes; limestone, clay slate, loess and basalt (at České Středohoří highlands up to 700 m).

Soil: very desiccated, shallow to moderately deep, frequently stony, loamy; dominantly Lithi-Rendzic Leptosols, Skeli-Rendzic Leptosols, Rendzic Leptosols and Cambi-Rendzic Leptosols - depends on site conditions; Calcaric Cambisols are rare (on clay slates); either Skeli-Lithic Leptosols or Rendzi-Lithic Leptosols are on more stony sites; Haplic Luvisols are on more loamy slopes.

Significant often dominant or indicator species:

<i>Adonis vernalis</i>	<i>Iris pumila</i>
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<i>Ajuga genevensis</i>	<i>Lathyrus vernus</i>
<i>Antennaria dioica</i>	<i>Melica ciliata</i>
<i>Brachypodium pinnatum</i>	<i>Polygonatum odoratum</i>
<i>Buglossoides purpureocaerulea</i>	<i>Pyrethrum corymbosum</i>
<i>Bupleurum falcatum</i>	<i>Seseli osseum</i>
<i>Campanula rapunculoides</i>	<i>Stipa capillata</i>
<i>Carex humilis</i>	<i>Teucrium chamaedrys</i>
<i>Carex michelii</i>	<i>Vincetoxicum hirundinaria</i>
<i>Carex montana</i>	<i>Viola hirta</i>
<i>Clinopodium vulgare</i>	( <i>Asperula tinctoria</i> )
<i>Convallaria majalis</i>	( <i>Brachypodium sylvaticum</i> )
<i>Dictamnus albus</i>	( <i>Calamagrostis arundinacea</i> )
<i>Euphorbia cyparissias</i>	( <i>Epipactis atrorubens</i> )
<i>Geranium sanguineum</i>	( <i>Melica uniflora</i> )
<i>Inula ensifolia</i>	( <i>Primula veris</i> )
<i>Melica transsilvanica</i>	( <i>Silene nutans</i> )

Forest site types:

- (1) on loess - calcareous (*Brachypodium pinnatum*)
- (2) on Rendzic Leptosols - lime (*calcarium*)
- (3) on Skeletic Leptosols - *Teucrium chamaedrys*
- (4) maple (*acerosum*) - transition to *Carpineto- Aceretum saxatile* (1J)
- (5) with *Carpinus betulus* - transition to *Carpineto-Quercetum illimerosum mesotrophicum* (1H)
- (6) rocky forest steppe (*saxatilis*)
- (8) grassy forest steppe (*herbaceum*)

Natural tree species composition:

Generally: *Quercus petraea* agg. 60 %, *Quercus pubescens* 20 %, *Carpinus betulus* 10 %, (*Quercus cerris* 0.5 %), *Sorbus torminalis* 10 %, *Sorbus aria* 0.5 %, *Acer campestre* 0.5 %, thermophilous shrubs

In dependence on site condotions (recomended): *Quercus petraea* agg. 20 - 60 %, *Quercus pubescens* 0 - 50 %, *Quercus virgiliana* 10 - 30 %, *Quercus ceris* 0 - 10 %, *Fagus sylvatica* 0 - 20 %, (*Carpinus betulus*, *Acer campestre*, *Betula pendula*, *Sorbus aria*, *Sorbus torminalis*, *Tilia cordata*) 30 - 40 %

Absolute height yield class: *Quercus* spp. (8) 12 - 16 (22) m, *Carpinus betulus* 12 - 16 m, *Pinus sylvestris* (14) 18 - 22 m, *Tilia cordata* 14 m

Hazards: strongly by desiccation, considerably by soil erosion and karst effect (and grazing).

**2<sup>nd</sup> forest vegetation zone 2X - Corneto-Fagi-Quercetum xerothermicum**

Occurence: known only from areas of Žatec, Kladno, Maravian karst, Bohemian karst and Polabí lowland; sunny plateaus, karst fields.

Soil: very desiccated, shallow to moderately deep, frequently stony, loamy; predominantly Rendzic Leptosols, Cambi-Rendzic Leptosols and Lithi-Rendzic Leptosols - depends on site conditions; Calcaric Cambisols and Lithi-Calcaric Cambisols are on clay state and loess covering limestone; Skeli-Lithic Leptosols are on basalts.

Significant often dominant or indicator species:

<i>Anthericum ramosum</i>	<i>Dictamnus albus</i>
<i>Brachypodium pinnatum</i>	<i>Melica nutans</i>



*Campanula rapunculoides*    *Pyrethrum corymbosum*  
*Carex montana*                *Teucrium chamaedrys*  
*Coronilla varia*                *Viola hirta*

Forest site types:

(1) on loess (*Brachypodium pinnatum*)

(2) on Rendzina (*calcarium*)

Natural tree species composition:

Generally: *Quercus petraea* agg. 50 %, *Quercus pubescens* 10 %, *Fagus sylvatica* 20 %, *Carpinus betulus* 10 %, *Sorbus torminalis* (*Tilia cordata*) 10 %, thermophilous shrubs

In dependence on site conditions (recommended): *Quercus petraea* agg. 20 - 60 %, *Quercus pubescens* 0 - 50 %, *Fagus sylvatica* 0 - 20 %, (*Acer campestre*, *Carpinus betulus*, *Betula pendula*, *Sorbus aria*, *Sorbus torminalis*, *Tilia cordata*) 30 - 40 %

Absolute height yield class: *Quercus* spp. (12) 14 - 16 m, *Fagus sylvatica* 14 m, *Tilia cordata* 16 m

Hazards: considerably by desiccation and soil erosion.

**3<sup>rd</sup> forest vegetation zone 3X - *Corneto-Fagetum xerothermicum***

Occurrence: known only from Moravian karst and Šumava promontory; small area on limestone and loess; it transit to W category (categoria *calcaria*).

Soil: desiccation on summer, shallow and moderately deep, gravely on limestone; Lithi-Rendzic Leptosols and Cambi-Rendzic Leptosols - depends on skeleton content; Calcaric Cambisols - on loess.

Significant often dominant or indicator species:

Frequently *Nudum*                (*Buglossoides purpurocaerulea*)  
*Anthericum ramosum*            (*Carex pilosa*)  
*Convallaria majalis*            (*Mercurialis perennis*)  
*Hepatica nobilis*                (*Senecio nemorensis*)  
*Melica uniflora*                 (*Vincetoxicum hirundinaria*)  
(*Brachypodium sylvaticum*)    (*Viola mirabilis*)

Forest site types:

(1) *Convallaria majalis*

(2) *Melica uniflora*

((3) lime (*calcarium*) - collected type (Šumava promontory)

Natural tree species composition:

Generally: *Fagus sylvatica* 70 %, *Quercus petraea* agg. 20 %, *Tilia cordata* 10 %, *Acer platanoides* 0.5 %, *Acer campestre* 0.5 %, *Abies alba* 0.5 %, (*Sorbus torminalis* 0.5 %), thermophilous shrubs

3X1 and 3X2: *Fagus sylvatica* 30 - 80 %, *Quercus petraea* agg. 10 - 40 %, *Pinus sylvestris* 0 - 20 %, *Tilia cordata* ± 20 %, *Ulmus glabra* ± 20 %, *Abies alba* 0 - 10 %, *Carpinus betulus* ± 10 %, *Acer platanoides* ± 10 %, *Sorbus aucuparia* ± 10 %, *Acer campestre* ± 0.1 %, thermophilous shrubs

Absolute height yield class: *Fagus sylvatica* 22 m, *Quercus petraea* agg. 12 - 16 m

Hazards: considerably by desiccation and soil erosion.

**4<sup>th</sup> forest vegetation zone 4X - *Fagetum dealpinum* (*xerothermicum*)**

Occurrence: rare only (Moravian karst and promontory of Českomoravská highlands)

Soil: shallow to moderately deep, debris, slightly dry; Rendzi-Lithic Leptosols dominantly; Rendzic Leptosols, Cambi-Rendzic Leptosols and Lithi-Rendzic Leptosols rare.

Significant often dominant or indicator species:

<i>Ajuga genevensis</i>	<i>Festuca pallens</i>
<i>Asplenium viride</i>	<i>Phyteuma orbiculare</i>
<i>Anthericum ramosum</i>	<i>Poa stiriaca</i>
<i>Brachypodium pinnatum</i>	<i>Polygala amara</i>
<i>Calamagrostis varia</i>	<i>Rubus saxatilis</i>
<i>Carduus glaucinus</i>	<i>Sesleria albicans</i>
<i>Carex alba</i>	<i>Veronica austriaca</i>
<i>Centaurea mollis</i>	( <i>Cortusa matthiolii</i> )
<i>Centaurea triumfetti</i>	( <i>Cypripedium calceolus</i> )
<i>Cephalanthera rubra</i>	( <i>Daphne cneorum</i> )
<i>Clematis recta</i>	( <i>Leontodon incanus</i> )
<i>Dianthus superbus</i>	( <i>Pulsatilla</i> spp.)

Forest site types:

(1) *Sesleria albicans*, grassy, heliophytes and beech species dominates

(2) *Brachypodium pinnatum*

Natural tree species composition:

Generally: *Fagus sylvatica* 80 %, *Quercus petraea* agg. 10 %, *Pinus sylvestris* 10 %, *Abies alba* 0.5 %, *Tilia cordata* (+ *Tilia platyphyllos*) 0.5 %, *Acer platanoides* 0.5 %, *Sorbus torminalis* 0.5 %; canopy is opened

4X1: *Fagus sylvatica* 30 - 80 %, *Quercus robur* agg. 10 - 40 %, *Pinus sylvestris* 20 - 90 %, *Abies alba* 0 - 10 %, *Carpinus betulus* ± 10 %, *Acer platanoides* ± 10 %, *Tilia cordata* (+ *Tilia platyphyllos*) ± 20 %, *Ulmus glabra* ± 20 %, *Sorbus aucuparia* ± 10 %, *Acer campestre* ± 0.1 %, thermophilous shrubs

Absolute height yield class: *Fagus sylvatica* 16 - 20 m, *Quercus petraea* agg. 12 - 14 m

Hazards: soil erosion and karst effects.

**Azonal 0X - *Pinetum dealpinum* (xerothermicum)**

Occurrence: rare on limes and serpentines; different forest vegetation zones (relict communities); steep slopes and rocky ridges;

Soil: shallow, desiccated, strongly stony; Lithi-Rendzic Leptosols, Rendzic Leptosols and Skeli-Rendzic Leptosols - depends on site conditions; Serpenti-Skeletal Leptosols are on serpentines; Rendzi-Lithic Leptosols are on more skeleton sites.

Significant often dominant or indicator species:

<i>Allium senescens</i>	<i>Genista pilosa</i>
<i>Anthericum ramosum</i>	<i>Helianthemum nummularium</i>
<i>Biscutella leavigata</i>	<i>Hieracium pilosella</i>
<i>Brachypodium pinnatum</i>	<i>Lembotropis nigricans</i>
<i>Bupleurum falcatum</i>	<i>Pimpinella saxifraga</i>
<i>Carex digitata</i>	<i>Potentilla arenaria</i>
<i>Carex humilis</i>	<i>Potentilla argentea</i>
<i>Carlina acaulis</i>	<i>Saxifraga paniculata</i>
<i>Elytrigia intermedia</i>	<i>Seseli osseum</i>

<i>Festuca ovina</i>	<i>Sesleria albicans</i>
<i>Festuca pallens</i>	<i>Stipa capillata</i>
<i>Fragaria vesca</i>	<i>Thymus serpyllum</i>
<i>Vincetoxicum hirundinaria</i>	<i>Cortusa mathiolii</i> (Moravian karst only)

Forest site types:

- (1) *Brachypodium pinnatum* - less clear-cut
- (2) *Sesleria albicans*
- (3) serpentine (*serpentinicum*)

Natural tree species composition:

Generally: *Pinus sylvestris* 90 %, *Quercus petraea* agg. 10 %, *Carpinus betulus* 0.5 % (higher altitudes *Fagus sylvatica* 0.5 %), *Betula pendula* 0.5 %, thermophilous shrubs discontinuously OX2 and OX3: *Pinus sylvestris* 70 - 90 %, *Quercus petraea* agg.  $\pm$  20 %, *Fagus sylvatica* 0 - 20 %, *Carpinus betulus*  $\pm$  0.5 %, *Tilia cordata*  $\pm$  0.1 %, *Betula pendula* 0 - 10 %, *Sorbus torminalis*  $\pm$  0.1 %, *Sorbus aria*  $\pm$  0.1 %, thermophilous shrubs discontinuously

Absolute height yield class: *Pinus sylvestris* 12 - 16 m, *Quercus petraea* agg. 12 - 14 (16) m

Hazards: Stands take soil protection function only.

#### 2.3.4. Maple series (J) – *series acerosa*

Maple series is characteristic by humus enriching, mostly by falling down the slope. Sites have good nitrification, which results to abundance of nitrophilous and heminitrophilous species. Mull-moder and mull make humus forms characteristic for these stands.

Tree layer is made dominantly by *Fraxinus excelsior*, *Ulmus glabra*, *Acer platanoides*, *Acer pseudoplatanus*, *Acer campestre*, *Tilia cordata* and *Tilia platyphyllos*. Tree species characterizing vegetation zones (*Quercus petraea* agg., *Fagus sylvatica* and *Picea abies*) are in admixture. Herb layer is made by *Anthriscus sylvestris*, *Alliaria officinalis*, *Geranium robertianum*, *Geum urbanum*, *Dentaria enneaphyllos*, *Festuca gigantea*, *Chelidonium majus*, *Galeobdolon luteum*, *Lamium maculatum*, *Lunaria rediviva*, *Hordelymus europaeus* *Mercurialis perennis*. Ferns are frequent. *Aruncus vulgaris* is typical for deep close valleys. Spring aspect is considerably developed (*Corydalis cava*, *Gagea lutea*, *Anemone ranunculoides*, *Adoxa moschatelina*, *Arum maculatum* and *Allium ursinum*). Mosses are developed on stones only, their abundance decrease on soil surface. Series cover categories, which differ by soils and production.

**1<sup>st</sup> forest vegetation zone** *Carpineto-Acereta* (hornbeam-maple forests („mixed debris woods“)). *Carpinus betulus* and *Quercus petraea* agg. are naturally presented. *Acer campestre*, *Acer platanoides*, *Tilia cordata*, *Sorbus torminalis* and *Cerasus avium* are admixed. *Fraxinus excelsior* is on calcic soils. Nitrophilous species are basic dominants in herb layer, further species tending to *Carpineto-Quercetum* and *Fageto-Quercetum* (*Stellaria holostea*, *Galium sylvaticum*, *Viola mirabilis*) and species of thermophilous transitions to both of them. Nitrophilous species of the higher forest vegetation zones lack (e.g. *Dentaria enneaphyllos* or *Dentaria glandulosa* resp.).

**2<sup>nd</sup> forest vegetation zone** *Carpineto-Querceta acerosa* (maple hornbeam-oak forests) (1st forest vegetation zone) and *Fageto-Querceta acerosa* (maple beech-oak forests) (2nd forest vegetation zone) are transitioned „aceric“ communities, where tree species composition and phytocoenosis relate to transition position between debris and developed soils.

**3<sup>rd</sup> forest vegetation zone** *Tilieta-Acereta* (linden-maple forests) around ridge breaks and rocky outcrops, on debris and ravines slope at 3rd forest vegetation zone. Positive soil and climate conditions allow characteristic abundance of „valuable“ broadleaves trees. Shrub

layer is pure developed. Nitrophilous and heminitrophilous species with tall herbs are dominant in phytocoenoses. Beech accompanied species are abundant. *Lunaria rediviva* lacks typically. Thermophilous species decrease.

**4<sup>th</sup> forest vegetation zone;** Aceric transitions are made by *Tilii-Querceto-Fageta acerosa* (maple linden-oak-beech) (3rd forest vegetation zone) and *Tilieto-Fageta acerosa* (maple linden-beech forests) (4th forest vegetation zone).

**5<sup>th</sup> forest vegetation zone** *Acereta saxatilis* (talus maple forests) have two varieties. *Fraxineto-Aceretum* (ash-maple forests) is the first one nutrient-richer. It is community of ravine debris and crumbles down hill peaks, which it is connected to positive air humidity. It covers 5th (fir-beech) and 6th (spruce-beech) forest vegetation zones. Herb layer is dominated by nitrophilous species and it is visible double étaged. *Lunaria rediviva* dominates at higher étage (*Salvia glutinosa* at *Carpaticum*). *Petasites albus* is on transition to U (*categoria vallidosa*) and V (*categoria humida*) categories. Tall ferns dominate at some types. *Urtica dioica*, *Allium ursinum* *Alliaria petiolata* are dominant too, *Mercurialis perennis* and *Galeobdolon luteum* do not lack. *Ulmeto-Aceretum* (elm-maple forests) is the second, nutrient poorer variety. It covers again two forest vegetation zones (5th and 6th). It is nutrient poorer due to poorer soil material. *Lunaria rediviva* lacks and *Dentaria enneaphyllos* and *Allium ursinum* occurrences are limited. Ferns make higher herb layer. *Impatiens noli-tangere*, *Urtica dioica*, *Festuca altissima* a *Prenanthes purpurea*, *Mercurialis perennis* and other heminitrophilous species are characteristic. Higher and lower vegetation zones differ in rang of *Acereta saxatile* (talus maple forests).

*Acereto-Fageta* (sycamore-beech forests) (5th forest vegetation zone) are maple transition with rather wider ecological range. They range transitions of more developed soil on nutrient-richer bases and debris on poor basis. They are closely to *Ulmeto-Acereta*.

**6<sup>th</sup> and 7<sup>th</sup> forest vegetation zones** - *Aceri-Piceeto-Fageta* and *Piceeto-Fageta acreosa* (sycamore-spruce-beech forests) are similar to before mentioned, but at 6th forest vegetation zone (simultaneously, they cover 7th forest vegetation zone, which it does not distinguish there) and they differ by natural presence of *Picea abies* and individual presence of sub-alpine herb species.

**8<sup>th</sup> vegetation zone** - *Acereto-Piceeta* (sycamore-spruce forests) cover not only all categories of maple series (*series acerosa*), but partly even nutrient-rich series (*series mesotrophica*), since richness indicators are more nitrophilous at this zone and communities have transition character between nutrient-rich (*series mesotrophica*) and maple series (*series acerosa*). Understory uses to be double étaged with an exception of phytocenoses with *Oxalis acetosella* dominancy. Tall herbs make upper layer, especially by sub-alpine. *Adenostyles alliariae*, *Doronicum austriacum*, *Cicerbita alpina*, *Veratrum album*, *Petasites albus* and *Athyrium distentifolium* dominate. *Picea abies* dominates at tree layer; *Acer pseudoplatanus* (never *Acer platanoides* and *Acer campestre*) is admixed. *Fagus sylvatica* is admixed too, but it looks shrubby-like.

#### 2.3.4.1 *Categoria acerosa saxatile* (J – category)

Category is characterized by debris or strongly stony soil and nitrophilous vegetation. It is mostly on steep ( $\pm$  shadow) debris slopes or ridges and around stony peaks and rocky headlands. Skeletic Leptosols and Cambi-Eutric Leptosols are dominated soil types. These both make mosaic with undeveloped soils of rocky outcrops - Eutric-Lithic Leptosols. Dominant soil types less frequently transit to more developed soils - Skeletic Cambisols. Cambi-Rendzic Leptosols, Calcaric Regosols and Lithi-Calcaric Regosols are on lime. Soils are positive humid (by condensation water), porous, well aired, with a good humification and with high humus content.

Phytocoenoses are characterized by dominance of nitrophilous species (e.g. *Mercurialis perennis*, *Lamium maculatum*, *Hordelymus europaeus*, *Geranium robertianum* and *Alliaria petiolata*). Forest site types with *Galeobdolon luteum* together with fern (*filices*) types make nutrient-poorer type varieties. Nutrient-richer varieties - *Lunaria rediviva* and *Arum maculatum* - present abundantly *Fraxinus excelsior* and they are transited to *Fraxineto-Aceretum vallidosum* (5U). Grassy types of phytocoenoses with *Calamagrostis arundinacea* and *Festuca altissima* are the most frequent degraded stage on debris. Limes, clay slates and basalts are characteristic basis of maple stands and they make separate types or type variants. Ravine maple stands make unambiguous sub-complexes. They are characteristic by their relief and above-standard yield class. Stands have anti-erosion and soil protection ecological functions. Stem production depends on individual types. Stands have suitable conditions for natural regeneration of valuable broadleaves species (*Acer* spp., *Ulmus* spp.) and linden (*Tilia* spp.), less for European beech (*Fagus sylvatica*) and Sessile oak (*Quercus petraea* spp.).

### **Forest site type complexes XXXXXX**

#### **1<sup>st</sup> + 2<sup>nd</sup> forest vegetation zones 1J - *Carpineto-Aceretum saxatilis***

Occurrence: small soil areas on warm slopes and rocky shifts; lowlands and uplands; nutrient-richer soil materials.

Soil: moderately deep, slightly humid - desiccated on summer, stony to debris (stabilized debris with loess admixture too); predominantly Skeletic Leptosols and Cambi-Eutric Leptosols; they transit to Skeli-Lithic Leptosols and Lithic Leptosols (either silicate or carbonate); Lithi-Rendzic Leptosols are on limes, exceptionally Rendzic Leptosols; eroded Haplic Luvisols are rare; mesotrophic Dystric Cambisols are patchy.

#### Significant often dominant or indicator species:

<i>Alliaria petiolata</i>	<i>Chelidonium majus</i>
<i>Asarum europaeum</i>	<i>Impatiens noli-tangere</i>
<i>Brachypodium sylvaticum</i>	<i>Lamium maculatum</i>
<i>Lithospermum purpureo-coeruleum</i>	<i>Melica nutans</i>
<i>Campanula persicifolia</i>	<i>Mercurialis perennis</i>
<i>Campanula rapunculoides</i>	( <i>Oxalis acetosella</i> )
<i>Campanula trachelium</i>	<i>Poa nemoralis</i>
<i>Clinopodium vulgare</i>	<i>Polygonatum multiflorum</i>
<i>Corydalis cava</i>	<i>Pulmonaria officinalis</i>
<i>Dryopteris carthusiana</i>	<i>Pyrethrum corymbosum</i>
<i>Galeobdolon luteum</i>	<i>Stellaria holostea</i>
<i>Galium aparine</i>	<i>Urtica dioica</i>
<i>Galium sylvaticum</i>	( <i>Allium ursinum</i> )
<i>Geranium robertianum</i>	( <i>Brachypodium pinnatum</i> )
<i>Geum urbanum</i>	( <i>Melica uniflora</i> )
<i>Hepatica nobilis</i>	( <i>Vincetoxicum hirundinaria</i> )

#### Forest site types:

- (1) *Poa nemoralis*
- (2) lime (*calcarium*)
- (3) *Geranium robertianum*
- (4) *Lamium maculatum*
- (5) *Mercurialis perennis*
- (6) ravine - in loamy hollows

Some types make soil variants: basalt, clay slate and lime.

Natural tree species composition:

Generally: *Quercus petraea* agg. 30 %, *Tilia cordata* 20 %, *Acer platanoides* 20 %, *Carpinus betulus* 20 %, *Sorbus torminalis* 10 %, *Acer campestre* 0.5 %, *Cerasus avium* 0.5 %, shrubs 1J1, 1J3, 1J4 and 1J5: *Quercus petraea* agg. 20 - 50 %, *Carpinus betulus* 10 - 30 %, *Acer platanoides* 20 - 40 %, *Ulmus* spp. ± 10 %, *Fraxinus excelsior* ± 10 %, *Tilia cordata* 10 - 30 %, *Sorbus torminalis* ± 10 %, (*Cerasus avium*, *Acer campestre*, *Sorbus aria*) ± 0.1 %

Absolute height yield class: *Quercus petraea* agg. (12) 18 - 22 (24) m, *Acer platanoides* 20 - 22 (24) m, *Tilia cordata* (18) 20 - 24 m, *Carpinus betulus* 10 - 16 (18) m

Hazards: strongly by soil erosion, moderately by brush and desiccation.

**3<sup>rd</sup> + 2<sup>nd</sup> + 4<sup>th</sup> forest vegetation zones 3J - *Tilieto-Aceretum saxatilis***

Occurrence: uplands (cool sites) to highlands and promontory (warm sites); stony debris slopes, ridges, ravines; mostly on nutrient-richer bases.

Soil: moderately deep, stony to rocky (free and stabilized debris); predominantly Skeli-Lithic Leptosols - with more skeleton, Skeletic Leptosols and Cambi-Eutric Leptosols - less skeleton; mesotrophic Skeletic Cambisols are patchy; eutrophic Dystric Cambisols to Eutric Cambisols are down the slopes; Liothi-Rendzic Leptosols and silicate Lithic Leptosols are on more debris sites, Rendzic Leptosols and Cambi-Rendzic Leptosols use to be on limes.

Significant often dominant or indicator species:

<i>Actaea spicata</i>	<i>Chelidonium majus</i>
<i>Alliaria petiolata</i>	<i>Impatiens noli-tangere</i>
<i>Aruncus vulgaris</i>	<i>Lamium maculatum</i>
<i>Asarum europaeum</i>	<i>Lathyrus vernus</i>
<i>Asplenium trichomanes</i>	<i>Lunaria rediviva</i>
<i>Athyrium filix-femina</i>	<i>Melica nutans</i>
<i>Brachypodium sylvaticum</i>	<i>Melica uniflora</i>
<i>Calamagrostis arundinacea</i>	<i>Mercurialis perennis</i>
<i>Campanula trachelium</i>	<i>Oxalis acetosella</i>
<i>Digitalis grandiflora</i>	<i>Poa nemoralis</i>
<i>Dryopteris carthusiana</i>	<i>Polypodium vulgare</i>
<i>Dryopteris dilatata</i>	<i>Pulmonaria officinalis</i>
<i>Fragaria vesca</i>	<i>Senecio fuchsii</i>
<i>Galeobdolon luteum</i>	<i>Stellaria holostea</i>
<i>Galium odoratum</i>	<i>Urtica dioica</i>
<i>Geranium robertianum</i>	( <i>Allium ursinum</i> )
<i>Hepatica nobilis</i>	( <i>Campanula persicifolia</i> )
<i>Hypnum cupressiforme</i>	( <i>Galium sylvaticum</i> )
( <i>Vincetoxicum hirundinaria</i> )	

Forest site types:

"nutrient-poorer":

- (1) *Poa nemoralis*, on warm sites
- (2) ferns (*filices*), rocky sites
- (3) *Galeobdolon luteum*

"nutrient-richer":

- (4) *Mercurialis perennis*
- (5) *Lunaria rediviva*
- (6) lime (*calcarium*)(with *Taxus baccata*)

(8) ravine

(9) ravine maple stands - lower zone (*Aruncus vulgaris*)

Natural tree species composition:

Generally: *Fagus sylvatica* 40 %, *Tilia cordata* 30 %, *Acer platanoides* (*Acer pseudoplatanus* resp.) 20 %, *Abies alba* 10 %, *Ulmus glabra* 0.5 %, *Carpinus betulus* 0.5 %, *Quercus petraea* agg. 5 - 10 %, *Fraxinus excelsior* 0.5 %

3J2, 3J4, 3J5 and 3J6: *Abies alba* ± 0 %, *Quercus petraea* agg. + *Quercus robur* ± 20 %, *Fagus sylvatica* 10 - 50 %, *Carpinus betulus* ± 20 %, *Acer platanoides* (*Acer pseudoplatanus* resp.) 10 - 40 %, *Fraxinus excelsior* ± 10 %, *Ulmus* spp. ± 10 %, *Tilia cordata* + *Tilia platyphyllos* 10 - 40 %, *Taxus baccata* ± 0.1 %

Absolute height yield class: *Fagus sylvatica* (16) 22 - 26 (34) m, *Acer pseudoplatanus* (20) 22 - 28 (34) m, *Acer platanoides* (18) 22 - 26 (30) m, *Tilia* spp. (18) 22 - 26 (30) m, *Quercus petraea* agg. 16 - 20 m, *Quercus robur* 26 - 28 m, *Pinus sylvestris* (16) 20 - (18) 24 m, *Picea abies* 22 - 28 (34) m, *Carpinus betulus* 18 m, *Fraxinus excelsior* (20) 22 (36) m, *Ulmus glabra* 22 - 24 m

Hazards: strongly by soil erosion and brush (especially by *Urtica dioica*).

**5<sup>th</sup> + 4<sup>th</sup> + 6<sup>th</sup> forest vegetation zones 5J - *Ulmi-Fraxineto-Aceretum saxatilis***

Occurrence: from highlands to mountains on debris slopes; ravines and valleys; on nutrient-richer (*Fraxineto-Aceretum*) and nutrient-poorer (*Ulmeto-Aceretum*) soil materials.

Soil: fresh humid, enriched by soil and humus material flow down the slope; stony, deep enough; predominantly Cambic Leptosol, Skeli-Lithic Leptosols are frequent (especially with mull humus form, moder is rare); Cambi-Rendzic Leptosols to Lithi-Rendzic Leptosols are on limes; Lithic Leptosols are on very stony bases; meso- and eutrophic Dystric Cambisols are in ravines; saturated Skeletic Cambisols are in higher skeleton content; Stagni-Dystric Cambisols are closely slopes bottom.

Significant often dominant or indicator species:

<i>Actaea spicata</i>	<i>Hordelymus europaeus</i>
<i>Alliaria petiolata</i>	<i>Impatiens noli-tangere</i>
<i>Allium ursinum</i>	<i>Lunaria rediviva</i>
<i>Asarum europaeum</i>	<i>Melica nutans</i>
<i>Athyrium filix-femina</i>	<i>Mercurialis perennis</i>
<i>Brachypodium sylvaticum</i>	<i>Milium effusum</i>
<i>Bromus benekenii</i>	<i>Mycelis muralis</i>
<i>Calamagrostis arundinacea</i>	<i>Oxalis acetosella</i>
<i>Carex sylvatica</i>	<i>Prenanthes purpurea</i>
<i>Circaea alpina</i>	<i>Rubus idaeus</i>
<i>Dentaria bulbifera</i>	<i>Salvia glutinosa</i>
<i>Dentaria enneaphyllos</i>	<i>Senecio fuchsii</i>
<i>Dryopteris dilatata</i>	<i>Stachys sylvatica</i>
<i>Dryopteris filix-mas</i>	<i>Stellaria nemorum</i>
<i>Festuca altissima</i>	<i>Urtica dioica</i>
<i>Festuca gigantea</i>	( <i>Aconitum vulparia</i> )
<i>Galeobdolon luteum</i>	( <i>Arum maculatum</i> )
<i>Galium odoratum</i>	( <i>Dentaria glandulosa</i> )
<i>Geranium robertianum</i>	( <i>Luzula sylvatica</i> )
<i>Gymnocarpium dryopteris</i>	( <i>Poa nemoralis</i> )
( <i>Rumex alpestris</i> )	

Forest site types:

- (1) *Mercurialis perennis*
- (2) *Impatiens noli-tangere*
- (3) ferns (*filices*) - nutrient-richer
- (5) *Lunaria rediviva*
- (6) ridge
- (8) stunted (*humilis*)
- (9) ravine maple stands - higher zone

Natural tree species composition: *Fagus sylvatica* 40 %, *Abies alba* 30 %, *Acer pseudoplatanus* 20 %, *Ulmus glabra* 10 %, *Fraxinus excelsior* 0.5 %, *Picea abies* 5 %, (*Taxus baccata* 0.5 %)

Absolute height yield class: *Picea abies* (22) 24 - 30 (38) m, *Abies alba* (20) 24 - 26 (36) m, *Fagus sylvatica* (20) 24 - 28 (32) m, *Acer pseudoplatanus* (18) 22 - 26 (30) m, *Tilia platyphyllos* (18) 24 - 26 (28) m

Hazards: strongly by soil erosion and brush; *Picea abies* by rot on nutrient-rich basis.

**6<sup>th</sup> + 7<sup>th</sup> forest vegetation zone 6J - *Ulmi-Piceeto-Aceretum saxatile***

Occurrence: at mountains on debris slopes and ravines; on nutrient-richer (*Fraxineto-Aceretum*) and nutrient-poorer (*Ulmeto-Aceretum*) soil materials (mapped on Šumava Mts. especially).

Soil: fresh humid, enriched by soil and humus material flow down the slope; stony, deep enough; predominantly Cambic Leptosols, Skeli-Lithic Leptosols are frequent (especially with mull humus form, moder is rare); Cambi-Rendzic Leptosols to Lithi-Rendzic Leptosols are on limes; Lithic Leptosols are on very stony bases; meso- and eutrophic Dystric Cambisols are in ravines; saturated Skeletic Cambisols are in higher skeleton content; Stagni-Dystric Cambisols are closely slopes bottom.

Significant often dominant or indicator species:

<i>Actaea spicata</i>	<i>Hordelymus europaeus</i>
<i>Alliaria petiolata</i>	<i>Impatiens noli-tangere</i>
<i>Allium ursinum</i>	( <i>Lunaria rediviva</i> )
<i>Asarum europaeum</i>	<i>Melica nutans</i>
<i>Athyrium filix-femina</i>	<i>Mercurialis perennis</i>
<i>Brachypodium sylvaticum</i>	<i>Milium effusum</i>
( <i>Bromus benekenii</i> )	<i>Mycelis muralis</i>
<i>Calamagrostis arundinacea</i>	<i>Oxalis acetosella</i>
<i>Carex sylvatica</i>	<i>Prenanthes purpurea</i>
<i>Circaea alpina</i>	<i>Rubus idaeus</i>
( <i>Dentaria bulbifera</i> )	( <i>Salvia glutinosa</i> )
( <i>Dentaria enneaphyllos</i> )	<i>Senecio fuchsii</i>
<i>Dryopteris dilatata</i>	<i>Stachys sylvatica</i>
<i>Dryopteris filix-mas</i>	<i>Stellaria nemorum</i>
<i>Festuca altissima</i>	<i>Urtica dioica</i>
<i>Festuca gigantea</i>	( <i>Aconitum vulparia</i> )
<i>Galeobdolon luteum</i>	( <i>Arum maculatum</i> )
( <i>Galium odoratum</i> )	( <i>Dentaria glandulosa</i> )
<i>Geranium robertianum</i>	<i>Luzula sylvatica</i>
<i>Gymnocarpium dryopteris</i>	( <i>Poa nemoralis</i> )



(*Doronicum austriacum*)      *Rumex alpestris*  
(*Adenostyles alliariae*)      (*Cicerbita alpina*)

Forest site types:

- (1) *Mercurialis perennis*
- (2) *Impatiens noli-tangere*
- (3) ferns (*filices*) - nutrient-richer
- (5) *Lunaria rediviva*
- (6) ridge
- (8) stunted (*humilis*)
- (9) ravine maple stands - higher zone

Natural tree species composition: *Fagus sylvatica* 40 %, *Abies alba* 30 %, *Acer pseudoplatanus* 20 %, *Ulmus glabra* 10 %, *Fraxinus excelsior* 0.5 %, *Picea abies* 5 %, (*Taxus baccata* 0.5 %)

Absolute height yield class: *Picea abies* (22) 24 - 30 (38) m, *Abies alba* (20) 24 - 26 (36) m, *Fagus sylvatica* (20) 24 - 28 (32) m, *Acer pseudoplatanus* (18) 22 - 26 (30) m, *Tilia platyphyllos* (18) 24 - 26 (28) m

Hazards: strongly by soil erosion and brush; *Picea abies* by rot on nutrient-rich basis.

#### 2.3.4.2 *Categoria acerosa lapidosa* (A – category)

Category is a transition to nutrient-rich series (series mesotrophica) on loamy filled debris and stony soils of not so much extreme sites. Forests already belong to commercial (rare to protected one). Category is typical for slopes, ridges, less for ravines. Mesotrophic or eutrophic Skeletic Cambisols, Cambi-Eutric Leptosols and Cambi-Rendzic Leptosols are general soil types.

Species composition is mostly poorer than J category (*categoria acerosa saxatile*). These localities are slightly gravelly and loamy debris of nutrient-rich soil materials with *Arum maculatum* and types with *Lunaria rediviva* or with *Hordelymus europaeus* are an exception. These are on transition to *Fraxineto-Aceretum vallidosum* (5U). *Mercurialis perennis*, *Melica uniflora* *Poa nemoralis* are basic types. Their variants on basalts and clay slates are significant. Very productive types are in *Carpaticum*.

Stands have infiltration and anti-erosion ecological function. Production is above standard. Broadleaves natural regeneration is good bellow slight shadow. It stops through strong brush hazards.

#### Forest site type complexes

##### 1<sup>st</sup> forest vegetation zone 1A - *Aceri-Carpineto-Quercetum lapidosum*

Occurrence: loamy debris with loess at lower elevations; heavy stony sites on slopes (warm at uplands); ravines, down the ridges, terraces and plateaus.

Soil: moderately deep, mostly slightly desiccated, strongly with skeleton content; almost Skeletic Cambisols only, Dystric Cambisols frequently mesotrophic, sometimes eutrophic and Cambi-Eutric Leptosols are very rarely; Rendzic Leptosols and Lithi-Rendzic Leptosols are on limes; Arenic Haplic Chernozems are on calcic pit-run gravel alluvia extraordinary.

Significant often dominant or indicator species:

<i>Asarum europaeum</i>	<i>Mercurialis perennis</i>
<i>Lithospermum purpureo-coeruleum</i>	<i>Poa nemoralis</i>
<i>Calamagrostis arundinacea</i>	<i>Pulmonaria mollis</i>
<i>Campanula persicifolia</i>	<i>Pyrethrum corymbosum</i>

*Campanula rapunculoides*  
*Campanula trachelium*  
*Carex sylvatica*  
*Fragaria vesca*  
*Hepatica nobilis*  
*Lathyrus vernus*  
*Luzula luzuloides*  
*Melica nutans*  
*Melica uniflora*

*Stellaria holostea*  
(*Alliaria petiolata*)  
(*Athyrium filix-femina*)  
(*Dryopteris dilatata*)  
(*Dryopteris filix-mas*)  
(*Galium odoratum*)  
(*Gymnocarpium dryopteris*)  
(*Vincetoxicum hirundinaria*)

Forest site types:

- (1) *Mercurialis perennis*
- (2) *Melica uniflora*
- (3) *Stellaria holostea*
- (5) *Poa nemoralis*
- (6) on pit-run gravels; Southmoravian vales (*saxatilis*)
- (9) lime (*calcarium*)

Natural tree species composition:

Generally: *Quercus petraea* agg. 70 %, *Tilia* spp. 10 %, *Carpinus betulus* 10 %, *Acer platanoides* 10 %, *Sorbus torminalis* 0.5 %

In dependence on site condotions: *Pinus sylvestris* 0 - 10 %, *Quercus petraea* 40 - 60 %, *Fagus sylvatica* ± 30 %, *Acer platanoides* ± 30 %, *Fraxinus excelsior* ± 0.1 %, (*Ulmus glabra*, *Ulmus minor*, *Ulmis laevis*) ± 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, (*Betula pendula*, *Acer campestre*, *Taxus baccata*) 0 - 10 %

1A9: *Quercus petraea* agg. + *Quercus robus* 40 - 60 %, *Fagus sylvatica* 0 - 20 %, *Acer platanoides* ± 30 %, *Fraxinus excelsior* ± 0.1 %, (*Ulmus glabra*, *Ulmus minor*, *Ulmus laevis*) ± 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, (*Betula pendula*, *Acer campestre*, *Taxus baccata*) 0 - 10 %

Absolute height yield class: *Quercus* spp. (16) 18 - 22 (24) m, *Pinus sylvestris* 18 - 22 m, *Acer platanoides* 22 - 24 m, *Tilia* spp. 22 - 24 m, *Carpinus betulus* 10 - 12 m

Hazards: soil erosion, sometimes by desiccation.

**2<sup>nd</sup> forest vegetation zone 2A - *Aceri-Fageto-Quercetum lapidosum***

Occurence: small plots of loamy debris in uplands; stony, developed soils on convex slopes; flat slopes, terraces, ravines.

Soil: gravel to stony; slightly desiccated at summer; almost predominantly mesotrophic Skeletic Cambisols (eutrophic sometimes), they rare transit to Cambi-Eutric Leptosols; Haplic Luvisols and eroded Haplic Luvisols are quite rare; Rendzic Leptosols, Lithi-Rendzic Leptosols and Cambi-Rendzic Leptosols are on limes; Calcaric Cambisols are on clay slates.

Significant often dominant or indicator species:

<i>Actaea spicata</i>	<i>Gymnocarpium dryopteris</i>
<i>Alliaria petiolata</i>	<i>Hepatica nobilis</i>
<i>Athyrium filix-femina</i>	<i>Euphorbia dulcis</i>
<i>Brachypodium sylvaticum</i>	<i>Lathyrus vernus</i>
<i>Campanula persicifolia</i>	<i>Melica nutans</i>
<i>Carex digitata</i>	<i>Melica uniflora</i>
<i>Convallaria majalis</i>	<i>Mercurialis perennis</i>
<i>Corydalis solida</i>	<i>Poa nemoralis</i>

<i>Dentaria bulbifera</i>	<i>Pulmonaria officinalis</i>
<i>Dryopteris dilatata</i>	<i>Stellaria holostea</i>
<i>Dryopteris filix-mas</i>	( <i>Campanula trachelium</i> )
<i>Euphorbia amygdaloides</i>	( <i>Carex michelii</i> )
<i>Galeobdolon luteum</i>	( <i>Carex pilosa</i> )
<i>Galium odoratum</i>	( <i>Dactylis glomerata</i> )
<i>Galium sylvaticum</i>	( <i>Galium schultesii</i> )
<i>Geranium robertianum</i>	( <i>Hordelymus europaeus</i> )
( <i>Melittis melissophyllum</i> )	

Forest site types:

- (1) *Mercurialis perennis*
- (2) *Melica uniflora*
- (3) *Poa nemoralis*
- (4) ridge (*Acer platanoides*)
- (5) *Stellaria holostea*
- (9) lime (*calcarium*)

Natural tree species composition:

Generally: *Quercus petraea* agg. 50 %, *Fagus sylvatica* 10 %, *Tilia cordata* 20 %, *Acer platanoides* 10 %, *Carpinus betulus* 10 %, *Acer campestre* 0.5 %

In dependence on site condotions: *Quercus petraea* agg. 40 - 60 %, *Fagus sylvatica* ± 30 %, *Acer platanoides* ± 30 %, *Pinus sylvestris* 0 - 10 %, *Fraxinus excelsior* ± 0.5 %, (*Ulmus glabra*, *Ulmus minor*, *Ulmus laevis*) ± 10 %, *Tilia cordata* ± 20 %, (*Betula pendula*, *Acer campestre*, *Taxus baccata*) 0 - 10 %

More stony sites: *Quercus petraea* agg. 40 - 60 %, *Fagus sylvatica* 0 - 20 %, *Acer platanoides* ± 30 %, *Fraxinus excelsior* ± 0.5 %, (*Ulmus glabra*, *Ulmus minor*, *Ulmus laevis*) ± 10 %, *Tilia cordata* ± 20 %, (*Betula pendula*, *Acer campestre*, *Taxus baccata*) 0 - 10 %

Absolute height yield class: *Quercus petraea* agg. (16) 18 - 22 (26) m, *Fagus sylvatica* 26 (28) m, *Acer platanoides* 22 (26) m, *Pinus sylvestris* 18 - 22 m, *Carpinus betulus* (12) 14 - 16 m, *Tilia cordata* (18) 20 - 22 (24) m

Hazards: considerably by soil erosion, moderately by brush, sometimes by desiccation.

**3<sup>rd</sup> forest vegetation zone 3A - *Tilii-Querceto-Fagetum acerosum lapidosum***

Occurence: convex slopes and flat ridges in uplands (300 to 500 m, on lime up to 600 m).

Soil: developed, but heavy stony; slightly desiccated from above downwards; mesotrophic Skeletic Cambisols (sometimes eutrophic too) and mesotrophic Dystric Cambisols are frequent; Cambi-Eutric Leptosols occur on higher skeleton proportion sites; Cambi-Rendzic Leptosols are on limes; Calcaric Cambisols are on clay slates.

Significant often dominant or indicator species:

<i>Actaea spicata</i>	<i>Lathyrus vernus</i>
<i>Asarum europaeum</i>	( <i>Luzula luzuloides</i> )
<i>Athyrium filix-femina</i>	<i>Melica uniflora</i>
<i>Brachypodium pinnatum</i>	<i>Mercurialis perennis</i>
<i>Bromus benekenii</i>	<i>Mycelis muralis</i>
( <i>Calamagrostis arundinacea</i> )	<i>Myosotis sylvatica</i>
<i>Campanula persicifolia</i>	<i>Oxalis acetosella</i>
<i>Campanula trachelium</i>	<i>Plagiomnium affine</i>
<i>Carex digitata</i>	<i>Poa nemoralis</i>

<i>Carex pairae</i>	<i>Rubus fruticosus</i> agg.
<i>Dentaria bulbifera</i>	<i>Rubus idaeus</i>
<i>Dryopteris dilatata</i>	<i>Senecio fuchsii</i>
<i>Dryopteris filix-mas</i>	<i>Stellaria holostea</i>
<i>Euphorbia amygdaloides</i>	<i>Urtica dioica</i>
<i>Galeobdolon luteum</i>	<i>Viola reichenbachiana</i>
<i>Galium aparine</i>	( <i>Aegopodium podagraria</i> )
<i>Galium odoratum</i>	( <i>Convallaria majalis</i> )
<i>Galium sylvaticum</i>	( <i>Dentaria enneaphyllos</i> )
<i>Geranium robertianum</i>	( <i>Hedera helix</i> )
<i>Hacquetia epipactis</i>	( <i>Hordelymus europaeus</i> )
<i>Hepatica nobilis</i>	( <i>Impatiens noli-tangere</i> )
( <i>Hieracium murorum</i> )	( <i>Lamium maculatum</i> )
<i>Chelidonium majus</i>	( <i>Melica nutans</i> )
( <i>Primula veris</i> )	

#### Forest site types:

- (1) *Mercurialis perennis*
- (2) *Melica uniflora*
- (3) *Galeobdolon luteum*
- (4) *Carex digitata* + *Calamagrostis arundinacea* - nutrient-poorer type
- (5) ferns (*filices*)
- (6) *Poa nemoralis*
- (9) lime (*calcarium*)

#### Natural tree species composition:

Generally: *Fagus sylvatica* 50 %, *Tilia cordata* 20 %, *Quercus petraea* 10 %, *Acer platanoides* 10 %, *Abies alba* 10 %

In dependence on site condotions: *Fagus sylvatica* 40 - 70 %, *Quercus petraea* ± 20 %, *Abies alba* ± 20 %, *Pinus sylvestris* 0 - 10 %, *Carpinus betulus* 5 %, *Acer platanoides* 10 - 20 %, *Fraxinus excelsior* 0.5 %, *Ulmus* spp. 5 %, *Tilia cordata* ± 20 %, *Sorbus torminalis* ± 0.5 %, *Cerasus avium* ± 0.5 %, (*Taxus baccata* 0.1 %)

Absolute height yield class: *Fagus sylvatica* (20) 22 - 26 (34) m, *Picea abies* (18) 24 - 28 (34) m, *Quercus petraea* (18) 22 - 24 (28) m, *Pinus sylvestris* (20) 22 - 24 (26) m, *Acer platanoides* 26 m, *Acer pseudoplatanus* (22) 24 - 26 (30) m, *Tilia cordata* (18) 26 - 30 (34) m

Hazards: considerably by soil erosion and brush; sunny (warm) sites by desiccation.

#### **4<sup>th</sup> forest vegetation zone 4A - *Tilieto-Fagetum acerosum lapidosum***

Occurence: uplands (colder sites), highlands (warm and ridge sites); stony slopes and ridges.

Soil: steady humid, heavy stony, with a high humus content; predominantly Skeletic Cambisols or Dystric Cambisols, both mesotrophic (eventually eutrophic); Cambi-Eutric Leptosols are on higher skeleton content sites; Cambi-Rendzic Leptosols (sometimes Rendzic Leptosols) are on limes; Calcaric Cambisols are on clay slates.

#### Significant often dominant or indicator species:

<i>Brachypodium sylvaticum</i>	<i>Mercurialis perennis</i>
<i>Bromus benekenii</i>	<i>Mycelis muralis</i>
<i>Campanula persicifolia</i>	<i>Oxalis acetosella</i>
<i>Dentaria bulbifera</i>	<i>Poa nemoralis</i>
<i>Dentaria enneaphyllos</i>	<i>Senecio fuchsii</i>

<i>Dryopteris filix-mas</i>	<i>Viola hirta</i>
<i>Galeobdolon luteum</i>	( <i>Calamagrostis arundinacea</i> )
<i>Galium odoratum</i>	( <i>Carex pilulifera</i> )
<i>Geranium robertianum</i>	( <i>Dentaria glandulosa</i> )
<i>Hedera helix</i>	( <i>Melica nutans</i> )
<i>Hepatica nobilis</i>	( <i>Sanicula europaea</i> )
<i>Melica uniflora</i>	

Forest site types:

- (1) *Mercurialis perennis*
- (2) *Melica uniflora*
- (3) ferns (*filices*), more stony slopes (nutrient-poorer type)
- (4) *Galeobdolon luteum*
- (6) *Acer pseudoplatanus* - on ridges
- (9) lime (*Hedera helix*)

Natural tree species composition:

Generally: *Fagus sylvatica* 60 %, *Acer platanoides* 10 %, *Tilia cordata* + *Tilia platyphyllos* 20 %, *Abies alba* 10 %, *Ulmus* spp. 5 %, (*Taxus baccata* 0.5 % mainly at 4A9)

4A1, 4A2 and 4A4: *Fagus sylvatica* 40 - 70 %, *Quercus petraea* agg.  $\pm$  20 %, *Abies alba*  $\pm$  20 %, *Pinus sylvestris* 0 - 10 %, *Carpinus betulus* 5 %, *Acer platanoides* 10 - 20 %, *Fraxinus excelsior* 0.5 %, *Ulmus* spp. 5 %, *Tilia cordata* + *Tilia platyphyllos*  $\pm$  20 %, *Sorbus torminalis*  $\pm$  0.1 %, *Cerasus avium*  $\pm$  0.5 %

Absolute height yield class: *Picea abies* (20) 24 - 28 (36) m, *Fagus sylvatica* (18) 22 - 28 (36) m, *Tilia* spp. (22) 26 - 30 m, *Acer pseudoplatanus* 24 - 26 m, *Acer platanoides* 24 - 28 m, *Fraxinus excelsior* 26 - 28 (32) m, *Ulmus* spp. 30 - 36 m

Hazards: considerably by soil erosion and brush.

**5<sup>th</sup> forest vegetation zone 5A - *Acereto-Fagetum lapidosum***

Occurrence: highlands and lower mountain elevations; nutrient-rich and moderate-rich bases; slopes, ridges, ravines.

Soil: fresh humid (steady), medium-deep to deep, heavy stony, high humus content; predominantly mesotrophic Skeletic Cambisols, sometimes eutrophic; less mesotrophic Dystric Cambisols; Cambi-Eutric Leptosols are on higher skeleton content sites; Cambi-Rendzic Leptosols are on (sporadic) limes.

Significant often dominant or indicator species:

<i>Allium ursinum</i>	( <i>Festuca gigantea</i> )
<i>Athyrium filix-femina</i>	( <i>Galeopsis pubescens</i> )
<i>Carex digitata</i>	( <i>Geranium robertianum</i> )
<i>Dentaria enneaphyllos</i>	( <i>Gymnocarpium dryopteris</i> )
<i>Dryopteris dilatata</i>	( <i>Impatiens noli-tangere</i> )
<i>Dryopteris filix-mas</i>	( <i>Lathyrus vernus</i> )
<i>Festuca altissima</i>	( <i>Melica nutans</i> )
<i>Galeobdolon luteum</i>	( <i>Milium effusum</i> )
<i>Galium odoratum</i>	( <i>Mycelis muralis</i> )
<i>Hedera helix</i>	( <i>Poa nemoralis</i> )
<i>Hordelymus europaeus</i>	( <i>Rubus hirtus</i> )
<i>Melica uniflora</i>	( <i>Rubus idaeus</i> )
<i>Mercurialis perennis</i>	( <i>Senecio fuchsii</i> )

*Oxalis acetosella*                      (*Stachys sylvatica*)  
(*Actaea spicata*)                      (*Symphytum tuberosum*)  
(*Dentaria glandulosa*)              (*Urtica dioica*)

Forest site types:

- (1) *Mercurialis perennis*
- (2) *Melica uniflora*
- (3) fern (*filices*)
- (4) *Festuca altissima*
- (5) *Galeobdolon luteum*
- (6) ridge (nutrient-poorer) (*Acer pseudoplatanus*)
- (7) *Allium ursinum*
- (9) lime (*Hedera helix*)

Natural tree species content:

Generally: *Fagus sylvatica* 50 %, *Abies alba* 30 %, *Acer pseudoplatanus* 20 %, *Ulmus glabra* 0.5 % (*Fraxinus excelsior* 0.1 %)

5A1, 5A2 and 5A7: *Fagus sylvatica* 40 - 70 %, *Quercus petraea* agg. ± 20 %, *Pinus sylvestris* 0 - 10 %, *Abies alba* ± 20 %, *Carpinus betulus* 5 %, *Acer pseudoplatanus* 10 - 20 %, *Fraxinus excelsior* 0.5 %, *Ulmus* spp. 5 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, *Sorbus torminalis* ± 0.5 %, *Cerasus avium* ± 0.5 %, (*Taxus baccata* 0.5 % - mainly at 5A3, 5A4, 5A7 and 5A9)

Absolute height yield class: *Picea abies* 24 - 28 (36) m, *Fagus sylvatica* (22) 24 - 28 (36) m, *Acer pseudoplatanus* (22) 24 - 28 (36) m, *Abies alba* 24 - 26 (34) m, *Larix decidua* 26 - 34 m, *Tilia* spp. 22 - 26 m

Hazards: strongly by soil erosion, considerably by brush.

**6<sup>th</sup> forest vegetation zone 6A - *Aceri-Piceeto-Fagetum lapidosum***

Occurrence: highlands and mountains; nutrient-rich and medium-rich bases; slopes, ridges, ravines (700 - 1000 m, Boubín 1150 m); locally reduced *Fagus sylvatica* vitality.

Soil: fresh humid all the year, medium-deep to deep, stony, humic; frequently mesotrophic Skeletic Cambisols and Skeli-Cambic Podzols; less mesotrophic Cambic Podzols; Stagni-Cambic Podzols are near the streams; Cambi-Eutric Leptosols and occasionally Skeli-Lithic Leptosols are on more skeleton bases.

Significant often dominant or indicator species:

*Athyrium filix-femina*                      (*Doronicum austriacum*)  
*Festuca altissima*                      (*Dryopteris dilatata*)  
*Galeobdolon luteum*                      (*Dryopteris filix-mas*)  
*Galium odoratum*                      (*Homogyne alpina*)  
*Gymnocarpium dryopteris*              (*Impatiens noli-tangere*)  
*Mercurialis perennis*                      (*Milium effusum*)  
*Oxalis acetosella*                      (*Mycelis muralis*)  
*Polystichum aculeatum*                      (*Paris quadrifolia*)  
*Rubus idaeus*                      (*Prenanthes purpurea*)  
*Stellaria nemorum*                      (*Salvia glutinosa*)  
(*Adenostyles alliariae*)                      (*Sanicula europaea*)  
(*Cicerbita alpina*)                      (*Senecio fuchsii*)  
(*Dentaria bulbifera*)                      (*Urtica dioica*)

Forest site types:

- (1) *Mercurialis perennis*
- (2) *Oxalis acetosella*
- (3) fern (*filices*, *Polystichum aculeatum* - Moravskoslezské Beskydy Mts., and *Gymnocarpium dryopteris* - Novohradské hory Mts.)
- (5) stunted - peak (*humilis*) (especially stunted tree forms of *Fagus sylvatica* and *Acer pseudoplatanus*), basalt peaks and ridges
- (6) *Festuca altissima* + (dominantly) *Petasites albus*, (less) *Petasites hybridus*

Natural tree species composition: *Fagus sylvatica* 50 %, *Abies alba* 30 %, *Picea abies* 10 %, *Acer pseudoplatanus* 10 %

6A1 and 6A3: *Fagus sylvatica* 40 - 60 %, *Picea abies* 10 - 30 %, *Abies alba* 20 - 40 %, *Acer pseudoplatanus* ± 20 %, *Ulmus* spp. ± 10 %, *Fraxinus excelsior* ± 0.5 %, (*Taxus baccata* 0.5 % especially at 6A6)

6A2: *Picea abies* 60 - 80 %, *Abies alba* ± 20 %, *Fagus sylvatica* 10 - 30 %, *Acer pseudoplatanus* 0.1 - 10 %, *Sorbus aucuparia* 0.5 %

Absolute height yield class: *Picea abies* 24 - 30 (34) m, *Abies alba* 24 - 26 (32) m, *Fagus sylvatica* (22) 24 - 28 (30) m, *Acer pseudoplatanus* 24 - 26 (30) m, *Fraxinus excelsior* 16 - 18 m.

Hazards: strongly by soil erosion and brush, medium by snowpack and windthrow.

#### **7<sup>th</sup> forest vegetation zone 7A - *Aceri-Fageto-Piceetum lapidosum***

Occurrence: mountains (in Jeseníky Mts. dominantly); stony slopes and slope debris; nutrient-rich and nutrient medium-rich soil materials;

Soil: enough humid all the year, wet at the slopes bottoms; heavy gravelly (debris) to stony; very good humic („humus fall“ down the slope); predominantly Skeli-Cambic Podzols; they transit to Stagni-Cambic Podzols at the slopes bottoms; Skeli-Lithic Leptosols (rare Cambi-Eutric Leptosols) are at heavy skeleton bases.

Significant often dominant or indicator species:

<i>Adenostyles alliariae</i>	( <i>Hordelymus europaeus</i> )
<i>Athyrium distentifolium</i>	( <i>Melica nutans</i> )
<i>Cicerbita alpina</i>	( <i>Polygonatum verticillatum</i> )
<i>Doronicum austriacum</i>	( <i>Calamagrostis villosa</i> )
<i>Festuca altissima</i>	( <i>Galeobdolon luteum</i> )
<i>Homogyne alpina</i>	( <i>Dryopteris dilatata</i> )
<i>Dryopteris filix-mas</i>	( <i>Gymnocarpium dryopteris</i> )
<i>Mercurialis perennis</i>	( <i>Oxalis acetosella</i> )
<i>Paris quadrifolia</i>	( <i>Galium boreale</i> )
<i>Polytrichum formosum</i>	( <i>Geranium sylvaticum</i> )
<i>Polytrichum juniperinum</i>	( <i>Luzula sylvatica</i> )
<i>Prenanthes purpurea</i>	( <i>Streptopus amplexifolius</i> )
<i>Plagiomnium affine</i>	( <i>Blechnum spicant</i> )
<i>Rumex alpinus</i>	

Forest site types:

- (1) *Oxalis acetosella*
- (2) *Athyrium distentifolium*
- (3) herbaceous (*herbaceum*)

Natural tree species composition: *Picea abies* 60 - 80 %, *Abies alba* ± 20 %, *Fagus sylvatica* 10 - 30 %, *Acer pseudoplatanus* ± 10 %, *Sorbus aucuparia* 0.5 % (*Taxus baccata* 0.1 %)

Absolute height yield class: *Picea abies* (20) 22 - 24 (26) m, *Abies alba* 20 - 22 (24) m, *Fagus sylvatica* 22 - 24 (26) m, *Acer pseudoplatanus* 20 - 22 (24) m

Hazards: strongly by soil erosion and snowpack; canopy-opened stands are responsible to brush hazards.

#### 2.3.4.3 *Categoria deluvia* (D – category)

This category is typical for humus-enriched deluvia, more or less uninfluenced by water. Frequently they are either on slope bases and stream ravine bottoms or on short loamy slopes of stream cut (sliding soils). Nitrophilous species abundance, as expression of good humification is significant feature. Soils are deep and loamy with a small gravel proportion. Eutrophic Dystric Cambisols, rare slightly Stagnic, are dominant soil type. Calcaric Vertisols and Haplic Luvisols are frequent. Haplic Chernozems (at 1st forest vegetation zone on loess) and Haplic Vertisols (on marls) are rare.

Many types of phytocoenoses, penetrating each other, are made by rich diverse vegetation with great nitrophilous species abundance. *Brachypodium sylvaticum*, *Mercurialis perennis*, *Melica uniflora* *Impatiens noli-tangere* (this transit to *Petasites albus* site type at higher elevations) are characteristic forest site types. Ferns (*filices*) are frequent too. „Sliding“ soils on slopes with clay basis make separate subcategory. They transit to V category (*categoria humida*) on mosaic-waterlogged sites.

Stands production is high above standard. Stands have soil-protected function at sliding terrains. Broadleaved trees natural regeneration is good bellow the slight shadow. The 5 - 10 % inclusion of *Pseudotsuga menziesii* and *Abies grandis* from the 2nd to 5th forest vegetation zones is viable.

This category differs from:

- 1) A-category (*categoria acerosa lapidosa*) not only by soil physic, but even better tree yield class.
- 2) H-category (*categoria illimerosa mesotrophica*) by higher abundance of nitrophilous species and higher gravel proportion in the soil.
- 3) V-category (*categoria humida*) by rare stagnic soil.

#### Forest site type complexes

##### 1<sup>st</sup> forest vegetation zone 1D - *Carpineto-Quercetum acerosum deluvium*

Occurence: warmest areas; plateaus, terraces and slope bases, ravines.

Soil: deep, loamy, desiccated, humous, sometimes slightly stagnic; eutrophic Dystric Cambisols, Calcaric Cambisols, Mellanic-Calcaric Cambisols and Calcaric Vertisols (stagnic or with mull varieties sometimes) are frequent; Haplic Luvisols (slightly stagnic), Arenic Haplic Luvisols, Albi-Haplic Luvisols, Arenic Haplic Chernozems, Luvic Chernozems and Haplic Vertisols are rare.

Significant often dominant or indicator species:

<i>Aconitum vulparia</i>	( <i>Carex montana</i> )
<i>Aegopodium podagraria</i>	( <i>Carex pallescens</i> )
<i>Asarum europaeum</i>	( <i>Corydalis cava</i> )
<i>Brachypodium sylvaticum</i>	( <i>Corydalis solida</i> )
<i>Lithospermum purpureo-coeruleum</i>	( <i>Digitalis grandiflora</i> )
<i>Convallaria majalis</i>	( <i>Ficaria bulbifera</i> )
<i>Dactylis glomerata</i>	( <i>Galeobdolon luteum</i> )
<i>Chaerophyllum temulum</i>	( <i>Galeopsis pubescens</i> )



<i>Lamium maculatum</i>	( <i>Galium aparine</i> )
<i>Melica uniflora</i>	( <i>Galium schultesii</i> )
<i>Mercurialis perennis</i>	( <i>Galium sylvaticum</i> )
<i>Poa nemoralis</i>	( <i>Geranium robertianum</i> )
( <i>Ajuga reptans</i> )	( <i>Lathyrus vernus</i> )
( <i>Alliaria petiolata</i> )	( <i>Oxalis acetosella</i> )
( <i>Allium ursinum</i> )	( <i>Polygonatum odoratum</i> )
( <i>Calamagrostis arundinacea</i> )	( <i>Pulmonaria officinalis</i> )
( <i>Calystegia sepium</i> )	( <i>Viola mirabilis</i> )
( <i>Campanula trachelium</i> )	( <i>Viola odorata</i> )
<i>Geranium robertianum</i>	

#### Forest site types:

- (1) *Brachypodium sylvaticum*, with soil varieties - clay - loess - sandy (transition to (Carpineto-) *Quercetum oligo-mesotrophicum* (1S)) - rendzic (transition to *Aceri-Carpineto-Quercetum lapidosum* (1A))
- (2) *Lamium maculatum*
- (3) *Aegopodium podagraria*, less clear-cut
- (4) *Convallaria majalis*
- (5) *Mercurialis perennis*
- (6) *Melica uniflora*
- (7) *Dactylis glomerata*, transition to *Carpineto-Quercetum mesotrophicum* (1B)
- (8) *Geranium robertianum*

Allochthonous allochthonous - planted *Pinus sylvestris* stands have nutrient degraded succession stage with *Calamagrostis arundinacea*.

Natural tree species composition: *Quercus petraea* 70 %, *Tilia cordata* 10 %, *Acer platanoides* 10 %, *Carpinus betulus* 10 %, *Sorbus torminalis* 0.5 %

1D1, 1D2, 1D3, 1D6 and 1D7: *Quercus petraea* 50 - 70 %, *Fagus sylvatica* 0 - 30 %, *Pinus sylvestris* 0 - 10 %, *Abies alba* ± 0.1 %, *Carpinus betulus* 0 - 20 %, *Acer platanoides* 0 - 10 %, *Fraxinus excelsior* ± 0.5 %, *Ulmus minor* + *Ulmus laevis* ± 0.5 %, *Tilia cordata* ± 20 %, (*Populus tremula*, *Betula pendula*, *Acer campestre*, *Cerasus avium*) ± 0.5 %

Absolute height yield class: *Quercus petraea* agg. (18) 24 - 28 (30) m, *Acer platanoides* 26 m, *Tilia cordata* 26 m, *Fraxinus excelsior* (26) 28 - 30 (32) m, *Carpinus betulus* 16 - 18 m

Hazards: considerably by desiccation, moderately by brush (especially by *Impatiens parviflora* and *Urtica dioica*).

#### **2<sup>nd</sup> forest vegetation zone 2D - *Fageto-Quercetum acerosum deluvium***

Occurrence: uplands, Southmoravian basin peripheries; slope bases, plateaus, terraces, ravines.

Soil: desiccated at summer, deep, loamy, humous, sometimes slightly stagnic; considerably meso- and eutrophic Dystric Cambisols, both can be slightly stagnic, they can rare transit to Stagni-Dystric Cambisols; Haplic Luvisols are frequent, these are often slightly stangic and sometimes they transit to Stagni-Haplic Luvisols, slow luvization process result to Albi-Haplic Luvisols and even to Albic Luvisols (sometimes slightly stagnic); Calcaris Cambisols and Calcaris Vertisols are frequent too, Eutri-Calcaric Cambisols are sporatic; Haplic Vertisols are more frequent that bellow mentioned, but very rare; Haplic Chernozems are negligible.

#### Significant often dominant or indicator species:

*Aegopodium podagraria* (*Campanula trachelium*)

<i>Brachypodium sylvaticum</i>	( <i>Carex digitata</i> )
<i>Carex montana</i>	( <i>Corydalis cava</i> )
<i>Carex pilosa</i>	( <i>Dactylis glomerata</i> )
<i>Galeobdolon luteum</i>	( <i>Fragaria vesca</i> )
<i>Galium odoratum</i>	( <i>Galium schultesii</i> )
<i>Lamium maculatum</i>	( <i>Hacquetia epipactis</i> )
<i>Melica uniflora</i>	( <i>Poa nemoralis</i> )
<i>Mercurialis perennis</i>	( <i>Pulmonaria officinalis</i> )
<i>Stellaria holostea</i>	( <i>Stachys sylvatica</i> )
( <i>Asarum europaeum</i> )	( <i>Viola reichenbachiana</i> )

Forest site types:

- (1) *Brachypodium sylvaticum*
- (2) *Lamium maculatum*, with its soil variety on loess
- (3) *Aegopodium podagraria*
- (4) *Carex pilosa*, transition to *Fageto-Quercetum illimerosum mesotrophicum* (2H)
- (5) *Melica uniflora*
- (6) *Mercurialis perennis*
- (8) *Stellaria holostea*
- (9) sloping - exposed, steep sliding slopes

Natural tree species composition: *Quercus petraea* agg. 60 %, *Fagus sylvatica* 10 %, *Tilia cordata* 10 %, *Acer platanoides* 10 %, *Carpinus betulus* 10 %, *Ulmus glabra* 0.5 %, shrubs slightly

In dependence on site condotions: *Quercus petraea* agg. 50 - 70 %, *Fagus sylvatica* 0 - 30 %, *Pinus sylvestris* 0 - 10 %, *Carpinus betulus* 0 - 20 %, *Acer platanoides* 0 - 10 %, *Tilia cordata* ± 20 %, *Abies alba* ± 0.1 %, *Fraxinus excelsior* ± 0.5 %, *Ulmus* spp. ± 5 %, (*Populus tremula*, *Betula pendula*, *Acer campestre*, *Cerasus avium*) ± 0.5 %

Exposed sites: *Quercus petraea* 40 - 60 %, *Fagus sylvatica* ± 30 %, *Acer platanoides* ± 30 %, *Tilia cordata* ± 20 %, *Pinus sylvestris* 0 - 10 %, *Fraxinus excelsior* ± 0.5 %, (*Ulmus glabra*, *Ulmus minor*, *Ulmus laevis*) ± 10 %, (*Betula pendula*, *Acer campestre*, *Taxus baccata*) 0 - 10 %

Absolute height yield class: *Quercus petraea* (20) 24 - 28 (30) m, *Tilia cordata* 28 (30) m, *Acer platanoides* 28 m, *Abies alba* 26 - 28 (30) m, *Picea abies* 30 - 32 m, *Pinus sylvestris* (22) 24 - 26 m, *Carpinus betulus* (16) 18 - 20 (22) m, *Larix decidua* 30 - 34 m

Hazards: moderately by brush (especially by *Impatiens parviflora*); soil crack formation is made due to summer drought.

**3<sup>rd</sup> forest vegetation zone 3D - *Querceto-Fagetum acerosum deluvium***

Occurence: uplands; slope bases; ravine bottoms, plateaus.

Soil: slightly desiccated, deep, loamy, humic, frequently slightly stagnic; predominantly meso- and eutrophic Dystric Cambisols, less Cambic Vertisols and Stagni-Dystric Cambisols; Luvic Cambisols are rare (this process often result to sporadic Albic Luvisols); Haplic Luvisols are rare (on loamy loess only); Calcaric Vertisols or Calcaric Cambisols sometimes slightly stagnic are on lime bases; Haplic Vertisols are rare.

Significant often dominant or indicator species:

<i>Aegopodium podagraria</i>	( <i>Dentaria enneaphyllos</i> )
<i>Athyrium filix-femina</i>	( <i>Dentaria glandulosa</i> )
<i>Brachypodium sylvaticum</i>	( <i>Dryopteris dilatata</i> )

<i>Carex pilosa</i>	( <i>Festuca gigantea</i> )
<i>Dryopteris filix-mas</i>	( <i>Galeobdolon luteum</i> )
<i>Galium odoratum</i>	( <i>Geranium robertianum</i> )
<i>Impatiens noli-tangere</i>	( <i>Hacquetia epipactis</i> )
<i>Lamium maculatum</i>	( <i>Hordelymus europaeus</i> )
<i>Melica uniflora</i>	( <i>Milium effusum</i> )
<i>Mercurialis perennis</i>	( <i>Mycelis muralis</i> )
( <i>Aconitum vulparia</i> )	( <i>Oxalis acetosella</i> )
( <i>Actaea spicata</i> )	( <i>Poa nemoralis</i> )
( <i>Pulmonaria officinalis</i> )	( <i>Arum maculatum</i> )
( <i>Rubus idaeus</i> )	( <i>Sanicula europaea</i> )
( <i>Asarum europaeum</i> )	( <i>Senecio fuchsii</i> )
( <i>Calamagrostis arundinacea</i> )	( <i>Viola reichenbachiana</i> )
( <i>Dentaria bulbifera</i> )	

Forest site types:

- (1) *Brachypodium sylvaticum*
- (2) *Lamium maculatum*
- (3) *Aegopodium podagraria*
- (5) *Carex pilosa*
- (6) *Mercurialis perennis*
- (7) ferns (*filices*)
- (8) *Impatiens noli-tangere*
- (9) seep slopes and terraced-like

Natural tree species composition: *Fagus sylvatica* 60 %, *Tilia cordata* 20 %, *Quercus petraea* agg. 20 %, *Acer platanoides* 5 %, *Abies alba* 0.5 %

In dependence on site conditions: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* agg. ± 30 %, *Carpinus betulus* 0 - 10 %, *Acer platanoides* 0 - 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, (*Fraxinus excelsior*, *Ulmus* spp.) 0.5 %, *Abies alba* ± 20 %, (*Cerasus avium*, *Populus tremula*) ± 0.5 %

3D9: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* agg. ± 30 %, *Abies alba* 10 - 20 %, *Carpinus betulus* ± 5 %, *Acer platanoides* ± 20 %, *Ulmus* spp. ± 0.5 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, *Fraxinus excelsior* ± 0.5 %

Absolute height yield class: *Picea abies* (24) 28 - 30 (36) m, *Quercus petraea* agg. (24) 26 - 28 (34) m, *Fagus sylvatica* (24) 26 - 32 (38) m, *Abies alba* (22) 24 - 28 m, *Carpinus betulus* 18 - 22 m, *Acer pseudoplatanus* (24) 26 - 30 (36) m, *Acer platanoides* 26 (28 - 34) m, *Tilia* spp. 32 - 34 m, *Fraxinus excelsior* 26 m, *Larix decidua* 28 - 30 m, *Pseudotsuga menziesii* 40 m

Hazards: moderately by brush, locally by soil slipping.

**4<sup>th</sup> forest vegetation zone 4D - *Fagetum acerosum deluvium***

Occurrence: from uplands to highlands and promontory; slope bases, ravine bottoms, plateaus.

Soil: fresh humid, loamy, deep humic, frequently slightly stagnic; predominantly mesotrophic Dystric Cambisols, sometimes slightly stagnic; less eutric Dystric Cambisols slightly stagnic too; patchy Albic Luvisols slightly stagnic; Calcaric Cambisols or Eutric Cambisols are on clay states only.

Significant often dominant or indicator species:

*Athyrium filix-femina* (*Carex digitata*)

<i>Brachypodium sylvaticum</i>	( <i>Carex sylvatica</i> )
<i>Dryopteris filix-mas</i>	( <i>Dentaria bulbifera</i> )
<i>Galium odoratum</i>	( <i>Dentaria enneaphyllos</i> )
<i>Impatiens noli-tangere</i>	( <i>Galeobdolon luteum</i> )
<i>Melica uniflora</i>	( <i>Galium rotundifolium</i> )
<i>Mercurialis perennis</i>	( <i>Geranium robertianum</i> )
<i>Oxalis acetosella</i>	( <i>Hordelymus europaeus</i> )
( <i>Actaea spicata</i> )	( <i>Rubus fruticosus</i> agg.)
( <i>Alliaria petiolata</i> )	( <i>Sanicula europaea</i> )
( <i>Senecio fuchsii</i> )	

Forest site types:

- (1) *Galium odoratum*, on transition to *Fagetum mesotrophicum* (4B)
- (2) *Melica uniflora*
- (3) *Mercurialis perennis*
- (4) ferns (*filices*)
- (5) *Impatiens noli-tangere*
- (6) *Aegopodium podagraria*
- (7) *Allium ursinum*
- (8) *Lunaria rediviva*
- (9) steep slopes

Natural tree species composition:

Generally: *Fagus sylvatica* 60 %, *Acer platanoides* 10 %, *Tilia cordata* + *Tilia platyphyllos* 20 %, *Abies alba* 10 %

In dependence on site conditions: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* agg. ± 30 %, *Acer platanoides* 0 - 10 %, *Abies alba* ± 20 %, *Carpinus betulus* 0 - 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, (*Fraxinus excelsior*, *Ulmus* spp.) 0.5 %, (*Cerasus avium*, *Populus tremula*) ± 0.1 %

4D9: *Fagus sylvatica* 50 - 70 %, *Quercus petraea* agg. ± 30 %, *Abies alba* 10 - 20 %, *Acer platanoides* ± 20 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, *Carpinus betulus* ± 0.5 %, *Ulmus* spp. ± 0.5 %, *Fraxinus excelsior* ± 0.5 %

Absolute height yield class: *Picea abies* (26) 28 - 32 (36) m, *Abies alba* (24) 28 - 34 m, *Fagus sylvatica* (24) 28 - 34 (36) m, *Tilia* spp. (28) 32 - 34 m, *Acer pseudoplatanus* 28 - 32 m, *Ulmus* spp. 24 - 28 m, *Fraxinus excelsior* 30 - 34 m, *Larix decidua* 32 - 34 m

Hazards: considerably by brush, locally by soil slipping.

### **5<sup>th</sup> forest vegetation zone 5D - *Abieto-Fagetum acerosum deluvium***

Occurrence: highlands and promontories; terraces, ravine bottoms, slope bases.

Soil: fresh humid, loamy, deep, humic, frequently slightly stagnic; predominantly mesotrophic Dystric Cambisols less eutrophic, they can be slightly stagnic, which can transit to Stagni-Dystric Cambisols.

Significant often dominant or indicator species:

<i>Allium ursinum</i>	( <i>Dentaria bulbifera</i> )
<i>Athyrium filix-femina</i>	( <i>Dentaria enneaphyllos</i> )
<i>Dryopteris filix-mas</i>	( <i>Dentaria glandulosa</i> )
<i>Gymnocarpium dryopteris</i>	( <i>Galeobdolon luteum</i> )
<i>Hordelymus europaeus</i>	( <i>Galium odoratum</i> )
<i>Impatiens noli-tangere</i>	( <i>Geranium robertianum</i> )

<i>Lunaria rediviva</i>	( <i>Oxalis acetosella</i> )
<i>Melica uniflora</i>	( <i>Plagiomnium affine</i> )
<i>Mercurialis perennis</i>	( <i>Plagiomnium undulatum</i> )
<i>Petasites albus</i>	( <i>Salvia glutinosa</i> )
<i>Polystichum aculeatum</i>	( <i>Sanicula europaea</i> )
( <i>Alliaria petiolata</i> )	( <i>Senecio fuchsii</i> )
( <i>Asarum europaeum</i> )	( <i>Carex sylvatica</i> )
( <i>Stachys sylvatica</i> )	( <i>Stellaria nemorum</i> )
( <i>Circaea lutetiana</i> )	( <i>Urtica dioica</i> )
( <i>Viola reichenbachiana</i> )	

Forest site types:

- (1) *Hordelymus europaeus*, on basalts
- (2) *Melica uniflora*
- (3) *Mercurialis perennis*
- (4) ferns (*filices*)
- (5) *Impatiens noli-tangere*
- (6) *Petasites albus*
- (7) *Allium ursinum*, nutrient-rich
- (8) *Lunaria rediviva*, on transition to *Fraxineto-Aceretum vallisum* (5U)
- (9) seep slopes (and terraced-like)

Natural tree species composition:

Generally: *Fagus sylvatica* 60 %, *Abies alba* 30 %, *Acer pseudoplatanus* 10 %

5D1 to 5D8: *Fagus sylvatica* 40 - 70 %, *Abies alba* 30 - 40 %, *Picea abies* ± 20 %, *Acer pseudoplatanus* ± 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 10 %, (*Fraxinus excelsior*, *Ulmus* spp.) 0.5 %

5D9: *Fagus sylvatica* 40 - 60 %, *Abies alba* 20 - 40 %, *Picea abies* ± 20 %, *Acer pseudoplatanus* ± 20 %, *Ulmus* spp. ± 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 10 %, *Fraxinus excelsior* ± 0.5 %

Absolute height yield class: *Picea abies* (26) 28 - 32 (38) m, *Abies alba* (24) 26 - 28 (36) m, *Fagus sylvatica* (24) 26 - 30 (36) m, *Larix decidua* 30 - 34 m, *Acer pseudoplatanus* 26 - 28 m

Hazards: considerably by brush (dominantly by species of genus *Rubus*), snowpack and windthrow; locally by soil slipping.

**6<sup>th</sup> + 7<sup>th</sup> forest vegetation zones 6D - *Piceeto-Fagetum acerosum deluvium***

Occurrence: mountains (especially at Šumava Mts.), promontories, highlands; ravine bottoms, terraces, slope bases.

Soil: deep, fresh humid, frequently stagnic, loamy, humic; predominantly mesotrophic Dystric Cambisols slightly stagnic, they sometimes transit to mesotrophic Stagni-Dystric Cambisols; mesotrophic Cambic Podzols sometimes stagnic are frequent; eutrophic Dystric Cambisols are rare; Cambic Fluvisols can occur rare on river and stream terraces only.

Significant often dominant or indicator species:

<i>Athyrium filix-femina</i>	<i>Oxalis acetosella</i>
<i>Dryopteris filix-mas</i>	( <i>Plagiomnium affine</i> )
<i>Impatiens noli-tangere</i>	( <i>Prenanthes purpurea</i> )
<i>Mercurialis perennis</i>	( <i>Pulmonaria officinalis</i> )
<i>Petasites albus</i>	( <i>Salvia glutinosa</i> )
( <i>Ajuga reptans</i> )	( <i>Sanicula europaea</i> )

<i>(Asarum europaeum)</i>	<i>(Senecio fuchsii)</i>
<i>(Calamagrostis villosa)</i>	<i>(Stellaria nemorum)</i>
<i>(Carex brizoides)</i>	<i>(Viola reichenbachiana)</i>
<i>(Carex pilulifera)</i>	<i>(Carex sylvatica)</i>
<i>(Dentaria bulbifera)</i>	<i>(Dentaria enneaphyllos)</i>
<i>(Equisetum sylvaticum)</i>	<i>(Festuca altissima)</i>
<i>(Mycelis muralis)</i>	

**in 7th forest vegetation zone add:**

<i>Adenostyles alliariae</i>	<i>Cicerbita alpina</i>
<i>Delphinium elatum</i>	<i>Doronicum austriacum</i>
<i>Rumex alpestris</i>	<i>Streptopus amplexifolius</i>

Forest site types:

- (1) *Impatiens noli-tangere*
- (2) *Petasites albus*
- (3) *Mercurialis perennis*
- (4) ferns (*filices*), ravine
- (5) terraced-like, on torrent alluvia (especially at Krkonoše Mts.)

**This forest site complex covers 6th and 7th forest vegetation zones.**

Natural tree species composition:

Generally: *Fagus sylvatica* 50 %, *Abies alba* 30 %, *Picea abies* 20 %, *Acer pseudoplatanus* 0.5 %

6D1 to 6D4: *Fagus sylvatica* 30 - 70 %, *Picea abies* 20 - 40 %, *Abies alba* 20 - 40 %, *Acer pseudoplatanus* ± 10 %, (*Fraxinus excelsior*, *Ulmus* spp.) 0.5 %

6D5: *Fagus sylvatica* 40 - 60 %, *Abies alba* 20 - 40 %, *Picea abies* 10 - 30 %, *Acer pseudoplatanus* ± 20 %, *Ulmus* spp. ± 10 %, *Fraxinus excelsior* ± 0.5 %

Absolute height yield class: *Picea abies* 28 - 32 (38) m, *Abies alba* (26) 30 - 32 m, *Acer pseudoplatanus* 28 m

Hazards: considerably by brush (especially in *Petasites albus* type), by snowpack, by windthrow and by raw climate at 7th forest vegetation zone (hoarfrost).

### **2.3.5 Ash series (L) – series *fraxinosa***

This series covers floodplain communities on quaternary streams and rivers alluvia, regularly or sometimes flooded, and communities enriched by ground water. Like maple series, this series excels by good nitrification and humification. Mull-moder and mull are dominant humus forms. Nitrophilous species abundance is characteristic.

Communities of this series are possible to divide through relief to:

- valey floodplain forests on wide alluvia (*Ulmeto-Quercetum alluviale*, *Querceto-Populetum vallisosum Fraxineto-Quercetum alluviale*),
- valley floodplain forests in close valleys from lowland to mountain zones (*Fraxineto-Alnetum alluviale*, *Fraxineto-Alnetum montanum* and *Alnetum incanae*),
- ravine communities, where either alluvium covers bottom part only (*Acereto-Fraxinetum vallisosum*) or ravine basis is enriched by ground water (*Fraxineto-Aceretum vallisosum*),
- slope loamy bottoms and spring areas enriched by ground water (humid and more humid types of V-category (*categoria humida*))

*Urtica dioica*, *Impatiens noli-tangere*, *Chaerophyllum hirsutum*, *Stellaria nemorum*, *Aegopodium podagraria*, *Carex remota*, *Stachys sylvatica*, *Petasites albus*, *Cicerbita alpina*,

*Adenostyles alliariae*, *Telekia speciosa*, *Doronicum austriacum*, *Veratrum lobelianum*, *Ranunculus platanifolius*, *Senecio subalpinus* etc. are abundant species combinations with species mentioned for (J) series (*series acerosa*).

**1<sup>st</sup> forest vegetation zone - Ulmeto-Querceta alluviale** (elm-oak floodplain forests) are most widespread communities of vale floodplain forests. Stream meadows, connected with ground water fall and limitation or elimination of floods, have contributed to their extension.

*Quercus robur*, *Fraxinus excelsior* (*Fraxinus angustifolia* in South Moravia only), *Ulmus minor* and *Carpinus betulus* are dominant tree species. *Cerasus avium*, *Tilia cordata*, *Acer campestre*, *Acer platanoides* and *Acer pseudoplatanus* are admixed. Except above mentioned tree species, dense shrub layer is built by *Sambucus nigra*, *Padus avium*, *Swida sanguinea*, *Euonymus europaea*, *Corylus avellana* and *Crataegus* spp.

*Aegopodium podagraria*, *Brachypodium sylvaticum*, *Glechoma hederacea*, *Geum urbanum*, *Pulmonaria officinalis*, *Carex sylvatica*, *Chaerophyllum temulum*, *Galium aparine*, *Impatiens parviflora*, *Lysimachia nummularia*, *Aethusa cynapium*, *Milium effusum*, *Dactylis glomerata*, *Carex brizoides*, *Carex remota*, *Lamium maculatum*, *Stellaria holostea*, *Rubus caesius* and many others („grove“ accompanying species) dominate in herb layer. Central Bohemia variety from central Polabí and low Poodří lowlands is characteristic by *Leucosium vernum* and *Scilla bifolia*. Eastbohemian and Poodří floodplain forests contain sub-mountain species (closely to mountain range, higher precipitations). In spite of the fact, that Southmoravian floodplain forests are characteristic by presence of *Fraxinus angustifolia* and Carpathian elements (*Hacquetia epipactis*, etc.), considerable presences of neophytes (*Aster lanceolatus* and *Bidens frondosa*, resp.) are there.

**Querceto-Populeta vallisosa** (oak-poplar floodplain forests) (also in 1st forest vegetation zone) have been more widespread before rivers management measures. They belong to floodplain forests, which used to be flooded through higher floods. *Fraxinus excelsior* (together with *Fraxinus angustifolia* in South Moravia), *Populus nigra* (very rare at present and it is often displaced by *Populus* cv. *canadensis*), *Populus alba* (especially at South Moravia, but often displaced by *Populus* x *canescens* in all floodplain areas at present) are predominant, *Ulmus minor* and *Tilia cordata* are less abundant. *Sambucus nigra* and *Padus avium* are in shrub layer. Beyond dominant *Urtica dioica*, abundant of hygrophilous (*Stellaria nemorum*, *Impatiens noli-tangere*, and *Circaea lutetiana*), wetland (*Humulus lupulus*, *Phalaris arundinacea*, *Lysimachia vulgaris*, *Lycopus europaeus*, *Lythrum salicaria*, *Iris pseudacorus*) species and magnocaricetes (*Carex acutiformis*, *Carex riparia*, *Carex gracilis*) are in phytocoenoses. Less presence of mesophilous species is due to floods.

**Querceto-Fraxineta alluviale** (oak-ash floodplain forest) (also in 1st forest vegetation zones) are recognized only in southmoravian floodplain forests on lower and middle river streams alluvia. They are sometimes flooded and there are often heavy soils of stagnosols - gleysols types.

**2<sup>nd</sup> forest vegetation zone - Fraxineto-Querceta alluviale** (ash-oak floodplain forests) cover wider alluvia of uplands and reach to foothills too. *Aegopodium podagraria* and „floodplain“ species combination declare phytocoenosis type.

**3<sup>rd</sup> forest vegetation zone - Fraxineto-Alneta alluviale** (ash-alder floodplain forests) contain *Alnus glutinosa* and *Fraxinus excelsior* in natural stands on stream alluvia. In comparison to vale floodplain communities, they are characterized by *Carex remota*, *Astrantia major*, *Chaerophyllum hirsutum*, *Crepis paludosa*, *Chrysosplenium alternifolium*, *Caltha palustris*, *Equisetum sylvaticum*, *Geum rivale*, *Primula elatior*, *Rubus idaeus*, etc. Phytocoenoses have different feature, depending on flooded material and on climatic conditions locally.

**6<sup>th</sup> forest vegetation zone Alneta incanae** (speckled alder floodplain forests) have very limited areas in *Hercynic-Sudeticum*. They have their centre on quarternary alluvia of mountain forest vegetation zones in *Carpathicum*. They are on young soils. More abundant of

higher elevation tall herbs and dominance *Alnus incana* are there with difference to *Fraxineto-Alneta alluviale*.

**3<sup>rd</sup> forest vegetation zone** - *Acereto-Fraxineta vallisosa* (maple-ash floodplain forests are ecological mosaic (alluvia and slope bases). *Fraxinus excelsior* and *Acer platanoides* (sometimes *Acer pseudoplatanus*) dominate, *Fagus sylvatica* and *Abies alba* penetrate. Phytocoenosis is a mirror of tree layer - combination „floodplain“ and „beech“ accompanying species.

**5<sup>th</sup> forest vegetation zone** - *Fraxineto-Acereta vallisosa* (ash-maple floodplain forests) introduce more humid (water influenced) branch of V-category (*categoria humida*). They introduce enriched „ravine forest“ with double étaged undestory. *Petasites albus*, *Lunaria rediviva* and tall ferns make higher layer.

V-category (*categoria humida*) makes transition between floodplain communities and zonal communities of B-category (*categoria mesotrophica*). Communities introduce stagnic and gleyic variants of climax communities with slight admixture of valuable broadleaves tree species (*Acer platanoides*, *Acer pseudoplatanus*, *Fraxinus excelsior*, *Ulmus laevis*, *Ulmus glabra*), nitrophilous understory species and tall herbs and ferns abundance (e.g. *Equisetum sylvaticum*, *Petasites albus*, *Pteridium aquilinum*).

### 2.3.5.1 *Categoria alluvialis* (L – category)

Extraordinary site feature and significant floodplain communities characterize category. It is category of alluvia periodically flooded, with ground water level bellow 80 cm for nearly whole the year. Eutric Fluvisols, Cambic Fluvisols, Stagnic Dystric Fluvisols, Gleyic Dystric Fluvisols and Cambic Gleysols make soil types. They make transitions and mosaics among them. Phytocoenoses mirror soil conditions, so then it is very difficult to determinate forest site type. Skeli-Dystric Fluvisols (somewhere Fluvic Arenosols) make initially stage of floodplain forest closely to water level, where soil development is disturbed by sedimentation and erosion. Vale floodplain forests are characterized by annual average temperature 8 - 9 °C, lower average is in Silesian floodplain area. Annual precipitation sum is 500 - 600 mm, but 650 - 700 mm at East Bohemian and Silesian floodplain areas.

*Aegopodium podagraria* *Brachypodium sylvaticum* types are very general in upland elm-oak floodplain forest (*Ulmeto-Quercetum alluvialis*). They are even at stream floodplain forest (ash-oak) (*Fraxineto-Quercetum alluvialis*). Valley communities with *Alnus incana* are rather different phytocoenologically. They often make mosaic of types and they are classified by collected type. Only lowland floodplain forests have commercial importance. Stream and alder floodplain forests cover mostly small areas only.

Stands have infiltration function (partly desuction) and closely to water level then water-conservation ecological function. Stands production is mostly considerably above standard. Natural tree species regeneration is bad due to brush.

### Forest site type complexes

#### 1<sup>st</sup> forest vegetation zone 1L - *Ulmeto-Quercetum alluvialis*

Occurence: vale peripheries; small elevations of alluvial terraces, rare flooded (with exception of forest type 1L9, where clay materials are settled by more slow and stagnating flood).

Soil: already considerably developed (no disturbed by floods), sandy-to-clay; predominantly Cambic Fluvisols, frequently Eutric Fluvisols, less frequent Stagnic Dystric Fluvisols and Gleyic Dystric Fluvisols; Fluvic Arenosols (fresh alluvia closely great river beds in sandstone and sand dune areas) and Skeli-Dystric Fluvisols (lower gravel terraces) are rare; Mollic Fluvisols or Mollic Gleysols are at lowlands near great rivers; Fluvic Vertisols, Cambic Gleysols and Fluvic Gleysols depend on more clay soils with tertiary marls bases.



Significant often dominant or indicator species:

<i>Aegopodium podagraria</i>	( <i>Allium ursinum</i> )
<i>Brachypodium sylvaticum</i>	( <i>Carex acutiformis</i> )
<i>Carex brizoides</i>	( <i>Carex gracilis</i> )
<i>Convallaria majalis</i>	( <i>Carex remota</i> )
<i>Deschampsia caespitosa</i>	( <i>Carex sylvatica</i> )
<i>Festuca gigantea</i>	( <i>Circaea lutetiana</i> )
<i>Galium odoratum</i>	( <i>Dactylis glomerata</i> )
<i>Glechoma hederacea</i>	( <i>Galium aparine</i> )
<i>Impatiens noli-tangere</i>	( <i>Geranium robertianum</i> )
<i>Iris pseudacorus</i>	( <i>Leucorum aestivum</i> )
<i>Lamium maculatum</i>	( <i>Lysimachia nummularia</i> )
<i>Melica nutans</i>	( <i>Phalaris arundinacea</i> )
<i>Mercurialis perennis</i>	( <i>Poa nemoralis</i> )
<i>Rubus caesius</i>	( <i>Polygonatum multiflorum</i> )
<i>Stellaria holostea</i>	( <i>Primula elatior</i> )
<i>Urtica dioica</i>	( <i>Pulmonaria maculosa</i> )
( <i>Ajuga reptans</i> )	( <i>Stachys sylvatica</i> )
( <i>Viola reichenbachiana</i> )	( <i>Symphytum officinale</i> )
( <i>Thalictrum aquilegifolium</i> )	

Forest site types:

- (1) *Rubus caesius*, Dolnomoravský basin
- (2) *Aegopodium podagraria*
- (3) *Carex brizoides* (or *Impatiens noli-tangere* resp.), not so much visible determined, often secondary
- (4) *Brachypodium sylvaticum*
- (5) *Stellaria holostea*
- (6) on „hrúd“ (= sandy flooded very small hills, often as small as dry islands through flood) (*Lamium maculatum*), quite visible determined community
- (7) gravel soils (*saxatilis*)
- (9) *Querceto-Fraxinetum alluvialis* (*Rubus caesius* + *Deschampsia caespitosa* + *Iris pseudacorus*)

Natural tree species composition:

Generally: *Quercus robur* 40 %, (*Ulmus minor*, *Ulmus laevis*) 20 %, *Fraxinus excelsior* 20 %, *Carpinus betulus* 10 %, *Tilia cordata* or *Tilia platyphyllos* (*Acer platanoides* resp.) 10 %, shrubs, (*Fraxinus angustifolia* 5 % - in South Moravia only)

In dependence on site condotions: *Quercus robur* 30 - 70 %, *Carpinus betulus* 0 - 20 %, *Acer campestre* + *Acer platanoides* + *Acer pseudoplatanus* ± 20 %, *Fraxinus excelsior* 10 - 30 %, (*Ulmus minor*, *Ulmus laevis*) 10 - 30 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, *Alnus glutinosa* ± 10 %, (*Populus alba*, *Populus nigra*) ± 10 %, *Salix* spp. ± 10 %, *Fraxinus angustifolia* 0 - 10 %

Absolute height yield class: *Quercus robur* (22) 24 - 30 (34) m, *Fraxinus* spp. (22) 28 - 32 (34) m, *Ulmus* spp. 30 - 34 m, *Tilia* spp. 22 - 24 (34) m, *Picea abies* 26 - 32 m, *Alnus glutinosa* 22 - 26 m.

Hazards: strongly by brush, considerably by floods (river bed erosion), allochthonous - planted *Picea abies* cultural stands by rot.

**2<sup>nd</sup> + part of 3<sup>rd</sup> forest vegetation zones 2L - *Fraxineto-Quercetum alluvialis***

Occurrence: from uplands to highlands and promontory peripheries; wide (valley) alluvia.

Soil: mature Fluvisols; predominantly Stagnic Dystric Fluvisols; Fluvic Vertisols, Cambic Fluvisols slightly Stagnic and Gleyic Dystric Fluvisols (depend on ground water level) are patchy; Fluvic Gleysols and Cambic Gleysols are less presented; Haplic Gleysols are rare.

Significant often dominant or indicator species:

<i>Aegopodium podagraria</i>	( <i>Galium odoratum</i> )
<i>Impatiens noli-tangere</i>	( <i>Geranium robertianum</i> )
<i>Lamium maculatum</i>	( <i>Glechoma hederacea</i> )
<i>Mercurialis perennis</i>	( <i>Lysimachia nummularia</i> )
<i>Oxalis acetosella</i>	( <i>Petasites hybridus</i> )
<i>Poa nemoralis</i>	( <i>Pulmonaria officinalis</i> )
( <i>Ajuga reptans</i> )	( <i>Rubus fruticosus</i> agg.)
( <i>Allium ursinum</i> )	( <i>Sanicula europaea</i> )
( <i>Asarum europaeum</i> )	( <i>Scrophularia nodosa</i> )
( <i>Brachypodium sylvaticum</i> )	( <i>Stachys sylvatica</i> )
( <i>Carex brizoides</i> )	( <i>Stellaria holostea</i> )
( <i>Carex sylvatica</i> )	( <i>Stellaria nemorum</i> )
( <i>Dactylis glomerata</i> )	( <i>Urtica dioica</i> )

Forest site types:

- (1) upland (*collinum*)
- (2) (sub-) highland (*supra-collinum*)

Natural tree species composition: *Quercus robur* 50 %, *Fraxinus excelsior* 30 %, (*Ulmus glabra*, *Ulmus minor*, *Ulmus laevis*) 10 %, *Acer platanoides* 10 %, *Alnus glutinosa* 0.5 %

In dependence on site condotions: *Quercus robur* 30 - 70 %, *Carpinus betulus* 0 - 20 %, *Acer campestre*, *Acer platanoides*, *Acer pseudoplatanus* ± 20 %, *Fraxinus excelsior* 10 - 30 %, (*Ulmus glabra*, *Ulmus minor*, *Ulmus laevis*) 10 - 30 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, *Alnus glutinosa* ± 10 %, (*Populus alba*, *Populus nigra*) ± 10 %, *Salix* spp. ± 10 %

Absolute height yield class: *Quercus robur* (22) 26 - 30 (34) m, *Fraxinus excelsior* (24) 26 - 32 (36) m, *Alnus glutinosa* (22) 24 - 28 (30) m, *Tilia* spp. 32 - 34 m, *Acer* spp. 26 m, *Picea abies* (24) 20 - 30 (34) m

Hazards: strongly by brush, medium by flood (closely to water level); allochtonous *Picea abies* by rot.

**part of 3<sup>rd</sup> + 4<sup>th</sup> + part of 5<sup>th</sup> forest vegetation zone 3L - *Fraxineto-Alnetum alluvialis***

Occurrence: uplands and low highlands; close stream alluvia; sources (slow moved oxidized water and greater nutrient content in the soil).

Soil: sandy-to-loamy (more clay at sources), well aired; predominantly Haplic Gleysols and Cambic Gleysols; sometimes Histi-Mollic Gleysols and Histi-Umbric Gleysols, these gleysols can be humic, all depend on distance from water level or ground water level to soil surface; frequently Dystric Fluvisols, Cambic Fluvisols, Stagnic Dystric Fluvisols and Gleyic Dystric Fluvisols; Skeli-Dystric Fluvisols and Fluvic Arenosols are less abundant; Calacric Fluvisols are at lime areas.

Significant often dominant or indicator species:

<i>Aegopodium podagraria</i>	( <i>Brachypodium sylvaticum</i> )
<i>Cardamine amara</i>	( <i>Carex sylvatica</i> )
<i>Carex brizoides</i>	( <i>Dactylis glomerata</i> )

<i>Carex remota</i>	( <i>Galium odoratum</i> )
<i>Deschampsia caespitosa</i>	( <i>Geranium robertianum</i> )
<i>Chaerophyllum hirsutum</i>	( <i>Glechoma hederacea</i> )
<i>Chrysosplenium alternifolium</i>	( <i>Lysimachia nummularia</i> )
<i>Impatiens noli-tangere</i>	( <i>Petasites albus</i> )
<i>Lamium maculatum</i>	( <i>Pulmonaria officinalis</i> )
<i>Mercurialis perennis</i>	( <i>Rubus fruticosus</i> agg.)
<i>Oxalis acetosella</i>	( <i>Sanicula europaea</i> )
<i>Poa nemoralis</i>	( <i>Scrophularia nodosa</i> )
<i>Stellaria nemorum</i>	( <i>Stachys sylvatica</i> )
( <i>Ajuga reptans</i> )	( <i>Stellaria holostea</i> )
( <i>Allium ursinum</i> )	( <i>Stellaria nemorum</i> )
( <i>Asarum europaeum</i> )	( <i>Urtica dioica</i> )

Forest site types:

- (1) stream (*Chaerophyllum hirsutum* + *Carex remota* + *Stellaria nemorum*)
- (2) source (*Cardamine amara* + *Chrysosplenium alternifolium*)
- (3) tufty (*Deschampsia caespitosa*)

Natural tree species composition:

Generally: *Alnus glutinosa* 70 %, *Fraxinus excelsior* 30 %, *Picea abies* (*Populus nigra*, *Populus tremula*) 0.5 %

In dependence on site condotions: *Alnus glutinosa* 40 - 80 %, *Fraxinus excelsior* 10 - 30 %, *Picea abies* 0 - 30 %, (*Acer* spp., *Populus tremula*, *Salix* spp., *Alnus glutinosa*) 0.5 %

Absolute height yield class: *Alnus glutinosa* (18) 22 - 26 (30) m, *Fraxinus excelsior* (22) 24 - 28 (30) m, *Picea abies* (22) 26 - 28 (36) m

Hazards: strongly by brush; wetting to flooding, frost (hollows); allochtonous *Picea abies* by rot.

**part of 5<sup>th</sup> + part of 6<sup>th</sup> forest vegetation zone 5L - *Fraxineto-Alnetum montanum***

Occurence: from highlands to mountains on stream and river alluvia; sources.

Soil: loamy-sandy to sandy-loamy transit to clay-loamy, often with deposited gravel; predominantly Haplic Gleysols, Cambic Gleysols, Histi-Umbric Gleysols and Histi-Molic Gleysols (variety: humic with mull as the most often humus form); frequently Eutric Fluvisols, Cambic Fluvisols; considerably Skeli-Dystric Fluvisols; sometimes Stagnic Dystric Fluvisols and Gleyic Dystric Fluvisols; all types are dominantly mesotrophic, but some are oligotrophic (especially on transition to *Alnetum incanae* (6L)).

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	( <i>Equisetum sylvaticum</i> )
<i>Cardamine amara</i>	( <i>Chaerophyllum hirsutum</i> )
<i>Carex remota</i>	( <i>Juncus effusus</i> )
<i>Deschampsia caespitosa</i>	( <i>Lysimachia nemorum</i> )
<i>Chrysosplenium alternifolium</i>	( <i>Mentha longifolia</i> )
<i>Petasites albus</i>	( <i>Myosotis palustris</i> )
<i>Stellaria nemorum</i>	( <i>Ranunculus flammula</i> )
( <i>Circaea alpina</i> )	( <i>Ranunculus repens</i> )
( <i>Stachys sylvatica</i> )	

Forest site types:

- (1) stream (*Chaerophyllum hirsutum* + *Carex remota* + *Stellaria nemorum*)  
(2) source (*Cardamine amara* + *Chrysosplenium alternifolium*)

Natural tree species composition: *Picea abies* 0 - 30 %, *Fraxinus excelsior* 10 - 30 %, *Alnus glutinosa* 40 - 80 %, (*Acer platanoides*, *Acer pseudoplatanus*, *Populus tremula*, *Salix*, *Alnus incana*) 0.5 % .

Absolute height yield class: *Alnus glutinosa* (18) 22 - 26 (30) m, *Fraxinus excelsior* (18) 20 - 30 (32) m, *Picea abies* (22) 26 - 30 (34) m

Hazards: hoarfrost; strongly by snowpack, soil erosion, allochthonous – allochthonous - planted *Picea abies* by rot.

### **part of 6<sup>th</sup> + 7<sup>th</sup> and 8<sup>th</sup> forest vegetation zone 6L - *Alnetum incanae***

Occurrence: mountain alluvia (floods at spring due to the snow and at summer due to heavy storms); sources with flowing water.

Soil: sandy-loamy to loamy-sandy often more grained (gravel, stones); predominantly Eutric Fluvisols and Skeli-Dystris Fluvisols; Stagnic Dystric Fluvisols and Cambic Gleysols correspond to increasing humidity (from water level).

#### Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	( <i>Equisetum sylvaticum</i> )
<i>Cardamine amara</i>	( <i>Chaerophyllum hirsutum</i> )
<i>Carex remota</i>	( <i>Juncus effusus</i> )
<i>Deschampsia caespitosa</i>	( <i>Lysimachia nemorum</i> )
<i>Chrysosplenium alternifolium</i>	( <i>Mentha longifolia</i> )
<i>Petasites albus</i>	( <i>Myosotis palustris</i> )
<i>Stellaria nemorum</i>	( <i>Ranunculus flammula</i> )
( <i>Circaea alpina</i> )	( <i>Stachys sylvatica</i> )
( <i>Ranunculus repens</i> )	( <i>Ranunculus platanifolius</i> )
( <i>Aconitum variegatum</i> )	

#### Forest site types:

(6) collected (*alluvium*)

#### Natural tree species composition:

Generally: *Alnus incana* 80 %, *Picea abies* 20 %, *Acer pseudoplatanus* 5 % (more „dry“ sites: moreover *Fagus sylvatica* 0.5 %, *Abies alba* 0.5 %; lower elevations: moreover: *Alnus glutinosa* 5 %, *Fraxinus excelsior* 0.5 %)

In dependence on site condotions: *Alnus incana* 60 - 80 %, *Picea abies* ± 30 %, *Acer pseudoplatanus* ± 10 %, *Abies alba* ± 0.1 %, *Fraxinus excelsior* 0 - 10 %, *Betula pendula* ± 10 %, *Sorbus aucuparia* 0.5 %

Absolute height yield class: *Alnus incana* 22 - 26 (28) m, *Picea abies* 26 - 30 m

Hazards: by soil erosion; strongly by snowpack, hoarfrost and brush; allochthonous - planted *Picea abies* by rot.

### **2.3.5.2 *Categoria vallisosa* (U – category)**

Category covers ravine sites and it makes connections with some characteristics of maple series (J) (*series acerosa*) and ash series (L) (*series fraxinosa*). An exception is forest site complex 1U (*Querceto-Populetum vallisosum*), which is a typical for floodplain forest. Category is situated on nutrient-rich soil material areas on stagnic ravine bases and bottoms (on the difference of *Ulmi-Fraxineto-Aceretum saxatile* (5J)). Difficult to map types on the

bottoms shallow ravines are solved, since they cover alluvia and humid (often stony) slope bases, which are physiognomically connected by phytocoenosis and high production.

Different Fluvisols with combination of Stagni-Dystric Cambisols or Cambic Gleysols make soil bases. *Querceto-Populetum vallidosum* (1U) site complex makes an exception (see below) of them.

Forest function is for production; soil protection is in ravine terrains only. Stands have infiltration and desuction ecological functions. Stands production is high above standard. Natural regeneration of broadleaves tree species is good, but it is necessary to eliminate brush.

### **Forest site type complexes**

#### **1<sup>st</sup> forest vegetation zones 1U - *Querceto-Populetum vallidosum***

Occurrence: vale, young soils; small developed, light, humid alluvia, regularly shortly flooded.

Soil: sand-loamy and loamy, aired, humic, humid; patchy combination of: Haplic Gleysols, Fluvic Gleysols, Cambic Fluvisols, Stagnic Dystric Fluvisols and Gleyic Dystric Fluvisols; Mollic Gleysols and Mollic Fluvisols are rare.

#### Significant often dominant or indicator species:

<i>Aegopodium podagraria</i>	<i>Lamium maculatum</i>
<i>Alliaria petiolata</i>	<i>Phalaris arundinacea</i>
<i>Caltha palustris</i>	<i>Phragmites australis</i>
<i>Carex acutiformis</i>	<i>Stellaria nemorum</i>
<i>Carex gracilis</i>	<i>Symphytum officinale</i>
<i>Carex riparia</i>	<i>Urtica dioica</i>
<i>Dactylis glomerata</i>	<i>Veronica hederifolia</i>
<i>Festuca gigantea</i>	( <i>Bidens frondosa</i> )
<i>Ficaria bulbifera</i>	( <i>Carex remota</i> )
<i>Filipendula ulmaria</i>	( <i>Deschampsia caespitosa</i> )
<i>Galium aparine</i>	( <i>Glechoma hederacea</i> )
<i>Hottonia palustris</i>	( <i>Impatiens parviflora</i> )
<i>Iris pseudacorus</i>	( <i>Rubus caesius</i> )

#### Forest site types:

(1) *Urtica dioica*, typical for light soils (on heavy soils transit to forest type 1L9)

(2) willow (with *Phalaris arundinacea* domination), youngest alluvia transits to *Saliceto-Alnetum* (1G)

#### Natural tree species composition:

Generally: *Quercus robur* 30 %, (*Populus alba*, *Populus x canescens*, *Populus nigra*) 30 %, *Ulmus minor* + *Ulmus laevis* 20 %, (*Fraxinus excelsior*, *Fraxinus angustifolia*) 20 %, (*Salix* spp., *Alnus glutinosa*) 0.5 %

1U1 and 1U2: *Quercus robur* 10 - 40 %, *Fraxinus excelsior* 10 - 40 %, *Ulmus minor* + *Ulmus laevis* ± 20 %, *Tilia cordata* + *Tilia platyphyllos* ± 10 %, *Alnus glutinosa* ± 20 %, (*Populus alba*, *Populus nigra*) 20 - 60 %, *Salix* spp. ± 10 %, *Fraxinus angustifolia* ± 5 % (in South Moravia only)

Absolute height yield class: *Quercus robur* 26 - 30 (32) m, *Alnus glutinosa* (20) 24 - 26 (28) m, *Fraxinus* spp. 34 m, *Populus* spp. (24) 28 - 30 (34) m, *Salix* spp. 24 - 26 m

Hazards: strongly by brush; pure stands of clone poplars are often planted.

#### **2<sup>nd</sup> + 3<sup>rd</sup> + 4<sup>th</sup> forest vegetation zones 3U - *Acereto-Fraxinetum vallidosum***

Occurrence: shallow ravines bottom and adjacent slope bases; uplands.

Soil: combination of alluvia and water influenced, loamy, often stony, slope bases; soil types change with water level distance and ground water table; alluvia: from Cambic Fluvisols slightly stagnic, through Stagnic Dystric Fluvisols to Gleyic Dystric Fluvisols and next to Cambic Gleysols; adjacent slope bases: from mesotrophic Dystric Cambisols slightly stagnic, through Stagni-Dystric Cambisols to Cambic Gleysols.

Significant often dominant or indicator species:

<i>Aegopodium podagraria</i>	( <i>Geranium palustre</i> )
<i>Brachypodium sylvaticum</i>	( <i>Chrysosplenium alternifolium</i> )
<i>Carex brizoides</i>	( <i>Lysimachia nummularia</i> )
<i>Impatiens noli-tangere</i>	( <i>Melica nutans</i> )
<i>Mercurialis perennis</i>	( <i>Melica uniflora</i> )
( <i>Allium ursinum</i> )	( <i>Milium effusum</i> )
( <i>Athyrium filix-femina</i> )	( <i>Oxalis acetosella</i> )
( <i>Cardamine amara</i> )	( <i>Paris quadrifolia</i> )
( <i>Carex remota</i> )	( <i>Petasites hybridus</i> )
( <i>Carex sylvatica</i> )	( <i>Pulmonaria officinalis</i> )
( <i>Cirsium oleraceum</i> )	( <i>Ranunculus lanuginosus</i> )
( <i>Dentaria bulbifera</i> )	( <i>Ranunculus repens</i> )
( <i>Dryopteris dilatata</i> )	( <i>Stachys sylvatica</i> )
( <i>Festuca gigantea</i> )	( <i>Stellaria holostea</i> )
( <i>Galeobdolon luteum</i> )	( <i>Urtica dioica</i> )
( <i>Galium odoratum</i> )	( <i>Valeriana officinalis</i> )

Forest site types:

- (1) *Aegopodium podagraria*
- (2) *Mercurialis perennis* + *Ranunculus repens* on Gleysols
- (3) *Mercurialis perennis* + *Brachypodium sylvaticum* on undeveloped alluvia
- (4) *Carex brizoides*, nutrient-impooverished - it has more humid variety with *Alnus glutinosa*
- (5) terraced-like

Natural tree species composition:

Generally: *Fraxinus excelsior* 40 %, *Fagus sylvatica* 30 %, *Abies alba* 20 %, *Acer platanoides* 10 %, *Picea abies* 0.5 %, *Quercus robur* 0.5 %, (= floodplain and climax tree species)

3U1 and 3U2: *Quercus robur* 10 - 40 %, *Fagus sylvatica* ± 20 %, *Abies alba* ± 20 %, (*Acer pseudoplatanus*, *Acer platanoides*) 10 - 30 %, *Picea abies* ± 0.1 %, *Fraxinus excelsior* 10 - 40 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, *Alnus glutinosa* 0.5 %

Absolute height yield class: *Picea abies* (26) 28 - 30 (38) m, *Quercus robur* (24) 26 - 28 (32) m, *Fraxinus excelsior* (18) 24 - 30 (34) m, *Fagus sylvatica* 24 - 28 (30) m, *Acer pseudoplatanus* 28 (30) - 30 (36) m, *Acer platanoides* (24) 28 - 30 (36) m

Hazards: considerably by brush, waterlogging, frost (frost hollow); allochtonous – planted *Picea abies* by rot.

### **5<sup>th</sup> + 6<sup>th</sup> forest vegetation zones 5U - *Fraxineto-Aceretum vallisodum***

Occurrence: highlands and lower mountain altitudes; nutrient-richer soil materials on slope bases enriched by water; humid ravines; stream terraces.

Soil: nutrient-rich, water-enriched, deep, humic; meso- and eutrophic Dystric Cambisols always slightly stagnic, Stagni-Dystric Cambisols, Gleyic Cambisols, Stagnic Dystric Fluvisols and Gleyic Dystric Fluvisols are frequent, less Eutric Fluvisols and Cambic

Fluvisols - both always slightly stagnic; Eutric Cambisols (limes), Skeli-Dystric Fluvisols and Cambic Gleysols are rare; Stagni-Haplic Luvisols can occur (loess promontory).

Significant often dominant or indicator species:

<i>Aegopodium podagraria</i>	( <i>Dentaria enneaphyllos</i> )
<i>Allium ursinum</i>	( <i>Dentaria glandulosa</i> )
<i>Geranium robertianum</i>	( <i>Dryopteris filix-mas</i> )
<i>Lunaria rediviva</i>	( <i>Festuca gigantea</i> )
<i>Mercurialis perennis</i>	( <i>Galium odoratum</i> )
<i>Oxalis acetosella</i>	( <i>Geranium robertianum</i> )
<i>Petasites albus</i>	( <i>Chaerophyllum hirsutum</i> )
<i>Stellaria nemorum</i>	( <i>Impatiens noli-tangere</i> )
( <i>Aconitum variegatum</i> )	( <i>Lamium maculatum</i> )
( <i>Athyrium filix-femina</i> )	( <i>Rubus idaeus</i> )
( <i>Carex sylvatica</i> )	( <i>Stachys sylvatica</i> )
( <i>Urtica dioica</i> )	

Forest site types:

- (1) ravine, *Petasites albus*
- (2) *Lunaria rediviva*
- (3) stream (with domination *Aegopodium podagraria*)

Natural tree species composition:

Generally: *Fagus sylvatica* 40 %, *Abies alba* 20 %, *Fraxinus excelsior* 20 %, *Acer pseudoplatanus* 20 %, *Ulmus glabra* 0.5 %, *Picea abies* 0.5 %

5U1 to 5U3: *Picea abies* ± 30 %, *Abies alba* 20 - 30 %, *Fagus sylvatica* 10 - 30 %, *Acer pseudoplatanus* 10 - 30 %, *Fraxinus excelsior* 10 - 30 %, *Ulmus glabra* ± 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 0.5 %, *Alnus glutinosa* ± 0.5 %

Absolute height yield class: *Picea abies* (24) 28 - 32 (38) m, *Fagus sylvatica* 26 - 30 (34) m, *Fraxinus excelsior* (18) 26 - 30 (34) m, *Acer pseudoplatanus* (22) 26 - 30 (36) m, *Abies alba* 24 - 28 (32) m, *Alnus glutinosa* 24 m

Hazards: strongly by brush, medium by waterlogging and allochthonous – planted *Picea abies* stands by windthrow and rot.

### 2.3.5.3 *Categoria humida* (V – category)

Category covers water-enriched soils on stagnic tall deluvia and steep slope bases, sources neighbourhood and stream terraces. Positive attribute of soil water results to nitrophilous species abundance at phytocoenosis. But its diversity is not as rich as in *Fraxineto-Aceretum vallidosum* (5U).

Soil conditions are made by mosaic of soil types from Stagni-Dystric Cambisols, through Gleyic Cambisols to small plots of Cambic Gleysols. Continuous sites of permanent waterlogged soils with Cambic Gleysols and Haplic Gleysols are classified as separate sub-complexes (or collected types) „wet“.

Forest site complex *Carpineto Quercetum fraxinosum humidum* (1V) is closest to floodplain communities. Others are characterized by types: *Impatiens noli-tangere* (only phytocoenologically similar stages are in *Picea abies* stands of B-category (*series mesotrophica*)), *Aegopodium podagraria*, *Athyrium filix-femina* and *Petasites albus* (at higher elevations). Relief plays the role for the „ravine“ and „stream“ types in the highest forest vegetation zones. Collected („wet“) types of permanent waterlogged soils cover phytocoenoses with dominances of *Equisetum sylvaticum*, *Petasites albus*, *Impatiens noli-*

*tangere* etc. Sources are site varieties. Since present stands are *Picea abies* monocultures, natural phytocoenosis reconstruction is very difficult.

Forest function is for production. Production is high above standard. Stands have infiltration and desuction ecological functions. Natural tree species regeneration is very limited by brush. *Abies grandis* is possible to produce at the rank of 2nd to 5th forest vegetation zones on the stand area of 15 %. Stands drainage is effective only on continuous sites of permanent waterlogged soils. Enriching by flowing water limits soil degradation of pure *Picea abies* stands and it allows *Fagus sylvatica* abundancy (that is the difference from stagnic soil stands).

### **Forest site type complexes**

#### **1<sup>st</sup> forest vegetation zone 1V - *Carpineto Quercetum fraxinosum humidum***

Occurrence: at lowest elevations; terrain depressions of loess soils and covers-over of marls and sands.

Soil: deep, enriched by water, loamy, rare gravelly or sandy; Cambisols: meso- and eutrophic Dystric Cambisols always slightly stagnic, Stagni-Dystric Cambisols, Gleyic Cambisols, Calcaric Cambisols slightly stagnic and Stagni-Calcaric Cambisols - on marls. Luvisols: Haplic Luvisols slightly stagnic and Stagni-Haplic Luvisols. Stagnosols: Luvic Stagnosols. Gleysols: Haplic Gleysols and Cambic Gleysols. Soils are better developed in comparison of those in floodplain forest.

#### Significant often dominant or indicator species:

<i>Aegopodium podagraria</i>	( <i>Festuca gigantea</i> )
<i>Brachypodium sylvaticum</i>	( <i>Galeobdolon luteum</i> )
<i>Carex brizoides</i>	( <i>Galium sylvaticum</i> )
<i>Deschampsia caespitosa</i>	( <i>Geranium robertianum</i> )
<i>Lamium maculatum</i>	( <i>Geum urbanum</i> )
<i>Molinia coerulea</i>	( <i>Holcus lanatus</i> )
<i>Stachys sylvatica</i>	( <i>Lapsana communis</i> )
<i>Urtica dioica</i>	( <i>Lysimachia vulgaris</i> )
( <i>Ajuga reptans</i> )	( <i>Maianthemum bifolium</i> )
( <i>Asarum europaeum</i> )	( <i>Melica nutans</i> )
( <i>Calamagrostis canescens</i> )	( <i>Pulmonaria officinalis</i> )
( <i>Campanula trachelium</i> )	( <i>Rubus idaeus</i> )
( <i>Carex montana</i> )	( <i>Sanicula europaea</i> )
( <i>Carex sylvatica</i> )	( <i>Scrophularia nodosa</i> )
( <i>Circaea lutetiana</i> )	( <i>Stellaria holostea</i> )
( <i>Convallaria majalis</i> )	( <i>Veronica chamaedrys</i> )
( <i>Dactylis glomerata</i> )	( <i>Viola reichenbachiana</i> )

#### Forest site types:

- (1) *Urtica dioica*
- (2) *Aegopodium podagraria* resp. *Brachypodium sylvaticum*
- (3) *Stachys sylvatica*
- (4) *Carex brizoides*, nutrient-impoverished
- (5) *Deschampsia caespitosa*
- (7) *Molinia coerulea*, nutrient-impoverished (transiting to wetland)
- (9) *Carpineto-Quercetum fraxinosum paludosum*, covers all above mentioned types on Gleysols only



Natural tree species composition:

Generally: *Quercus robur* 50 %, *Fraxinus excelsior* (*Fraxinus angustifolia* at south Moravia) 20 %, (*Ulmus minor*, *Ulmus laevis*) 10 %, *Tilia cordata* 10 %, *Carpinus betulus* 10 %, *Acer platanoides* (*Acer pseudoplatanus* - rarely) 0.5 %

1V1 to 1V3: *Quercus robur* 50 - 70 %, *Fagus sylvatica* 0 - 20 %, *Carpinus betulus* ± 20 %, *Acer platanoides* (*Acer pseudoplatanus* resp.) ± 10 %, *Fraxinus excelsior* (*Fraxinus angustifolia* resp.) ± 20 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, (*Ulmus minor*, *Ulmus laevis*) ± 10 %, *Abies alba* ± 0.1 %, *Alnus glutinosa* ± 0.5 %, *Acer campestre* ± 0.5 %

Absolute height yield class: *Quercus robur* (22) 26 - 28 (30) m, *Fraxinus* spp. (24) 26 - 30 (32) m, *Ulmus* spp. 26 m, *Tilia* spp. 26 - 28 m, *Picea abies* 30 (32) - 32 (34) m

Hazards: strongly by brush; locally by warterlogging; allochtonous – planted *Picea abies* by rot.

**2<sup>nd</sup> forest vegetation zone 2V - *Fageto-Quercetum fraxinosum humidum***

Occurrence: lowlands and lower uplands; plateaus, gentle slopes, ravines; different soil materials, frequently covered-over by loess and loamy-loess.

Soil: deep, wet at bottom, sandy-loamy to clay-loamy; dominantly Haplic Gleysols and Cambic Gleysols; less mesotrophic or eutrophic Dystric Cambisols - always slightly stagnic, Stagni-Dystric Cambisols and Gleyic Cambisols; Stagni-Calcaric Cambisols are on marls and clay slates.

Significant often dominant or indicator species:

<i>Aegopodium podagraria</i>	( <i>Galeobdolon luteum</i> )
<i>Carex pilosa</i>	( <i>Hepatica nobilis</i> )
<i>Carex sylvatica</i>	( <i>Mercurialis perennis</i> )
<i>Deschampsia caespitosa</i>	( <i>Mycelis muralis</i> )
<i>Impatiens noli-tangere</i>	( <i>Oxalis acetosella</i> )
<i>Stellaria holostea</i>	( <i>Primula elatior</i> )
( <i>Viola reichenbachiana</i> )	( <i>Pulmonaria officinalis</i> )
( <i>Asarum europaeum</i> )	( <i>Sanicula europaea</i> )
( <i>Festuca gigantea</i> )	( <i>Senecio fuchsii</i> )

Forest site types:

- (1) *Impatiens noli-tangere*
- (2) *Deschampsia caespitosa*, nutrient-poorer and more clayed
- (3) *Aegopodium podagraria*
- (4) *Stellaria holostea*, transition to B-category (*categoria mesotrophica*)
- (5) bent (grass) (especially *Carex sylvatica*, but *Carex pilosa* - on transition to D-category (*categoria deluvia*))
- (9) *Fageto-Quercetum fraxinosum paludosum* covers all above-mentioned types (1 - 5) on Gleysols only

Natural tree species composition:

Generally: *Quercus robur* 50 %, *Fraxinus excelsior* 10 %, *Acer platanoides* 10 %, *Fagus sylvatica* 10 %, (*Ulmus minor*, *Ulmus laevis*) 0.5 %, *Abies alba* 20 %

2V1, 2V3 and 2V4: *Quercus robur* 50 - 70 %, *Fagus sylvatica* 0 - 20 %, *Carpinus betulus* ± 5 %, *Acer platanoides* ± 10 %, *Fraxinus excelsior* ± 10 %, (*Ulmus minor*, *Ulmus laevis*) ± 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, *Alnus glutinosa* ± 0.5 %, *Acer campestre* ± 0.1 %, *Abies alba* ± 0.1 %

Absolute height yield class: *Quercus robur* (22) 24 - 28 (30) m, *Fraxinus excelsior* 28 - 30 (34) m, *Abies alba* (26) 28 m, *Picea abies* (26) 30 - 34 (38) m

Hazards: canopy opens by brush; by soil erosion; locally by waterlogging; allochthonous – planted *Picea abies* by windthrow and rot.

### **3<sup>rd</sup> forest vegetation zone 3V - *Querceto-Fagetum fraxinosum humidum***

Occurrence: uplands; deluvia; flat ravines, terrace and slope sources.

Soil: deep, fresh humid loamy; dominantly Haplic Gleysols and Cambic Gleysols; less mesotrophic or eutrophic Dystric Cambisols - always slightly stagnic, Stagni-Dystric Cambisols and Gleyic Cambisols; Stagnic Glossisols are rare.

#### Significant often dominant or indicator species:

<i>Aegopodium podagraria</i>	( <i>Dryopteris filix-mas</i> )
<i>Athyrium filix-femina</i>	( <i>Festuca gigantea</i> )
<i>Cardamine amara</i>	( <i>Galeobdolon luteum</i> )
<i>Carex pilosa</i>	( <i>Galium odoratum</i> )
<i>Carex sylvatica</i>	( <i>Galium rotundifolium</i> )
<i>Equisetum sylvaticum</i>	( <i>Hacquetia epipactis</i> )
<i>Impatiens noli-tangere</i>	( <i>Melica nutans</i> )
<i>Oxalis acetosella</i>	( <i>Mercurialis perennis</i> )
<i>Senecio fuchsii</i>	( <i>Plagiomnium affine</i> )
( <i>Actaea spicata</i> )	( <i>Pulmonaria officinalis</i> )
( <i>Ajuga reptans</i> )	( <i>Rubus hirtus</i> )
( <i>Asarum europaeum</i> )	( <i>Rubus idaeus</i> )
( <i>Circaea lutetiana</i> )	( <i>Sanicula europaea</i> )
( <i>Dentaria bulbifera</i> )	( <i>Stachys sylvatica</i> )
( <i>Deschampsia caespitosa</i> )	( <i>Urtica dioica</i> )

#### Forest site types:

- (1) *Impatiens noli-tangere*
- (2) *Athyrium filix-femina*
- (3) *Aegopodium podagraria*
- (4) magnoherbaceous (especially species of the genus *Rubus*)
- (5) *Oxalis acetosella*, transition to *Abieti-Querceto-Fagetum variohumidum mesotrophicum* - *Oxalis acetosella* (306)
- (9) *Querceto-Fagetum fraxinosum paludosum*, covers all above mentioned types (1 - 5) on Gleysols only - it has its own variants: sources (with *Cardamine amara*) - nutrient-poorer (with *Equisetum sylvaticum*)

#### Natural tree species composition:

Generally: *Fagus sylvatica* 30 %, *Quercus robur* 30 %, *Abies alba* 30 %, *Acer platanoides* 10 %

3V1, 3V2, 3V3 and 3V5: *Abies alba* 30 - 40 %, *Quercus robur* 10 - 40 %, *Fagus sylvatica* 20 - 40 %, *Acer platanoides* (*Acer pseudoplatanus* resp.) ± 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, *Carpinus betulus* ± 0.5 %, (*Fraxinus excelsior*, *Ulmus glabra*, *Ulmus minor*, *Ulmus laevis*, *Populus tremula*) ± 0.5 %, (*Taxus baccata* 0.1 % in forest site type 3V2)

Absolute height yield class: *Picea abies* (24) 26 - 32 (36) m, *Abies alba* 24 - 28 (30) m, *Fagus sylvatica* (22) 26 - 30 (36) m, *Alnus glutinosa* 22 - 28 m, *Fraxinus excelsior* (24) 26 - 30 (33) m

Hazards: strongly by brush; locally by waterlogging; allochthonous – planted *Picea abies* stands by windthrow and rot.

#### **4<sup>th</sup> forest vegetation zone 4V - *Fagetum fraxinosum humidum***

Occurrence: from uplands to highlands; not well mapped up till now.

Soil: deep, fresh humid, loamy; dominantly Haplic Gleysols and Cambic Gleysols; less mesotrophic or eutrophic Dystric Cambisols - always slightly stagnic, Stagni-Dystric Cambisols and Gleyic Cambisols.

Significant often dominant or indicator species:

<i>Athyrium filix-femina</i>	( <i>Circaea lutetiana</i> )
<i>Carex sylvatica</i>	( <i>Festuca gigantea</i> )
<i>Equisetum sylvaticum</i>	( <i>Galeobdolon luteum</i> )
<i>Impatiens noli-tangere</i>	( <i>Glechoma hederacea</i> )
<i>Oxalis acetosella</i>	( <i>Luzula pilosa</i> )
( <i>Aegopodium podagraria</i> )	( <i>Melica nutans</i> )
( <i>Ajuga reptans</i> )	( <i>Mercurialis perennis</i> )
( <i>Asarum europaeum</i> )	( <i>Milium effusum</i> )
( <i>Carex brizoides</i> )	( <i>Sanicula europaea</i> )
( <i>Carex digitata</i> )	( <i>Stachys sylvatica</i> )
( <i>Viola reichenbachiana</i> )	

Forest site types:

- (1) *Impatiens noli-tangere*
- (2) *Athyrium filix-femina*; (some authors names it generally - ferns)
- (3) *Aegopodium podagraria*
- (5) *Oxalis acetosella*, transition to *Querceto-Abietum variohumidum mesotrophicum* - *Oxalis acetosella* (4O1)
- (9) *Fagetum fraxinosum paludosum*; covers all above mentioned types (1, 2, 3 and 5) on Gleysols only (with characteristic *Equisetum sylvaticum* domination)

Natural tree species composition:

Generally: *Fagus sylvatica* 40 %, *Abies alba* 40 %, *Quercus robur* 10 %, *Acer platanoides* 10 %

4V1 to 4V3: *Abies alba* 30 - 40 %, *Quercus robur* 10 - 40 %, *Fagus sylvatica* 20 - 40 %, (*Acer platanoides*, *Acer pseudoplatanus*) ± 10 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, *Carpinus betulus* ± 0.5 %, (*Fraxinus excelsior*, *Ulmus glabra*, *Ulmus leavis*, *Populus tremula*) ± 0.5 %, *Taxus baccata* 0.1 % in forest site type 4V2

Absolute height yield class: *Picea abies* (26) 28 - 32 (36) m, *Abies alba* 26 - 28 (32) m, *Fagus sylvatica* 26 - 30 (32) m, *Quercus robur* 26 m, *Alnus glutinosa* 22 - 26 (30) m, *Acer platanoides* 26 m

Hazards: strongly by brush; locally by waterlogging; allochthonous planted *Picea abies* stands by windthrow and rot.

#### **5<sup>th</sup> forest vegetation zone 5V - *Abieto-Fagetum fraxinosum humidum***

Occurrence: highlands and promontories; loamy deluvia of slopes bottom and flat ravines; slope and terrace sources.

Soil: deep, sandy-loamy to loamy, bottom wet, moderately humic; dominantly Haplic Gleysols and Cambic Gleysols; less mesotrophic or eutrophic Dystric Cambisols - always

slightly stagnic, Stagni-Dystric Cambisols and Gleyic Cambisols, Skeletic Cambisols slightly stagnic are rare on stony terrain; Histi-Umbric Gleysols are rare.

Significant often dominant or indicator species:

<i>Athyrium filix-femina</i>	( <i>Circaea lutetiana</i> )
<i>Carex sylvatica</i>	( <i>Dentaria bulbifera</i> )
<i>Equisetum sylvaticum</i>	( <i>Deschampsia caespitosa</i> )
<i>Festuca gigantea</i>	( <i>Dryopteris filix-mas</i> )
<i>Galium odoratum</i>	( <i>Galeobdolon luteum</i> )
<i>Impatiens noli-tangere</i>	( <i>Galium rotundifolium</i> )
<i>Oxalis acetosella</i>	( <i>Geranium robertianum</i> )
<i>Petasites hybridus</i>	( <i>Luzula pilosa</i> )
<i>Senecio fuchsii</i>	( <i>Lysimachia nemorum</i> )
<i>Stellaria nemorum</i>	( <i>Mercurialis perennis</i> )
<i>Urtica dioica</i>	( <i>Mycelis muralis</i> )
( <i>Actaea spicata</i> )	( <i>Petasites albus</i> )
( <i>Asarum europaeum</i> )	( <i>Rubus idaeus</i> )
( <i>Cardamine amara</i> )	( <i>Salvia glutinosa</i> )
( <i>Circaea alpina</i> )	( <i>Sanicula europaea</i> )
( <i>Circaea lutetiana</i> )	( <i>Stachys sylvatica</i> )

Forest site types:

- (1) *Impatiens noli-tangere*
- (2) *Athyrium filix-femina*
- (3) *Petasites hybridus*, *Petasites albus* resp.
- (6) magnoherbaceous (with a higher *Abies alba* abundance) (*magnoherbaceum*)
- (7) *Oxalis acetosella*
- (9) *Abieto-Fagetum fraxinosum paludosum* - covers all above mentioned types (1, 2, 3, 6 and 7) on Gleysols only- it has its own variants - *Impatiens noli-tangere*- *Equisetum sylvaticum* - terraced-like

Natural tree species composition:

Generally: *Fagus sylvatica* 50 %, *Abies alba* 40 %, *Acer pseudoplatanus* 10 %, *Fraxinus excelsior* 0.5 %, *Picea abies* 0.1 %

In dependence on site condotions: *Picea abies* ± 30 %, *Abies alba* 20 - 40 %, *Fagus sylvatica* 30 - 70 %, *Acer pseudoplatanus* ± 10 %, (*Ulmus glabra*, *Tilia cordata* + *Tilia platyphyllos*, *Alnus glutinosa*, *Alnus incana*) ± 0.5 %, *Taxus baccata* (in forest site type 5V2 only) 0.5 %

Absolute height yield class: *Picea abies* (26) 28 - 32 (38) m, *Abies alba* (24) 26 - 28 (36) m, *Fagus sylvatica* (24) 26 - 28 (34) m, *Fraxinus excelsior* (24) 26 - 30 (34) m, *Alnus* spp. (18) 22 - 26 (28) m, *Acer pseudoplatanus* 26 - 28 m

Hazards: strongly by brush and windthrow; moderately by waterlogging and snowpack.

**6<sup>th</sup> forest vegetation zone 6V - *Piceeto-Fagetum fraxinosum humidum***

Occurrence: form highlands to mountains; loamy deluvia of different soil materials (with an exception of nutrient-poorest); slopes bottom, ravines and alluvia terraces.

Soil: deep, loamy (more grain on alluvia), wet, moderately humic; predominantly Stagnic Gleysols, rather less Haplic Gleysols and Cambic Gleysols; frequently Cambic Podzols slightly stagnic, Stagni-Cambic Podzol and Gleyi-Cambic Podzols; mesotrophic or eutrophic Dystric Cambisols slightly stagnic, Stagni-Dystric Cambisols, Gleyic Cambisols, Fluvic-

Eutric Cambisols and Gleyic Stagnosols are rare; Skeletic Cambisols always stagnic are in more rocky terrains patchy.

Significant often dominant or indicator species:

<i>Athyrium filix-femina</i>	( <i>Festuca altissima</i> )
<i>Cardamine trifolia</i>	( <i>Galeobdolon luteum</i> )
<i>Dentaria glandulosa</i>	( <i>Homogyne alpina</i> )
<i>Dryopteris filix-mas</i>	( <i>Luzula pilosa</i> )
<i>Equisetum sylvaticum</i>	<i>Luzula sylvatica</i>
( <i>Maianthemum bifolium</i> )	<i>Oxalis acetosella</i>
( <i>Mercurialis perennis</i> )	<i>Petasites albus</i>
( <i>Mycelis muralis</i> )	( <i>Ajuga reptans</i> )
( <i>Prenanthes purpurea</i> )	( <i>Athyrium distentifolium</i> )
( <i>Ranunculus lanuginosus</i> )	( <i>Blechnum spicant</i> )
( <i>Rubus idaeus</i> )	( <i>Calamagrostis villosa</i> )
( <i>Sanicula europaea</i> )	( <i>Carex remota</i> )
( <i>Senecio fuchsii</i> )	( <i>Cicerbita alpina</i> )
( <i>Solidago virgaurea</i> )	( <i>Circaea alpina</i> )
( <i>Stachys sylvatica</i> )	( <i>Dryopteris dilatata</i> )
( <i>Circaea lutetiana</i> )	( <i>Urtica dioica</i> )
( <i>Petasites hybridus</i> )	

Forest site type:

- (1) *Athyrium filix-femina*
- (2) *Petasites albus*, (resp. *Petasites hybridus*)
- (3) *Luzula sylvatica*, Beskydy Mts.
- (4) *Oxalis acetosella*, Beskydy Mts.
- (5) ravines (*filices* + sub-alpine species)
- (6) *Cardamine trifolia*, Novohradské hory Mts.
- (9) *Piceeto-Fagetum fraxinosum paludosum* - covers types on Gleysols only- it has its own variants: - *Petasites albus* and *Petasites hybridus* resp. - *Equisetum sylvaticum*- ferns (*filices*) - source (area)

Natural tree species composition:

Generally: *Fagus sylvatica* 30 %, *Abies alba* 40 %, *Picea abies* 30 %, *Acer pseudoplatanus* 0.5 %, *Fraxinus excelsior* 0.5 %

6V1, 6V2, 6V4 and 6V5: *Picea abies* ± 30 %, *Abies alba* 20 - 40 %, *Fagus sylvatica* 30 - 70 %, *Acer pseudoplatanus* ± 10 %, (*Ulmus glabra*, *Tilia cordata* + *Tilia platyphyllos*, *Alnus glutinosa*, *Alnus incana*) ± 0.5 %, *Taxus baccata* 0.1 % (in forest site types 6V1 and 6V5 only)

Absolute height yield class: *Picea abies* (24) 28 - 32 (38) m, *Abies alba* (24) 26 - 30 (32) m, *Fagus sylvatica* 24 - 28 (30) m, *Alnus* spp. 24 - 28 m, *Acer pseudoplatanus* 26 m, *Ulmus* spp. 26 m

Hazards: strongly by brush and windthrow; moderately by waterlogging and snowpack.

**7<sup>th</sup> forest vegetation zone 7V - *Fageto-Piceetum acerosum humidum***

Occurrence: mountains (850 - 1050 m); slope bases, slope sources, ravines and terraces (in ravines it continues down to promontories)

Soil: predominantly sandy-loamy to loamy, deep, fresh to wet, humification is reduced, partly histic; frequently Podzols and Gleysols;

Podzols: mesotrophic Cambic Podzols slightly stagnic and Stagni-Cambic Podzols are frequent; Gleyi-Cambic Podzols are less frequent; stony mosaic sites are covered by Skeli-Cambic Podzols. Gleysols: Cambic Gleysols - frequent; Haplic Gleysol - less frequent; Histi-Umbric Gleysols - rare.

Significant often dominant or indicator species:

<i>Athyrium distentifolium</i>	( <i>Calamagrostis villosa</i> )
<i>Cicerbita alpina</i>	( <i>Doronicum austriacum</i> )
<i>Equisetum sylvaticum</i>	( <i>Homogyne alpina</i> )
<i>Oxalis acetosella</i>	( <i>Luzula sylvatica</i> )
<i>Petasites albus</i>	( <i>Plagiothecium undulatum</i> )
( <i>Adenostyles alliariae</i> )	( <i>Prenanthes purpurea</i> )
( <i>Aruncus vulgaris</i> )	( <i>Rubus fruticosus</i> agg.)
( <i>Athyrium filix-femina</i> )	( <i>Senecio fuchsii</i> )
( <i>Blechnum spicant</i> )	( <i>Senecio subalpinus</i> )

Forest site types:

- (1) *Athyrium distentifolium* - its variants: sandy and sandstone ravines (with abundant *Cicerbita alpina*)  
- stony to rocky (filices )
- (2) *Petasites albus*
- (3) *Oxalis acetosella*, in Šumava Mts. with high *Abies alba* abundance
- (4) ravine (in stony depressions)
- (9) *Fageto-Piceetum acerosum paludosum* - covers types on Gleysols only- it has its own variants: - (a) *Petasites albus* - (b) *Equisetum sylvaticum* - (c) ferns (*filices*)

Natural tree species composition:

Generally: *Picea abies* 70 %, *Fagus sylvatica* 10 %, *Abies alba* 10 %, *Acer pseudoplatanus* 10 %

7V1, 7V2, 7V3, 7V4, 7V9a and 7V9b: *Picea abies* 60 - 80 %, *Abies alba* 10 - 40 %, *Fagus sylvatica* 10 - 30 %, *Acer pseudoplatanus* ± 0.5 %, (*Betula pendula*, *Sorbus aucuparia*) ± 0.5 %, (*Taxus baccata* 0.1 % - in forest site types 7V1 and 7V3)

Absolute height yield class: *Picea abies* (24) 26 - 30 (34) m, *Abies alba* (24) 28 - 30 (34) m, *Fagus sylvatica* 24 m

Hazards: strongly by brush and windthrow; considerably by waterlogging, snowpack and hoarfrost and soil frost penetration.

**8<sup>th</sup> forest site type 8V - *Acereto-Piceetum humidum***

Occurrence: *Picea abies* natural stands zone; source slopes and wet slope bases; ravines and stream terraces; nutrient soil material differences are eliminated by nutrient contribution of underground water.

Soil: medium-deep (often stony) with reduced humification (humus accumulation); Stagni-Cambic Podzols and Gleyi-Cambic Podzols are frequent; Gleyic Podzols are patchy; Haplic Gleysols and Cambic Gleysols - both often humic on stream terraces.

Significant often dominant or indicator species:

<i>Aconitum vulparia</i>	( <i>Equisetum sylvaticum</i> )
<i>Adenostyles alliariae</i>	( <i>Gymnocarpium dryopteris</i> )
<i>Athyrium distentifolium</i>	( <i>Homogyne alpina</i> )
<i>Calamagrostis villosa</i>	( <i>Luzula sylvatica</i> )

<i>Petasites albus</i>	<i>(Maianthemum bifolium)</i>
<i>(Athyrium filix-femina)</i>	<i>(Oxalis acetosella)</i>
<i>(Cicerbita alpina)</i>	<i>(Polygonatum verticillatum)</i>
<i>(Deschampsia caespitosa)</i>	<i>(Prenanthes purpurea)</i>
<i>(Avenella flexuosa)</i>	<i>(Rubus idaeus)</i>
<i>(Doronicum austriacum)</i>	<i>(Senecio fuchsii)</i>
<i>(Dryopteris dilatata)</i>	<i>(Stellaria nemorum)</i>
<i>(Vaccinium myrtillus)</i>	

#### Forest site types:

- (1) *Adenostyles alliariae*
  - (2) ravine sometimes called as female-fern (*Athyrium distentifolium*)
  - (3) stream - *Calamagrostis villosa*- *Petasites albus*
- Stunted forms make transition to *Sorbeto-Piceetum (humilis)* (8Z).

#### Natural tree species composition:

Generally: *Picea abies* 100 %, *Acer pseudoplatanus* 0.5 %; stands are more canopy opened closely to timberline.

8V1 to 8V3: *Picea abies* 90 - 100 %, *Abies alba* 0 - 10 %, *Acer pseudoplatanus* 0 - 10 %, (*Betula pubescens*, *Sorbus aucuparia*)  $\pm$  0.5 %

Absolute height yield class: *Picea abies* (20) 22 - 26 (28) m

Hazards: strongly by brush, windthrow, snowpack, waterlogging, hoarfrost and soil frost penetration.

### **2.3.6 Stagnic series (P) – series variohumidum**

Soil water regime is determining factor of this series. In the frame of this, categories are divided through soil nutrient richness.

Alternate humid soil is the characteristic feature, i. e. wet on spring and dry and considerably hard (especially at lower forest vegetation zones) on summer. Bad permeable, insufficiently aired, „cold“ soils transfer vegetation zones down. Always reduced humification and phytocoenosis composition depend on relevant category. *Carex brizoides*, *Potentilla erecta*, *Pteridium aquilinum*, *Convallaria majalis* *Betonica officinalis* are significant plant species indicating forest sites of this series.

*Abies alba* asserts strongly in natural tree species composition due to limited abundance of *Fagus sylvatica*. *Quercus robur* and *Betula pubescens* are present in lower forest vegetation zones, *Picea abies* strongly dominates in higher once. Names of relevant forest site complexes relate to relevant dominate tree species abundance, *Abies alba* especially. *Tilio-Querceta* (linden-oak stands) (sub-continental) and *Betuleto-Querceta* (birch-oak stands) are forest site complexes (and communities) without *Abies alba*.

**1<sup>st</sup> and 2<sup>nd</sup> forest vegetation zones;** *Tilio-Querceta variohumida* (linden-oak stagnic forests) are limited by nutrient-richer of heavy alternate humid soils in 1st and 2nd forest vegetation zones with warm sub-continentally influenced climate. *Potentilla alba*, *Dianthus superbus*, *Melica picta*, *Selinum carvifolia*, *Hypericum montanum*, *Ranunculus polyanthemus* single species with the centre in *Carpineto-Quercetum illimerosum mesotrophicum* (1H) make significant combination of thermophilous (nutrient-richer) branch. *Serratula tinctoria*, *Betonica officinalis*, *Galium boreale*, *Scorzonera humilis*, *Convallaria majalis*, *Melampyrum pratense*, *Molinia arundinacea* etc. are general species for all complexes. Communities are relatively rich-abundant by mesophilous species of oak-hornbeam woods, e.g. *Dactylis glomerata*, *Poa nemoralis*, *Hepatica nobilis*, *Stellaria holostea*, *Galium sylvaticum*,

*Campanula trachelium*, *Melica nutans*, *Lathyrus vernus*, *Polygonatum multiflorum*, *Pulmonaria officinalis* and *Galium odoratum*.

**1<sup>st</sup> – 3<sup>rd</sup> forest vegetation zones;** *Betuleto-Querceta variohumida* (birch-oak stagnic forests), as communities with centre in Atlantic and Sub-atlantic regions, are limited by climate conditions of 1st - 3rd (4th) forest vegetation zones of Central European region. Stands are mostly naturally lightened (canopy opened). *Quercus robur* and *Quercus petraea* agg. are dominant, *Betula pubescens* is an admixture. *Frangula alnus*, *Sorbus aucuparia*, *Rubus fruticosus* agg. and regenerated *Picea abies* are in shrub layer. Grassy aspect of the herb layer is conditioned by open canopy. Communities' characters are made by *Pteridium aquilinum*, *Molinia arundinacea*, *Holcus mollis*, *Agrostis stolonifera*, *Deschampsia caespitosa*, *Avenella flexuosa*, *Calamagrostis arundinacea* (locally *Calamagrostis villosa*). *Vaccinium myrtillus*, *Convallaria majalis*, *Carex brizoides*, *Oxalis acetosella*, *Maianthemum bifolium*, *Melampyrum pratense*, *Lysimachia vulgaris*, *Dryopteris dilatata* are single species characteristic for *Querceta variohumida* abundant. Wetter variants transit to *Betuleto-Alnetum (paludosum oligotrophicum)* (1T) and drier variants to *Pineto-Quercetum oligotrophicum (arenosum)* (1M).

**2<sup>nd</sup> + 3<sup>rd</sup> forest vegetation zone;** *Abieto-Querceta variohumida* (fir-oak stagnic forests) are covered at 2nd and 3rd forest vegetation zones on periodically wet soils of loess and slope loams. *Abies alba* abundant beside dominating *Quercus robur* in natural tree species composition. *Populus tremula*, *Fagus sylvatica* (nutrient-rich soils), *Betula pendula* and *Pinus sylvestris* (nutrient-poorest soils) are an admixture of tree layer. *Luzula luzuloides*, *Luzula pilosa*, *Melampyrum pratense*, *Hieracium murorum*, *Potentilla erecta*, *Maianthemum bifolium* makes composition of quite monotonous phytocoenoses. *Vaccinium myrtillus*, *Avenella flexuosa* and *Carex pilulifera* cover nutrient-poorest soils. Nutrient-richer communities are made by *Fagus sylvatica* and *Carpinus betulus* in tree layer of 3rd forest vegetation zone (*Abieti-Querceto-Fagetum variohumidum mesotrophicum*) and by *Sanicula europaea*, *Oxalis acetosella*, *Mycelis muralis*, *Brachypodium sylvaticum* and other species in herb layer.

**4<sup>th</sup> forest vegetation zone;** *Querceto-Abieta variohumida* (oak-fir stagnic forests) are analogy of *Abieto-Querceta variohumida* (fir-oak stagnic stands) but *Abies alba* is more abundant at 4th forest vegetation zone. Even medium nutrient-rich sites with dominant *Carex brizoides* abundant *Oxalis acetosella*, *Maianthemum bifolium*, *Calamagrostis arundinacea*, *Dryopteris dilatata* and *Deschampsia caespitosa* are also in this zone. *Sphagnum* spp. and *Molinia coerulea* are in nutrient-poor types.

**5<sup>th</sup> forest vegetation zone;** *Abieta variohumida* (fir stagnic forests) in 5th forest vegetation zone take a very narrow area on transition between more clear-cut *Querceto-Abieta variohumida* (oak-fir stagnic stands) and *Piceeto-Abieta variohumida* (spruce-fir stagnic stands). They are practically lower vegetation zone of *Piceeto-Abieta variohumida* (spruce-fir stagnic stands) with rare admixture of *Picea abies* or higher vegetation zone of *Querceto-Abieta variohumida* (oak-fir stagnic stands) with peter out of *Quercus* spp. Rather more clear-cut community with admixtures of *Fagus sylvatica* (at tree layer) and *Oxalis acetosella*, *Galium rotundifolium*, *Senecio fuchsii*, *Maianthemum bifolium*, and *Prenanthes purpurea* (in herb layer) occur on medium nutrient-rich soils only (Stagni-Dystric Cambisols predominantly).

**6<sup>th</sup> forest vegetation zone -** *Piceeto-Abieta variohumida* (spruce-fir stagnic forests) consist of 30 - 40 % *Picea abies* proportion in natural tree composition. Sub-alpine species lack in herb layer. *Calamagrostis villosa* is significantly dominant. *Sphagnum* spp. is frequent.

**7<sup>th</sup> forest vegetation zone -** *Abieto-Piceeta variohumida* (fir-spruce stagnic forests) are already on transition between alternative and permanent wet soils, since summer desiccation and hardening soils do not exist practically. *Picea abies* dominates in natural tree species composition. *Abies alba* and *Fagus sylvatica* are admixtures on nutrient-rich and drier



localities. *Calamagrostis villosa* is in herb layer. *Vaccinium myrtillus*, *Avenella flexuosa*, *Oxalis acetosella*, *Dryopteris dilatata*, *Luzula pilosa* and *Trientalis europaea* are abundant. *Homogyne alpina*, *Luzula sylvatica*, *Soldanella montana*, *Lycopodium annotinum*, *Huperzia selago* and other occur at higher elevations. *Equisetum sylvaticum* and *Sphagnum* spp. occur on transition to G-series (*series paludosa*).

#### 2.3.6.1 *Categoria variohumida acidophila* (P – category)

Category is basic category of this series. Dystric Planosols and Haplic Stagnosols are at 5th and 6th forest vegetation zones. Histi-Dystric Planosols, Stagni-Dystric Cambisols, and Stagni-Haplic Podzols and Gleyic Podzols are less frequent in *Betuleto-Quercetum variohumidum acidophilum* (1P). Humus form of morr-moder is made due to slow humification.

*Luzula pilosa* and *Calamagrostis villosa* are characteristic forest site types of whole category. Nutrient-poorer types are with *Sphagnum* spp., *Deschampsia caespitosa* and *Avenella flexuosa*. Type with *Carex hirta* is on sandy soils (or flown sands soils). *Vaccinium myrtillus* shows transition to nutrient-poorer category (Q-category - *categoria variohumida oligotrophica*), *Oxalis acetosella*, *Galium rotundifolium* and *Carex brizoides* then transition to nutrient-richer category (O-category - *categoria variohumida mesotrophica*).

Forest function is for production. Stands have desuction ecological function. *Picea abies* regenerates well, *Abies alba* regenerates better in *Pinus sylvestris* stands and *Pinus sylvestris* regenerates in longer canopy opened stands only. Stands drain only for tree regeneration. That is connected with liming on nutrient-impoverished types.

#### Forest site type complexes

##### 1<sup>st</sup> forest vegetation zone 1P - *Betuleto-Quercetum variohumidum acidophilum*

Occurrence: vales terraces, uplands, basins (South Bohemia), higher elevations - rare; nutrient-poor soil materials, predominantly sediments, frequently with cover-over of slope and loess loams.

Soil: clay-sandy, clay-loamy, deep enough, but shallow physiologically, wet bottom; predominantly transition between Stagni-Haplic Podzols and Dystric Planosols; transitions between Stagni-Dystric Cambisols and Cambic Stagnosols are on loess; Dystric Planosols, Gleyic Podzols and Albic Planosols are rare.

##### Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	( <i>Convallaria majalis</i> )
<i>Carex brizoides</i>	( <i>Dryopteris dilatata</i> )
<i>Deschampsia caespitosa</i>	
<i>Avenella flexuosa</i>	( <i>Galium odoratum</i> )
<i>Ledum palustre</i>	( <i>Galium palustre</i> )
<i>Leucobryum glaucum</i>	( <i>Galium sylvaticum</i> )
<i>Melampyrum pratense</i>	( <i>Luzula pilosa</i> )
<i>Molinia arundinacea</i>	( <i>Lysimachia vulgaris</i> )
<i>Molinia coerulea</i>	( <i>Maianthemum bifolium</i> )
<i>Potentilla erecta</i>	( <i>Milium effusum</i> )
<i>Pteridium aquilinum</i>	( <i>Oxalis acetosella</i> )
<i>Rubus caesius</i>	( <i>Pulmonaria officinalis</i> )
<i>Vaccinium myrtillus</i>	( <i>Sphagnum</i> spp.)
( <i>Anemone nemorosa</i> )	( <i>Stellaria holostea</i> )
( <i>Viola reichenbachiana</i> )	

Forest site types:

- (1) *Carex brizoides*, Silesian and Polabí lowlands
- (2) *Calamagrostis arundinacea*; in Třeboň basin with *Ledum palustre*; on transition to forest site type 1Q1 (*Betuleto-Quercetum variohumidum oligotrophucum - Molinia coerulea*)
- (4) *Pteridium aquilinum*, Polabí lowland  
*Vaccinium myrtillus* and *Leucobryum glaucum* dominations make impoverished stages (signed - d) of all types.

Natural tree species composition:

Generally: *Quercus robur* (also rare possible *Quercus petraea* agg.) 70 %, *Betula pendula* (also rare possible *Betula pubescens*) 20 %, *Picea abies* 10 %, *Populus tremula* 0.5 % (rare *Picea abies* is in dominant and subdominant layers)

1P1 and 1P4: *Pinus sylvestris* ± 30 %, *Quercus robur* (also rare possible *Quercus petraea* agg.) 50 - 80 %, *Betula pendula* (also rare possible *Betula pubescens*) 10 - 30 %, *Populus tremula* ± 0.5 %

Absolute height yield class: *Quercus* spp. 20 - 24 (26) m, *Pinus sylvestris* 20 - 24 (26) m, *Picea abies* (22) 24 m

Hazards: transitionally by wet, considerably by brush; pure planted *Picea abies* stands by windthrow; soils easy impoverish.

**2<sup>nd</sup> forest vegetation zone 2P - *Quercetum abietinum variohumidum acidophilum***

Occurrence: uplands; plateaus and gentle slopes bases; acid soil materials with covers-over slope and loess loams.

Soil: predominantly loamy and clay-loamy, mature deep, slightly desiccated; predominantly Dystric Planosols; Dystric Planosols, Cambic Stagnosols and Stagni-Haplic Vertisols are locally; oligotrophic Stagni-Dystric Cambisols are very rare.

Significant often dominant or indicator species:

<i>Betonica officinalis</i>	<i>Scorzonera humilis</i>
<i>Carex hirta</i>	<i>Vaccinium myrtillus</i>
<i>Carex pilulifera</i>	( <i>Anemone nemorosa</i> )
<i>Convallaria majalis</i>	( <i>Athyrium filix-femina</i> )
<i>Avenella flexuosa</i>	( <i>Calamagrostis arundinacea</i> )
<i>Equisetum sylvaticum</i>	( <i>Calamagrostis epigeios</i> )
<i>Luzula luzuloides</i>	( <i>Carex digitata</i> )
<i>Luzula pilosa</i>	( <i>Galium rotundifolium</i> )
<i>Melampyrum pratense</i>	( <i>Hieracium murorum</i> )
<i>Molinia arundinacea</i>	( <i>Maianthemum bifolium</i> )
<i>Molinia coerulea</i>	( <i>Oxalis acetosella</i> )
<i>Pleurozium schreberi</i>	( <i>Rubus idaeus</i> )
<i>Polytrichum formosum</i>	( <i>Senecio fuchsii</i> )
<i>Potentilla erecta</i>	( <i>Veronica officinalis</i> )
<i>Rubus fruticosus</i> agg.	( <i>Viola reichenbachiana</i> )

Forest site types:

- (1) *Luzula pilosa*, quite prevailing type
- (2) *Convallaria majalis*, transition to *Querceto-Fagetum illimerosum acidophilum - Convallaria majalis* (3I3)
- (3) *Betonica officinalis*, transition to *Betuleto-Quercetum variohumidum acidophilum* (1P) on tertiary sediments

(4) *Carex hirta*

(6) *Pteridium aquilinum* (+ *Molinia coerulea*)

Nutrient-poorer variants with *Vaccinium myrtillus* are on sandy covers-over.

Natural tree species composition:

Generally: *Quercus robur* (+ also rare possible *Quercus petraea* agg.) 60 %, *Fagus sylvatica* 10 %, *Abies alba* 30 %, *Populus tremula* 0.5 %

In dependence on site condotions: *Quercus robur* (+ also rare possible *Quercus petraea* agg.) 30 - 50 %, *Abies alba* 20 - 40 %, *Pinus sylvestris* ± 30 %, *Fagus sylvatica* ± 20 %, *Picea abies* 0 - 10 %, *Betula pendula* ± 20 %, *Populus tremula* 0.5 %

Absolute height yield class: *Pinus sylvestris* 20 - 24 (26) m, *Quercus* spp. (18) 20 - 24 (26) m, *Abies alba* (20) 22 - 24 m, *Picea abies* (22) 24 - 26 (28) m, *Betula* spp. 18 - 22 m

Hazards: periodically by wet; locally by brush; allochtonous planted *Picea abies* stands by windthrow.

**3<sup>rd</sup> forest vegetation zone 3P- *Abieto-Quercetum variohumidum acidophilum***

Occurrence: plateaus, flat hollows, gentle slopes bases; acid soil materials with loamy covers-over; abundance of herb layer is medium to low.

Soil: loamy to clay-loamy, deep, alternatively wet (desiccated at summer); almost only Dystric Planosols; locally Cambic Stagnosols or Dystric Planosols and oligotrophic Stagni-Dystric Cambisols.

Significant often dominant or indicator species:

<i>Carex pilulifera</i>	<i>Maianthemum bifolium</i>
<i>Dicranum scoparium</i>	<i>Pleurozium schreberi</i>
<i>Hieracium sylvaticum</i>	<i>Pohlia nutans</i>
<i>Luzula luzuloides</i>	<i>Polytrichum formosum</i>
<i>Luzula pilosa</i>	<i>Vaccinium myrtillus</i>

Forest site types:

(1) *Luzula pilosa* - dominantly on plateaus

(5) *Carex pilulifera* - very gentle slopes

*Vaccinium myrtillus* and *Leucobryum glaucum* dominations make impoverished stages (signed - d) of all types.

Natural tree species composition: *Quercus robur* (+ also rare possible *Quercus petraea* agg.) 30 - 40 %, *Abies alba* 30 - 40 %, *Picea abies* 0 - 10 %, *Pinus sylvestris* 0 - 30 %, *Fagus sylvatica* 10 - 20 %, *Tilia cordata* + *Tilia platyphyllos* ± 10 %, (*Betula pendula*, *Populus tremula*, *Alnus glutinosa*) 0.5 %

Absolute height yield class: *Quercus* spp. (16) 20 - 22 (24) m, *Picea abies* (16) 22 - 24 (26) m, *Abies alba* 20 - 22 m

Hazards: by brush in canopy open stands (especially by *Calamagrostis arundinacea* and *Calamagrostis epigeios*); aloochtonous planted *Picea abies* by windthrow.

**4<sup>th</sup> forest vegetation zone 4P - *Querceto-Abietum variohumidum acidophilum***

Occurrence: uplands; plateaus, flat hollows, gentle slopes bases; acid soil material with loamy covers-over.

Soil: sandy-loamy to clay-loamy, alternatively wet; predominantly Dystric Planosols, less Cambic Stagnosols; sometimes histic Dystric Planosols or Haplic Stagnosols; Stagni-Haplic

Vertisols occur on tertiary clays; Luvic Stagnosols, Stagnic Gleysols and oligotrophic Stagni-Dystric Cambisols are rare.

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	<i>Luzula luzuloides</i>
<i>Carex hirta</i>	<i>Luzula pilosa</i>
<i>Carex pilulifera</i>	<i>Maianthemum bifolium</i>
<i>Deschampsia caespitosa</i>	<i>Melampyrum pratense</i>
<i>Avenella flexuosa</i>	<i>Oxalis acetosella</i>
<i>Equisetum sylvaticum</i>	<i>Potentilla erecta</i>
<i>Hieracium murorum</i>	<i>Vaccinium myrtillus</i>

Forest site types:

(1) *Luzula pilosa*

(3) *Avenella flexuosa* - or + *Fagus sylvatica* (Třeboň basin)

(5) *Calamagrostis arundinacea*

*Vaccinium myrtillus*, *Equisetum sylvaticum* and *Leucobryum glaucum* dominations make degraded stages (signed - d) of all types.

Natural tree species composition:

Generally: *Quercus robur* (+ also rare possible *Quercus petraea* agg.) 40 %, *Abies alba* 40 %, *Fagus sylvatica* 10 %, *Populus tremula* 10 %

In dependence on site conditions: *Quercus robur* (+ also rare possible *Quercus petraea* agg.) 30 - 40 %, *Abies alba* 30 - 40 %, *Picea abies* 0 - 10 %, *Pinus sylvestris* 0 - 30 %, *Fagus sylvatica* 10 - 20 %, (*Betula pendula*, *Tilia cordata* + *Tilia platyphyllos*, *Populus tremula*) 0.5 %

Absolute height yield class: *Picea abies* (20) 22 - 26 (30) m, *Abies alba* (20) 22 - 24 (26) m, *Quercus* spp. (18) 20 - 24 (28) m, *Pinus sylvestris* 22 - 24 (32) m

Hazards: considerably by windthrow and soil nutrient degradation.

**5<sup>th</sup> forest vegetation zone 5P - *Abietum piceosum variohumidum acidophilum***

Occurrence: highlands and promontories; undulating plateaus and gentle slopes bottoms; *crystallinum* with eluvial and slope loamy covers-over.

Soil: (sandy-) loamy, clay-loamy at bottom, well-balanced humidity; almost only Dystric Planosols; less - Cambic Stagnosols; rare - histic Dystric Planosols, Haplic Stagnosols, oligotrophic Stagni-Dystric Cambisols and Gleyic Stagnosols.

Significant often dominant or indicator species:

<i>Avenella flexuosa</i>	( <i>Agrostis capillaris</i> )
<i>Luzula pilosa</i>	( <i>Carex pilulifera</i> )
<i>Molinia arundinacea</i>	( <i>Deschampsia caespitosa</i> )
<i>Molinia coerulea</i>	( <i>Hieracium murorum</i> )
<i>Oxalis acetosella</i>	( <i>Luzula luzuloides</i> )
<i>Sphagnum</i> spp.	( <i>Maianthemum bifolium</i> )
<i>Vaccinium myrtillus</i>	( <i>Potentilla erecta</i> )
<i>Calamagrostis villosa</i>	( <i>Trientalis europaea</i> )

Forest site types:

(1) *Luzula pilosa*; it has variety with *Molinia coerulea*

(4) *Avenella flexuosa* - on neogenic sediments

(5) *Calamagrostis villosa*

*Vaccinium myrtillus* and *Sphagnum* spp. dominations make impoverished stages (signed - d) of all types.

Natural tree species composition:

Generally: *Fagus sylvatica* 20 %, *Abies alba* 70 %, *Picea abies*, (*Populus tremula*) 10 %

In dependence on site conditions: *Fraxinus excelsior* 40 - 70 %, *Pinus sylvestris* 0 - 20 %, *Picea abies* 10-60 %, *Fagus sylvatica* ± 20 %, (*Betula pendula*, *Populus tremula*) ± 0.1 %

Absolute height yield class: *Picea abies* (22) 24 - 28 (30) m, *Abies alba* 20 - 24 (28) m, *Fagus sylvatica* 22 - 24 (26) m, *Pinus sylvestris* (22) 24 - 26 - (28) m

Hazards: strongly by windthrow and moderately by snowpack and hoarfrost; soils are responsible to nutrient degradation.

**6<sup>th</sup> forest vegetation zone 6P - *Piceeto-Abietum variohumidum acidophilum***

Occurrence: highlands (Českomoravská, Brdská, Lužická and Karlovarská) and some mountains; undulating plateaus, gentle slopes and terraces; nutrient-poorer soil materials and loamy covers-over.

Soil: alternatively wet, but more well balanced; loamy, rare stony; predominantly Dystric Stagnosols; sometimes Haplic Stagnosols and Stagni-Cambic Podzols; rare - Cambic Stagnosols and Gleyic Stagnosols; oligotrophic Stagni-Dystric Cambisols peter out yet.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	( <i>Hieracium sylvaticum</i> )
<i>Avenella flexuosa</i>	( <i>Luzula nemorosa</i> )
<i>Equisetum sylvaticum</i>	( <i>Luzula pilosa</i> )
<i>Oxalis acetosella</i>	( <i>Maianthemum bifolium</i> )
<i>Sphagnum</i> spp.	( <i>Mycelis muralis</i> )
<i>Vaccinium myrtillus</i>	( <i>Pleurozium schreberi</i> )
( <i>Carex pilulifera</i> )	( <i>Polytrichum commune</i> )
( <i>Deschampsia caespitosa</i> )	( <i>Polytrichum formosum</i> )
( <i>Dicranum scoparium</i> )	( <i>Prenanthes purpurea</i> )
( <i>Dryopteris dilatata</i> )	( <i>Senecio fuchsii</i> )

Forest site types:

(1) *Calamagrostis villosa*; it has wetter variety with *Equisetum sylvaticum*

(2) *Avenella flexuosa*

(4) stony (*saxatilis*); - transition to *Abieto-Piceetum variohumidum acidophilum - saxatilis* (7P5) (with *Dryopteris dilatata* domination)

*Vaccinium myrtillus* and *Sphagnum* spp. dominations make impoverished stages (signed - d) of all types.

Natural tree species composition:

Generally: *Fagus sylvatica* 10 %, *Abies alba* 50 %, *Picea abies* 40 %,

In dependence on site conditions: *Picea abies* 10 - 60 %, *Abies alba* 40 - 70 %, *Pinus sylvestris* 0 - 20 %, *Fagus sylvatica* ± 20 %, (*Betula pendula*, *Populus tremula*) ± 0.1 %

Absolute height yield class: *Picea abies* (22) 24 - 28 (32) m, *Abies alba* 20 - 24 (32) m, *Pinus sylvestris* (18) 22 - 26 m, *Fagus sylvatica* 22 m

Hazards: strongly by windthrow, considerably by wet, snowpack, hoarfrost, brush and soil frost penetration.

### **7<sup>th</sup> forest vegetation zone 7P - *Abieto-Piceetum variohumidum acidophilum***

Occurrence: mountains and highlands (tertiary basin extraordinary); plateaus, gentle slope bases.

Soil: deep, clay-sandy to clay-loamy, hardly permeable (transition between alternatively and permanent wet); predominantly Histi-Dystric Planosols and Histi-Haplic Stagnosols, less Cambic Stagnosols; (mountain) Haplic Podzols stagnic, Gleyic Podzols histic and Stagni-Cambic Podzols are frequent.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	( <i>Hylocomium splendens</i> )
<i>Oxalis acetosella</i>	( <i>Luzula pilosa</i> )
<i>Sphagnum</i> spp.	( <i>Luzula sylvatica</i> )
<i>Vaccinium myrtillus</i>	( <i>Maianthemum bifolium</i> )
( <i>Bazzania trilobata</i> )	( <i>Mycelis muralis</i> )
( <i>Carex brizoides</i> )	( <i>Plagiomnium affine</i> )
( <i>Deschampsia caespitosa</i> )	( <i>Plagiothecium undulatum</i> )
( <i>Avenella flexuosa</i> )	( <i>Polytrichum commune</i> )
( <i>Dicranum scoparium</i> )	( <i>Polytrichum formosum</i> )
( <i>Dryopteris dilatata</i> )	( <i>Trientalis europaea</i> )

Forest site types:

- (1) *Calamagrostis villosa*
- (2) *Calamagrostis villosa* + *Sphagnum* spp.
- (5) skeletal (*saxatilis*) - Šumava Mts.

Natural tree species composition:

Generally: *Picea abies* 80 %, *Abies alba* 20 %, *Betula pendula* (also rare possible *Betula pubescens*) 0.5 %, *Fagus sylvatica* 0.1 %, *Sorbus aucuparia* 0.5 %

7P2 and 7P5: *Picea abies* 60 - 80 %, *Abies alba* 10 - 30 %, *Fagus sylvatica* ± 20 %, *Pinus sylvestris* ± 0.5 %, *Acer pseudoplatanus* ± 0.1 %, (*Betula* spp., *Sorbus aucuparia*) ± 0.5 %

Absolute height yield class: *Picea abies* (22) 24 - 26 (28) m, *Abies alba* 20 m

Hazards: strongly by windthrow, snowpack, hoarfrost, wet, brush; frost hollows, soil frost penetration.

### **8<sup>th</sup> forest vegetation zone 8P - *Piceetum variohumidum acidophilum***

Occurrence: mountains (Krkonoše Mts.), ridge plateaus and gentle slopes.

Soil: to clay-loamy, locally stony, shallow with slightly weathered out soil materials and thick mor humus layer; Haplic Podzols (mountain) stagnic and Histi-Mollic Gleysols podzoled.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	<i>Polytrichum commune</i>
<i>Deschampsia caespitosa</i>	<i>Molinia coerulea</i>
<i>Eriophorum angustifolium</i>	<i>Trientalis europaea</i>
<i>Sphagnum</i> spp.	

Forest site types:

- (1) *Calamagrostis villosa*

*Vaccinium myrtillus* and *Vaccinium vitis-idaea* abundances make impoverished stage (signed - d).

Natural tree species composition: *Picea abies* 80 - 100 %, *Sorbus aucuparia* 0 - 20 %, (*Abies alba*, *Betula pubescens*, *Pinus mugo*) ± 0.5 %

Absolute height yield class: *Picea abies* 20 - 24 m

Hazards: by snowpack and hoarfrost, wet, brush and soil frost penetration.

#### **Azonal 0P - *Pinetum quercino-abietinum variohumidum acidophilum***

Occurrence: sandy sediments of permocarbon, chalk, tertiary and pleistocen (sandy weathered out granite rarely); decreased soil permeability.

Soil: loamy-sandy to sandy (slightly clay); predominantly stagic Arenic Podzols, Stagni-Haplic Podzols and Gleyic Podzols; frequently Dystric Planosols and Albic Planosols.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	( <i>Maianthemum bifolium</i> )
<i>Molinia coerulea</i>	( <i>Pleurozium schreberi</i> )
<i>Vaccinium myrtillus</i>	( <i>Polytrichum commune</i> )
( <i>Calluna vulgaris</i> )	( <i>Polytrichum formosum</i> )
( <i>Avenella flexuosa</i> )	( <i>Pteridium aquilinum</i> )
( <i>Leucobryum glaucum</i> )	( <i>Sphagnum</i> spp.)
( <i>Vaccinium vitis-idaea</i> )	

Forest site types:

(1) *Vaccinium myrtillus*; on pleistocen sediments with *Molinia coerulea*

(2) *Calamagrostis villosa*

(5) *Pinetum abietinum variohumidum acidophilum* - collected type covering transitions between *Pinetum quercino-abietinum variohumidum mesotrophicum* (0O) and *Pinetum quercino-abietinum variohumidum oligotrophicum* (0Q)

Natural tree species composition:

Generally: *Pinus sylvestris* 60 %, *Quercus robur* (also rare possible *Quercus petraea* agg.) 30 %, *Abies alba* 10 %, *Picea abies* 0.5 %, *Betula pendula* 0.5 %

In dependence on site condotions: *Pinus sylvestris* 70 - 80 %, *Quercus robur* (also rare possible *Quercus petraea* agg.) ± 20 %, *Abies alba* ± 10 %, *Picea abies* 0 - 10 %, *Betula pendula* ± 10 %

Absolute height yield class: *Pinus sylvestris* (16) 20 - 24 (28) m, *Quercus* spp. 18 m, *Picea abies* (18) 20 - 24 (26) m, *Abies alba* 18 m

Hazards: by summer desiccation, brush and frost hollows.

#### **2.3.6.2 *Categoria variohumida oligotrophica* (Q – category)**

This category covers nutrient very poor sites, where Dystric Planosols transit to Gleyic Podzols and Stagni-Haplic Podzols. Mor (raw humus) makes humus form.

Basic types, *Vaccinium myrtillus* with *Sphagnum* spp., are in poor complexes with fir (*Abies alba*) and in birch-oak stands (*Betuleto-Quercetum variohumidum oligotrophicum*). *Molinia arundinacea*, characteristic for 1Q1 (*Betuleto-Quercetum variohumidum oligotrophicum-Molinia coerulea*), makes in fir complexes only drier variants on Stagni-Haplic podzols, while wetter variants on Histi-Molic Gleysols belong to T-category (*categoria paludosa oligotrophica*). Little clear-cut moss (*musci*) and heather (*Calluna vulgaris*) types are difficult to distinguish from nutrient-impoverished stages. Significant type is on kaolinic Gleyic Podzols. Whole category makes frequent transitions to T-category (*categoria paludosa oligotrophica*).

Forest function is for production. Stands have desuction ecological function. Natural tree species regeneration is pure and discontinuous. *Abies alba* naturally regenerates in pine (*Pinus sylvestris*) stands. Stands drain only for tree regeneration. That is connected with liming.

### **Forest site type complexes**

#### **1<sup>st</sup> forest vegetation zone 1Q - *Betuleto-Quercetum variohumidum oligotrophicum***

Occurrence: plateaus and flat terrain depressions with worse outflow conditions; vales, lowlands, uplands; nutrient-poor sediments, with loamy covers-over frequently.

Soil: clay-loamy to clay-sandy; heavy permeable at bottom; predominantly Stagni-Haplic Podzols to Gleyic Podzols; Dystric Planosols and Haplic Stagnosols (at higher elevations) are frequent; Gleyic Planosols podzoled are rare.

Significant often dominant or indicator species:

<i>Holcus mollis</i>	( <i>Avenella flexuosa</i> )
<i>Leucobryum glaucum</i>	( <i>Dicranum scoparium</i> )
<i>Molinia arundinacea</i>	( <i>Luzula pilosa</i> )
<i>Molinia coerulea</i>	( <i>Maianthemum bifolium</i> )
<i>Pteridium aquilinum</i>	( <i>Pleurozium schreberi</i> )
<i>Sphagnum</i> spp.	( <i>Polytrichum commune</i> )
<i>Vaccinium myrtillus</i>	( <i>Potentilla erecta</i> )
( <i>Calluna vulgaris</i> )	( <i>Sieglingia decumbens</i> )
<i>Holcus lanatus</i>	( <i>Vaccinium vitis-idaea</i> )
( <i>Leucobryum glaucum</i> )	

Forest site types:

- (1) *Molinia coerulea*
- (2) *Vaccinium myrtillus*; at Polabi lowland is variety with *Pteridium aquilinum*
- (3) *Sphagnum* spp. - wetter
- (4) *Holcus mollis*, (*Holcus lanatus*)

Higher *Leucobryum glaucum* abundance signalizes impoverished stages (signed - d).

Natural tree species composition: *Quercus robur* (also rare possibly *Quercus petraea* agg.) 80 %, *Betula pendula* 20 %, *Pinus sylvestris* 0.5 %, *Populus tremula* 0.5 %

In dependence on site condotions: *Quercus robur* (also rare possibly *Quercus petraea* agg.) 50 - 80 %, *Pinus sylvestris* ± 30 %, *Betula pendula* 10 - 30 %, *Populus tremula* 0.5 %

Absolute height yield class: *Pinus sylvestris* (16) 18 - 22 (24) m, *Quercus* spp. 18 - 20 (24) m, *Picea abies* 16 - 20 m, *Ulmus* spp. 18 - 20 m

Hazards: by desiccation, moderately by brush, allochtonous planted *Picea abies* stands by windthrow; soils are responsible to nutrient-degradation.

#### **2<sup>nd</sup> forest vegetation zone 2Q - *Quercetum abietinum variohumidum oligotrophicum***

Occurrence: nutrient poor loamy plateaus and gentle slopes, vales, basins, uplands; acid soil material regions.

Soil: alternately wet, desiccated, sandy-loamy to clay-loamy, compacted to bottom; predominantly Stagni-Haplic Podzols to Dystric Planosols; locally Dystric Planosols and Gleyic Podzols; rarely oligotrophic Stagni-Dystric Cambisols.

Significant often dominant or indicator species:

<i>Bazzania trilobata</i>	( <i>Cladonia</i> spp.)
<i>Calluna vulgaris</i>	( <i>Dicranum undulatum</i> )



<i>Avenella flexuosa</i>	( <i>Luzula luzuloides</i> )
<i>Leucobryum glaucum</i>	( <i>Maianthemum bifolium</i> )
<i>Luzula pilosa</i>	( <i>Melampyrum pratense</i> )
( <i>Sieglingia decumbens</i> )	( <i>Molinia arundinacea</i> )
<i>Sphagnum</i> spp.	( <i>Molinia coerulea</i> )
<i>Vaccinium myrtillus</i>	( <i>Nardus stricta</i> )
<i>Vaccinium vitis-idaea</i>	( <i>Pleurozium schreberi</i> )
( <i>Cetraria</i> spp.)	( <i>Potentilla erecta</i> )

Forest site types:

(1) borůvkový (*Vaccinium myrtillus*)

(3) moss (*musci*), incl. *Sphagnum* spp.

*Calluna vulgaris* + *Vaccinium vitis-idaea* higher abundances signalize impoverished stages (signed - d).

Natural tree species composition: *Quercus robur* (also rare possibly *Quercus petraea* agg.) 60 %, *Fagus sylvatica* 10 %, *Abies alba* 20 %, *Betula pendula* 10 %, *Pinus sylvestris* 0.5 %, *Frangula alnus* 0.5 %

2Q1 and 2Q3 (resp. 2Q1d and 2Q3d): *Quercus robur* (also rare possibly *Quercus petraea* agg.) 30 - 50 %, *Abies alba* 20 - 40 %, *Picea abies* 0 - 10 %, *Pinus sylvestris* ± 30 %, *Fagus sylvatica* ± 20 %, *Betula pendula* ± 20 %, *Populus tremula* 0.5 %

Absolute height yield class: *Pinus sylvestris* (16) 18 - 22 (24) m, *Quercus* spp. (16) 18 - 22 (26) m, *Abies alba* 20 - 22 m

Hazards: by desiccation, moderately by brush, windthrow, soil nutrient degradation.

### **3<sup>rd</sup> forest vegetation zone 3Q - *Abieto-Quercetum variohumidum oligotrophicum***

Occurrence: nutrient-poor loams and clays; plateaus, gentle slopes, terrain depressions; higher uplands (Zábřežská upland).

Soil: loamy to clay-loamy, deep, slightly wet to desiccated; mor-moder to mor - humus form; Stagni-Haplic Podzols to Gleyic Podzols and Dystric Planosols.

Significant often dominant or indicator species:

<i>Avenella flexuosa</i>	<i>Melampyrum pratense</i>
<i>Carex pilulifera</i>	<i>Pleurozium schreberi</i>
<i>Cladonia</i> spp.	<i>Polytrichum formosum</i>
<i>Dicranum polysetum</i>	<i>Sieglingia decumbens</i>
<i>Dicranum scoparium</i>	<i>Vaccinium myrtillus</i>
<i>Leucobryum glaucum</i>	( <i>Vaccinium vitis-idaea</i> )

Lesní typy:

(1) *Vaccinium myrtillus*

*Vaccinium vitis-idaea* high domination shows impoverished stage (signed - d).

Natural tree species composition: *Quercus robur* (also rare possibly *Quercus petraea* agg.) 20 - 40 %, *Abies alba* 20 - 50 %, *Pinus sylvestris* ± 20 %, (*Picea abies*, *Betula pendula*) ± 10 %

Absolute height yield class: *Quercus robur* (also rare possibly *Quercus petraea* agg.) 22 - 24 m, *Picea abies* 20 - 26 m, *Pinus sylvestris* 20 - 22 m

Hazards: desiccation, brush, soil nutrient degradation, allochthonous planted *Picea abies* stands by windthrow.

#### **4<sup>th</sup> forest vegetation zone 4Q - *Querceto-Abietum variohumidum oligotrophicum***

Occurrence: plateaus, shallow terrain depressions and gentle slopes; uplands, basins (Southbohemian, Krušné hory bottom); acid soil material regions with nutrient-poor loams covers-over (often kaolinized soils).

Soil: bad permeable, alternatively wet (drought), sandy-loamy to clay-loamy; predominantly Dystric Planosols, less Gleyic Stagnosols or Haplic Stagnosols; Podzols are the next abundant soil types: Stagni-Haplic Podzols to Gleyic Podzols often kaolinic; Stagni-Dytric Cambisols are rare.

##### Significant often dominant or indicator species:

<i>Arnica montana</i>	( <i>Cladonia</i> spp.)
<i>Molinia arundinacea</i>	( <i>Avenella flexuosa</i> )
<i>Molinia coerulea</i>	( <i>Dicranum scoparium</i> )
<i>Sphagnum</i> spp.	( <i>Leucobryum glaucum</i> )
<i>Vaccinium uliginosum</i>	( <i>Luzula pilosa</i> )
<i>Vaccinium myrtillus</i>	( <i>Polytrichum commune</i> )
( <i>Carex pilulifera</i> )	( <i>Polytrichum formosum</i> )
( <i>Sieglingia decumbens</i> )	

##### Forest site types:

- (1) *Vaccinium myrtillus*
- (2) *Sphagnum* spp.
- (3) moss (*musci*)
- (4) *Molinia coerulea*; with *Vaccinium uliginosum* and *Arnica montana* at Krušné hory bottom basin

##### Natural tree species composition:

Generally: *Fagus sylvatica* 10 %, *Quercus robur* (also rare possibly *Quercus petraea* agg.) 40 %, *Abies alba* 40 %, *Betula pendula* 10 %, *Populus tremula* 0.5 %, *Frangula alnus* 0.5 %

In dependence on site condotions: *Quercus robur* (also rare possibly *Quercus petraea* agg.) 30 - 50 %, *Abies alba* 20 - 40 %, *Picea abies* 0 - 10 %, *Pinus sylvestris* ± 30 %, *Fagus sylvatica* ± 20 %, *Betula pendula* ± 20 %, *Populus tremula* 0.5 %

Absolute height yield class: *Pinus sylvestris* (16) 18 - 22 (26) m, *Abies alba* 18 - 20 (22) m, *Quercus* spp. 16 - 18 (24) m, *Betula pendula* 16 - 20 m

Hazards: moderately to strongly by brush, windthrow and soil nutrient degradation.

#### **5<sup>th</sup> forest vegetation zone 5Q - *Abietum piceosum variohumidum oligotrophicum***

Occurrence: undulating plateaus to gently slopes, flat mounds and depressions (transition to T-category (*Betuleto-Alnetum (paludosum oligotrophicum)*)); nutrient-poor kaolinized loams.

Soil: bad permeable, unbalanced humidity; predominantly Dystric Planosols; Gleyic Stagnosols and H

##### Significant often dominant or indicator species:

<i>Calluna vulgaris</i>	<i>Vaccinium myrtillus</i>
<i>Avenella flexuosa</i>	<i>Vaccinium vitis-idaea</i>
<i>Dicranum scoparium</i>	( <i>Carex pilulifera</i> )
<i>Hypnum cupressiforme</i>	( <i>Cladonia</i> spp.)
<i>Leucobryum glaucum</i>	( <i>Equisetum sylvaticum</i> )
<i>Luzula pilosa</i>	( <i>Hieracium murorum</i> )
<i>Polytrichum formosum</i>	( <i>Hylocomium splendens</i> )

*Pteridium aquilinum*                    (*Pleurozium schreberi*)  
*Sphagnum* spp.                        (*Sieglingia decumbens*)

Forest site types:

- (1) *Vaccinium myrtillus*; it has its own variant with *Pteridium aquilinum*
- (2) *Sphagnum* spp.; it has variant on kaolinic Stagi-Haplic Podzols
- (3) moss (*musci*)

Natural tree species composition:

Generally: *Fagus sylvatica* 20 %, *Abies alba* 60 %, *Betula pendula* 10 %, *Picea abies* (*Pinus sylvestris*) 10 %

In dependence on site condition: *Quercus robur* (also rare possibly *Quercus petraea* agg.) 30 - 50 %, *Abies alba* 50 - 70 %, *Fagus sylvatica* ± 20 %, *Betula pendula* ± 20 %, *Populus tremula* 0.5 %

Absolute height yield class: *Picea abies* (18) 20 - 22 (24) m, *Pinus sylvestris* (16) 18 - 22 (24) m, *Abies alba* (18) 20 - 24 m

Hazards: by wet, moderately by brush and snowpack, strongly by windthrow and soil nutrient degradation.

#### **6<sup>th</sup> forest vegetation zone 6Q - *Piceeto-Abietum variohumidum oligotrophicum***

Occurrence: plateaus, shallow depressions and steep slope bases with loamy covers-over; poor soil materials; lower mountains and highlands.

Soil: deep, clay-sandy to clay-loamy at bottom, impermeable; predominantly Dystric Planosols (often histic), less Haplic Stagnosols; histic Gleyic Podzols and Stagni-Haplic Podzols are rare.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	<i>Vaccinium myrtillus</i>
<i>Avenella flexuosa</i>	( <i>Calamagrostis arundinacea</i> )
<i>Maianthemum bifolium</i>	( <i>Carex pilulifera</i> )
<i>Polytrichum commune</i>	( <i>Dicranum scoparium</i> )
<i>Sphagnum</i> spp.	( <i>Pleurozium schreberi</i> )
<i>Trientalis europaea</i>	( <i>Polytrichum formosum</i> )

Forest site types:

- (1) *Vaccinium myrtillus*
- (2) *Sphagnum* spp.
- (3) *Pinus sylvestris* - Českomoravská and Český les highlands.

Natural treespecies composition:

Generally: *Fagus sylvatica* 10 %, *Abies alba* 50 %, *Picea abies* 40 %, *Betula pendula* 0.5 %

In dependence on site condotions: *Picea abies* 10-60 %, *Abies alba* 40 - 70 %, *Pinus sylvastris* 0 - 20 %, *Fagus sylvatica* ± 20 %, (*Betula pendula*, *Populus tremula*) ± 0.1 %

Absolute height yield class: *Picea abies* (18) 20 - 22 (26) m, *Abies alba* (18) 20 - 24 (26) m, *Pinus sylvestris* (18) 20 - 22 (24) m

Hazards: strongly by wet, windthrow and snowpack, moderately by brush.

#### **7<sup>th</sup> forest vegetation zone 7Q - *Abieto-Piceetum variohumidum oligotrophicum***

Occurrence: mountains and highlands (in climate inversions - lower); plateaus, gentle slopes and depressions.

Soil: more well-balanced humidity (transition to permanent wet), slightly permeable; predominantly histic Dystric Planosol, rare Gleyic Podzols.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	( <i>Leucobryum glaucum</i> )
<i>Avenella flexuosa</i>	( <i>Luzula pilosa</i> )
<i>Molinia coerulea</i>	( <i>Maianthemum bifolium</i> )
<i>Sphagnum</i> spp.	( <i>Pleurozium schreberi</i> )
<i>Vaccinium myrtillus</i>	( <i>Polytrichum commune</i> )
( <i>Dicranum scoparium</i> )	( <i>Vaccinium vitis-idaea</i> )

Lesní typy:

- (1) *Vaccinium myrtillus*
- (2) *Sphagnum* spp.
- (3) *Molinia coerulea* with *Pinus sylvestris*

Natural tree species composition:

Generally: *Picea abies* 80 %, *Abies alba* 20 %, *Fagus sylvatica* 0.5 %, *Betula pendula* 0.5 %  
7Q1 to 7Q3: *Picea abies* 60 - 80 %, *Abies alba* 10 - 30 %, *Fagus sylvatica* ± 20 %, *Pinus sylvestris* ± 5 %, *Acer oseudoplatanus* ± 0.5 %, (*Betula pendula*, *Sorbus aucuparia*) ± 0.5 %

Absolute height yield class: *Picea abies* 20 - 22 (24) m, *Pinus sylvestris* (16) 18 - 20 (22) m

Hazards: strongly by windthrow, snowpack and hoarfrost; moderately by wet and brush; soils are responsible for frost penetration.

**7<sup>th</sup> forest vegetation zone 8Q - *Piceetum variohumidum oligotrophicum***

Occurrence: higher mountain elevations, (separate areas at - Šumava, Krušné hory, Jizerské hory, Lužické hory, Krkonoše Mts.); plateaus and gentle slopes.

Soil: slightly permeable well-balanced humidity (permanently wet), histic particularly; predominantly Histi-Mollic Gleysols podzoled; Histi-Gleyic Podzols are rare.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	( <i>Blechnum spicant</i> )
<i>Avenella flexuosa</i>	( <i>Dicranum scoparium</i> )
<i>Equisetum sylvaticum</i>	( <i>Dryopteris dilatata</i> )
<i>Homogyne alpina</i>	( <i>Luzula sylvatica</i> )
<i>Sphagnum</i> spp.	( <i>Maianthemum bifolium</i> )
<i>Trientalis europaea</i>	( <i>Polytrichum commune</i> )
<i>Vaccinium myrtillus</i>	( <i>Polytrichum formosum</i> )
( <i>Athyrium distentifolium</i> )	( <i>Soldanella montana</i> )

Forest site types:

- (1) *Vaccinium myrtillus*
- (2) *Sphagnum* spp.
- (3) *Equisetum sylvaticum* - nutrient-richer transition to *Piceetum paludosum mesotrophicum-Equisetum sylvaticum* (8G1)

Natural tree species composition:

Generally: *Picea abies* 100 %, *Sorbus aucuparia* 0.5 %, *Betula pubescens* 0.5 %

8Q1 to 8Q3: *Picea abies* 80 - 100 %, *Sorbus aucuparia* ± 10 %, *Abies alba* ± 0.1 %, *Pinus sylvestris* ± 0.1 %, *Betula pubescens* ± 0.5 %, *Pinus mugo* ± 5 %

Absolute height yield class: *Picea abies* 18 - 22 (24) m

Hazards: strongly by windthrow, snowpack and hoarfrost, considerably by wet, soil frost penetration and brush.

### **Azonal 0Q - *Pinetum quercino-abietinum variohumidum oligotrophicum***

Occurrence: as the poorest site complex „pine with fir stands“ cover undulating plateaus and gentle mounds on nutrient-poor soil material of permocarbon and tertiary.

Soil: alternatively wet, clay-sandy to sandy-clay, kaolinic; predominantly kaolinic Stagni-Haplic Podzols; they locally transit either to Arenic Podzols slightly stagnic or to Albic Planosols.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	( <i>Dicranum undulatum</i> )
<i>Calluna vulgaris</i>	( <i>Leucobryum glaucum</i> )
<i>Molinia arundinacea</i>	<i>Vaccinium myrtillus</i>
( <i>Pleurozium schreberi</i> )	<i>Vaccinium vitis-idaea</i>
( <i>Polytrichum commune</i> )	( <i>Cetraria</i> spp.)
( <i>Polytrichum formosum</i> )	( <i>Cladonia</i> spp.)
( <i>Pteridium aquilinum</i> )	( <i>Avenella flexuosa</i> )
( <i>Ptilidium ciliare</i> )	( <i>Sphagnum</i> spp.)

Forest site types:

(1) *Vaccinium myrtillus*

(3) *Molinia arundinacea*

(5) *Pinetum abietinum variohumidum oligotrophicum* - collected type (it changes *Pinetum piceosum variohumidum oligotrophicum* above 600 m, when fir is naturally changed by spruce)

Sites with *Vaccinium vitis-idaea* domination are impoverished stages (signed - d) with *Calluna vulgaris* and stunted *Pinus sylvestris* admixtures

Natural tree species composition: *Pinus sylvastris* 70 %, *Quercus robur* (also rare possibly *Quercus petraea* agg.) 10 %, *Betula pendula* 10 %, *Picea abies* (*Abies alba*) 10 %

In dependence on site condotions: *Pinus sylvestris* 70 - 80 %, *Quercus robur* (also rare possibly *Quercus petraea* agg.)  $\pm$  20 %, *Picea abies* 0 - 10 %, *Abies alba*  $\pm$  10 %, *Betula pendula*  $\pm$  10 %

0Qd: *Pinus sylvestris* 90 - 100 %, *Betula pendula*  $\pm$  10 %

Absolute height yield class: *Pinus sylvestris* 12 – 18 (22) m, *Picea abies* 14 - 20 (22) m, *Quercus* spp. 12 - 14 m, *Betula pendula* 14 - 16 m

Hazards: by wet in higher elevations; by desiccation, frost hollows and soil nutrient degradation in lower elevations.

### **2.3.6.3 *Categoria variohumida mesotrophica* (O – category)**

This is a transitive category to H (*categoria illimerosa mesotrophica*) and V-categories (*categoria humida*), especially in 2nd and 3rd forest vegetation zones. It differs from H-category (*categoria illimerosa mesotrophica*) by „fir“ character (depended even geographically too) and by stagnic stage. V-category is differed by nitrophilous species presence in herb layer and by valuable broadleaves species in tree layer. Transition character of this category makes possibility of *Fagus sylvatica* presence.

Cambic Stagnosols or Stagni Dystric Cambisols are predominant soil types on loamy covers-over of different nutrient-rich soil materials. Gleyic Cambisols and Cambic Gleysols are a

mosaic transition of both above-mentioned dominant types. Calcaric Verisols slightly stagnic, Stagni-Calcaric Cambisols, Albic Planosols and Gleyic Podzols occur only on specific forest site types of lower forest vegetation zones. Moder is dominant humus form.

*Oxalis acetosella*, *Carex brizoides* rather nutrient-poorer *Galium rotundifolium* types are characteristic for „fir“ stands. Nutrient-richer *Sanicula europaea*, *Brachypodium sylvaticum*, *Carex digitata* and *Carex pilosa* types add to them in 2nd and 3rd forest vegetation zones. Sub-continental *Tilio-Quercetum variohumidum mesotrophicum* (linden-oak stands) have specific conditions and it results to characteristic types. Natural phytoconosis uses to be difficult to differ from successional stages for „fir“ stands types, since *Galium rotundifolium* - *Oxalis acetosella* is frequently seral stage than type. Grassy stage with *Calamagrostis arundinacea* dominancy is conspicuous physiognomically. *Vaccinium myrtillus* abundance shows transitions to P-category (*categoria variohumida acidophila*). *Equisetum sylvaticum*, *Athyrium distentifolium* abundance and Stagnosols show transition to (G)-series (*series paludosa*) in higher forest vegetation zones especially.

Forest function is for production. Stands have infiltration and desuction ecological function. Natural tree species regeneration is good for *Abies alba* and *Quercus robur* on less brush infestationed stands, the worse for *Picea abies* (on nutrient-poorer types better). *Abies grandis* is possible to produce at the rank of 2nd to 5th forest vegetation zones on the stand area of 15 %.

### Forest site type complexes

#### 1<sup>st</sup> forest vegetation zone 1O - *Tilieto-Quercetum variohumidum mesotrophicum*

Occurrence: lowlands and lower uplands; plateaus and gentle tall and warm slopes; marls and clay slates with loamy covers-over.

Soil: heavy, alternatively humid (desiccated), deep, loamy to clay-loamy; predominantly Stagni-Haplic Luvisols and Stagni-Calcaric Cambisols; Stagni-Dystric Cambisols, Stagnic Glossisols, Albi-Haplic Luvisols slightly stagnic, Luvic Cambisols slightly stagnic, Luvic Stagnosols and Cambic Stagnosols are rare; Haplic Vertisols are at 1O1 forest site type only.

Significant often dominant or indicator species:

<i>Brachypodium sylvaticum</i>	( <i>Ficaria bulbifera</i> )
<i>Calamagrostis arundinacea</i>	( <i>Galium boreale</i> )
( <i>Carex brizoides</i> )	( <i>Galium sylvaticum</i> )
<i>Carex montana</i>	( <i>Heracleum sphondylium</i> )
<i>Deschampsia caespitosa</i>	( <i>Luzula luzuloides</i> )
<i>Dianthus superbus</i>	( <i>Luzula pilosa</i> )
<i>Galium odoratum</i>	( <i>Lysimachia nummularia</i> )
<i>Galium rotundifolium</i>	( <i>Lysimachia vulgaris</i> )
<i>Molinia arundinacea</i>	( <i>Melampyrum pratense</i> )
<i>Poa nemoralis</i>	( <i>Pleurozium schreberi</i> )
<i>Potentilla alba</i>	( <i>Poa angustifolia</i> )
<i>Rubus fruticosus</i> agg.	( <i>Polygonatum multiflorum</i> )
( <i>Agrostis capillaris</i> )	( <i>Polytrichum formosum</i> )
( <i>Betonica officinalis</i> )	( <i>Potentilla erecta</i> )
( <i>Carex pallescens</i> )	( <i>Rubus caesius</i> )
( <i>Cephalanthera rubra</i> )	( <i>Sanicula europaea</i> )
( <i>Convallaria majalis</i> )	( <i>Scorzonera humilis</i> )
( <i>Dactylis glomerata</i> )	<i>Serratula tinctoria</i>
( <i>Festuca heterophylla</i> )	( <i>Viola odorata</i> )
<i>Stellaria holostea</i>	

Forest site types:

- (1) *Potentilla alba*, *Dianthus superbus* variants
- (2) *Galium sylvaticum*; it has *Galium odoratum* variant
- (3) *Calamagrostis arundinacea* –nutrient poorer (and thin sandy cover-over)
- (4) *Molinia arundinacea*
- (5) *Deschampsia caespitosa*
- (6) *Rubus fruticosus* agg. - nutrient-enriched by humidestruction due to opened canopy
- (7) *Galium odoratum*
- (8) *Stellaria holostea*
- (9) *Poa nemoralis* - drier

Natural tree species composition:

Generally: *Quercus robur* (also rare possibly *Quercus petraea* agg.) 80 %, *Carpinus betulus* 10 %, *Tilia cordata* + *Tilia platyphyllos* 10 % *Populus tremula* 0.5 %, *Betula pendula* 0.5 %

In dependence on site conditions: *Quercus robur* (also rare possibly *Quercus petraea* agg.) 60 - 80 %, *Carpinus betulus* ± 20 %, *Tilia cordata* + *Tilia platyphyllos* 10 - 20 %, (*Acer platanoides*, *Fraxinus excelsior*, *Ulmus minor*, *Ulmus laevis*) ± 0.5 %, (*Alnus glutinosa*, *Populus tremula*) ± 0.1 %

101 and 102: *Quercus robur* (also rare possibly *Quercus petraea* agg.) 60 - 80 %, *Abies alba* 0 - 20 %, *Fagus sylvatica* 0 - 10 %, *Carpinus betulus* ± 20 %, (*Acer platanoides*, *Fraxinus excelsior*, *Ulmus minor*, *Ulmus laevis*) ± 0.5 %, *Tilia cordata* + *Tilia platyphyllos* 10 - 20 %, (*Alnus glutinosa*, *Populus tremula*) ± 0.5 %

Absolute height yield class: *Pinus sylvestris* 22 - 24 m, *Quercus* spp. (18) 22 - 26 (28) m, *Tilia* spp. (20) 26 - 28 m, *Carpinus betulus* 18 - 20 m, *Picea abies* 28 - 32 m

Hazards: considerably by desiccation, moderately by brush and allochthonous planted *Picea abies* stands by windthrow.

**2<sup>nd</sup> forest vegetation zone 20 - *Abieto-Fagi-Quercetum variohumidum mesotrophicum***

Occurrence: lowlands and uplands; loamy covers-over of different soil materials; plateaus, flat hollows and gentle slopes bases.

Soil: clay-loamy to (sandy-)loamy, slightly desiccated from the surface; Cambic Stagnosols and Stagni-Dystric Cambisols slightly dominate; Cambic Vertisols slightly stagnic and Cambic Gleysols are rare; Stagni-Haplic Luvisols are on loess; Stagni-Calcaric Cambisols are on marls and clay slates; Stagnic Glossisols are locally.

Significant often dominant or indicator species:

<i>Brachypodium sylvaticum</i>	( <i>Dactylis glomerata</i> )
<i>Carex brizoides</i>	( <i>Dryopteris dilatata</i> )
<i>Carex digitata</i>	( <i>Galium rotundifolium</i> )
<i>Carex pilosa</i>	( <i>Galium sylvaticum</i> )
<i>Deschampsia caespitosa</i>	( <i>Holcus lanatus</i> )
<i>Galium odoratum</i>	( <i>Luzula luzuloides</i> )
<i>Impatiens noli-tangere</i>	( <i>Lysimachia nummularia</i> )
<i>Luzula pilosa</i>	( <i>Maianthemum bifolium</i> )
<i>Oxalis acetosella</i>	( <i>Mycelis muralis</i> )
<i>Poa nemoralis</i>	( <i>Plagiomnium affine</i> )
<i>Rubus hirtus</i>	( <i>Pleurozium schreberi</i> )
<i>Rubus idaeus</i>	( <i>Polytrichum formosum</i> )
<i>Sanicula europaea</i>	( <i>Potentilla erecta</i> )

<i>Senecio fuchsii</i>	( <i>Ranunculus repens</i> )
( <i>Anemone nemorosa</i> )	( <i>Urtica dioica</i> )
( <i>Calamagrostis arundinacea</i> )	( <i>Vaccinium myrtillus</i> )
( <i>Convallaria majalis</i> )	( <i>Viola reichenbachiana</i> )

Forest site types:

- (1) *Sanicula europaea*
- (2) *Brachypodium sylvaticum*
- (3) *Carex digitata*
- (4) *Oxalis acetosella* - transition to *Abieti-Querceto-Fagetum variohumidum mesotrophicum* -  
*Oxalis acetosella* (306)
- (5) *Carex brizoides*
- (6) *Deschampsia caespitosa*
- (7) *Abieto-Quercetum variohumidum mesotrophicum*

Natural tree species composition:

Generally: *Quercus robur* (also *Quercus petraea* agg.) 60 %, *Fagus sylvatica* 20 %, *Abies alba* 20 %, *Tilia cordata* + *Tilia platyphyllos* 0.5 %, *Carpinus betulus* 0.5 %

201, 202 and 204: *Quercus robur* (also *Quercus petraea* agg.) 60 - 80 %, *Abies alba* 0 - 20 %, *Fagus sylvatica* 0 - 10 %, *Carpinus betulus* ± 20 %, *Tilia cordata* + *Tilia platyphyllos* 10 - 20 %, (*Acer platanoides*, *Fraxinus excelsior*, *Ulmus minor*, *Ulmus laevis*) ± 5 %, (*Alnus glutinosa*, *Populus tremula*) ± 0.5 %

207: *Quercus robur* 60 - 80 %, *Abies alba* 0 - 20 %, (*Fraxinus excelsior*, *Ulmus minor*, *Ulmus laevis*) ± 20 %, *Alnus glutinosa* ± 10 %, (*Acer platanoides*, *Populus tremula*, *Carpinus betulus*) ± 0.5 %

Absolute height yield class: *Quercus* spp. (20) 22 - 28 (30) m, *Abies alba* 22 - 24 (26) m, *Pinus sylvestris* 22 (30) - 24 (34) m, *Tilia* spp. (24) 26 m, *Larix decidua* 26 (30) - 28 (34) m, *Picea abies* (22) 24 - 28 (32) m, *Fagus sylvatica* 20 - 22 m

Hazards: transitionally by desiccation, locally by brush, allochthonous planted *Picea abies* stands by windthrow (and rot, resp.).

**3<sup>rd</sup> forest vegetation zone 30 - *Abieti-Querceto-Fagetum variohumidum mesotrophicum***

Occurrence: uplands; undulating plateaus and slope bases; different soil materials with loess and slope loams covers-over; clay slates.

Soil: deep, sandy-loamy, clay-loamy at bottom; predominantly: mesotrophic Dystric Cambisols slightly stagnic to mesotrophic Stagni-Dystric Cambisols, Cambic Stagnosols and Luvic Stagnosols; Stagnic Glossisols and Stagni-Calcaric Cambisols occur locally at dependence on site conditions.

Significant often dominant or indicator species:

<i>Asarum europaeum</i>	( <i>Carex sylvatica</i> )
<i>Brachypodium sylvaticum</i>	( <i>Dactylis glomerata</i> )
<i>Carex brizoides</i>	( <i>Avenella flexuosa</i> )
<i>Carex digitata</i>	( <i>Dryopteris filix-mas</i> )
<i>Carex pilosa</i>	( <i>Galeobdolon luteum</i> )
<i>Luzula luzuloides</i>	( <i>Galium odoratum</i> )
<i>Luzula pilosa</i>	( <i>Galium rotundifolium</i> )
<i>Melica nutans</i>	( <i>Holcus lanatus</i> )
<i>Oxalis acetosella</i>	( <i>Milium effusum</i> )
<i>Rubus hirtus</i>	( <i>Mycelis muralis</i> )



<i>Sanicula europaea</i>	( <i>Poa nemoralis</i> )
<i>Senecio fuchsii</i>	( <i>Rubus fruticosus</i> agg.)
( <i>Aegopodium podagraria</i> )	( <i>Rubus idaeus</i> )
( <i>Ajuga reptans</i> )	( <i>Vaccinium myrtillus</i> )
( <i>Athyrium filix-femina</i> )	( <i>Veronica chamaedrys</i> )
( <i>Calamagrostis arundinacea</i> )	( <i>Viola reichenbachiana</i> )

Forest site types:

- (1) *Sanicula europaea*
- (2) *Brachypodium sylvaticum*
- (3) *Carex pilosa*
- (4) *Carex digitata*
- (5) *Rubus fruticosus* agg. (or *Rubus hirtus* - Moravskoslezské Beskydy Mts.)
- (6) *Oxalis acetosella*
- (7) *Carex brizoides*
- (8) *Deschampsia caespitosa*

Natural tree species composition: *Fagus sylvatica* 30 %, *Quercus robur* (also *Quercus petraea* agg.) 30 %, *Abies alba* 40 %, *Tilia cordata* + *Tilia platyphyllos* 0.5 %

3O1, 3O3, 3O4 and 3O6: *Abies alba* 30 - 40 %, *Quercus robur* (also *Quercus petraea* agg.) 10 - 40 %, *Fagus sylvatica* 20 - 40 %, *Tilia cordata* + *Tilia platyphyllos* ± 20 %, *Acer platanoides* ± 10 %, *Carpinus betulus* ± 0.5 %, (*Fraxinus excelsior*, *Ulmus minor*, *Ulmus laevis*, (*Ulmus glabra*), *Populus tramula*) ± 0.5 %

Absolute height yield class: *Picea abies* (22) 26 - 30 (36) m, *Abies alba* (22) 24 - 28 (34) m, *Quercus* spp. (22) 24 - 28 (34) m, *Fagus sylvatica* (22) 24 - 28 (32) m, *Pinus sylvestris* 28 - 32 m.

Hazards: transitionally by desiccation, moderately by brush, *Picea abies* (cultural) stands by windthrow.

**4<sup>th</sup> forest vegetation zone 4O - *Querceto-Abietum variohumidum mesotrophicum***

Occurrence: higher uplands; undulating plateaus, flat hollows, slope bases; loamy with a different soil materials.

Soil: deep, clay-loamy at bottom, alternatively humid; dominantly Cambic Stagnosols, Luvic Stagnosols and Dystric Planosols; Stagni-Haplic Verisols or Stagni-Calcaric Cambisols are on marls; mesotrophic Stagni-Dystric Cambisols are little less dominant; Stagni-Haplic Luvisols and Stagnic Glossisols are rare.

Significant often dominant or indicator species:

<i>Carex brizoides</i>	<i>Oxalis acetosella</i>
<i>Equisetum sylvaticum</i>	<i>Rubus idaeus</i>
<i>Galium rotundifolium</i>	<i>Sanicula europaea</i>
<i>Luzula pilosa</i>	<i>Senecio fuchsii</i>
<i>Maianthemum bifolium</i>	<i>Sphagnum</i> spp.
<i>Molinia coerulea</i>	( <i>Vaccinium myrtillus</i> )

Forest site types:

- (1) *Oxalis acetosella*
- (2) *Carex brizoides*
- (4) *Equisetum sylvaticum* - more humid transition to *Querceto-Abietum piceosum paludosum mesotrophicum* - *Equisetum sylvaticum* (4G1)

(6) *Sanicula europaea* - transition to *Querceto-Fagetum fraxinosum humidum* - *Impatiens noli-tangere* (3V1)

Natural tree species composition:

Generally: *Fagus sylvatica* 20 %, *Quercus robur* (also *Quercus petraea* agg.) 40 %, *Abies alba* 40 %, *Populus tremula* 0.5 %

4O1, 4O2 and 4O6: *Abies alba* 30 - 50 %, *Quercus robur* (also *Quercus petraea* agg.) 30 - 50 %, *Fagus sylvatica* 10 - 30 %, *Tilia cordata* + *Tilia platyphyllos* ± 10 %, (*Pinus sylvestris*, *Populus tremula*, *Picea abies*) ± 0.5 %

Absolute height yield class: *Picea abies* (22) 26 - 30 (36) m, *Abies alba* 24 - 26 (36) m, *Quercus* spp. 22 - 26 (28) m, *Pinus sylvestris* 22 - 28 (32) m.

Hazards: transitionally by wet (desiccation), considerably by windthrow, moderately by brush.

**5<sup>th</sup> forest vegetation zone 5O - (*Fageto*-) *Abietum variohumidum mesotrophicum***

Occurrence: highlands and higher uplands; plateaus, flat hollows, gentle slopes; different thick loamy covers-over on different (but medium nutrient-rich) soil materials.

Soil: deep, fresh humid for the most of the year; dominantly: Dystric Planosols and Cambic Stagnosols; little less dominantly: Stagni-Dystric Cambisols or Dystric Cambisols slightly stagnic and both always mesotrophic; quite rarely: Gleyic Cambisols and Cambic Gleysols.

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	( <i>Dryopteris dilatata</i> )
<i>Carex brizoides</i>	( <i>Luzula luzuloides</i> )
<i>Equisetum sylvaticum</i>	( <i>Maianthemum bifolium</i> )
<i>Festuca altissima</i>	( <i>Mycelis muralis</i> )
<i>Galium rotundifolium</i>	( <i>Polytrichum formosum</i> )
<i>Luzula pilosa</i>	( <i>Rubus idaeus</i> )
<i>Oxalis acetosella</i>	( <i>Senecio fuchsii</i> )
<i>Sanicula europaea</i>	( <i>Sphagnum</i> spp.)
( <i>Athyrium filix-femina</i> )	( <i>Vaccinium myrtillus</i> )
( <i>Viola reichenbachiana</i> )	

Forest site types:

- (1) *Oxalis acetosella*; in has variety with *Calamagrostis arundinacea*
- (2) *Carex brizoides*
- (3) *Festuca altissima* - nutrient-richer

Natural tree species composition:

Generally: *Fagus sylvatica* 20 %, *Abies alba* 70 %, *Picea abies* (*Populus tremula*) 10 %

5O1 and 5O2: *Picea abies* 10 - 50 %, *Abies alba* 40 - 70 %, *Fagus sylvatica* 10 - 30 %, *Alnus incana* 0.5 %, *Populus tremula* ± 0.1 %

Absolute height yield class: *Picea abies* (22) 26 - 30 (36) m, *Abies alba* 24 - 28 - 32 (36) m, *Fagus sylvatica* (24) 26 - 30 (36) m, *Larix decidua* 30 - 36 m, *Pinus sylvestris* 26 - 32 m, *Alnus incana* 22 - 24 m

Hazards: considerably by windthrow, snowpack; moderately by brush and wet.

**6<sup>th</sup> forest vegetation zone 6O - *Piceeto-Abietum variohumidum mesotrophicum***

Occurrence: highlands (on climate inversion sites even lower); slope bases and plateaus; loamy covers-over on different soil materials.

Soil: deep, clay at bottom, alternatively humid (humid more well-balanced); predominantly Cambic Stagnosols, Dystric Planosols both humic sometimes and Stagni-Dystric Cambisols; Dystric Cambisols slightly stagnic and transiting to Stagni-Cambic Podzols are less frequent; Cambic Gleysols and Gleyic Cambisols are rare.

Significant often dominant or indicator species:

<i>Calamagrostis arundinacea</i>	( <i>Homogyne alpina</i> )
<i>Carex brizoides</i>	( <i>Maianthemum bifolium</i> )
<i>Deschampsia caespitosa</i>	( <i>Mycelis muralis</i> )
<i>Dryopteris dilatata</i>	( <i>Pleurozium schreberi</i> )
<i>Festuca altissima</i>	( <i>Polytrichum formosum</i> )
<i>Luzula pilosa</i>	( <i>Rubus idaeus</i> )
<i>Oxalis acetosella</i>	( <i>Senecio fuchsii</i> )
<i>Calamagrostis villosa</i>	( <i>Soldanella montana</i> )
( <i>Avenella flexuosa</i> )	( <i>Vaccinium myrtillus</i> )
( <i>Viola reichenbachiana</i> )	

Forest site types:

- (1) *Oxalis acetosella*; it has variant with *Calamagrostis arundinacea*
- (2) *Carex brizoides*

Natural tree species composition:

Generally: *Fagus sylvatica* 20 %, *Abies alba* 50 %, *Picea abies* 30 %

In dependence on site conditions: *Picea abies* 10 - 50 %, *Abies alba* 40 - 70 %, *Fagus sylvatica* 10 - 30 %, *Alnus incana* 0.5 %, *Populus tremula* ± 0.1 %

Absolute height yield class: *Picea abies* (22) 26 - 30 (34) m, *Abies alba* 24 - 26 (30) m, *Fagus sylvatica* 24 m.

Hazards: strongly by windthrow; considerably by snowpack, wet and by grassy brush.

### **7<sup>th</sup> forest vegetation zone 7O - *Abieto-Piceetum variohumidum mesotrophicum***

Occurrence: mountains, less highlands (on climate inversion sites even lower); undulating plateaus, slope bases, flat hollows.

Soil: alternatively to permanently humid (well-balanced), deep, clay to bottom; Stagni-Cambic Podzols (histic) to Dystric Planosols or Cambic Stagnosols and Gleyic Stagnosols (humic), locally to Histi-Mollic Gleysols podzoled.

Significant often dominant or indicator species:

<i>Athyrium distentifolium</i>	<i>Carex brizoides</i>
( <i>Avenella flexuosa</i> )	<i>Dryopteris dilatata</i>
( <i>Gymnocarpium dryopteris</i> )	<i>Equisetum sylvaticum</i>
( <i>Homogyne alpina</i> )	<i>Luzula sylvatica</i>
( <i>Luzula pilosa</i> )	<i>Oxalis acetosella</i>
( <i>Maianthemum bifolium</i> )	( <i>Athyrium filix-femina</i> )
( <i>Mycelis muralis</i> )	( <i>Calamagrostis villosa</i> )
( <i>Rubus idaeus</i> )	( <i>Deschampsia caespitosa</i> )
( <i>Senecio fuchsii</i> )	( <i>Vaccinium myrtillus</i> )

Forest site types:

- (1) *Oxalis acetosella*
- (3) *Carex brizoides* + *Luzula sylvatica*

(5) *Oxalis acetosella* + ferns (*filices*); Transition to *Fageto-Piceetum acerosum humidum* - *Athyrium distentifolium* (7V1)

Natural tree species composition:

Generally: *Picea abies* 70 %, *Abies alba* 30 %, *Fagus sylvatica* 0.5 %

7O1, 7O3 and 7O5: *Picea abies* 60 - 80 %, *Abies alba* 10 - 30 %, *Fagus sylvatica* ± 20 %, *Pinus sylvestris* ± 0.5 %, *Acer pseudoplatanus* ± 0.5 %, (*Betula pendula*, *Sorbus aucuparia*) ± 0.5 %

Absolute height yield class: *Picea abies* (24) 26 - 30 (32) m

Hazards: strongly by windthrow and snowpack, considerably by wet, brush and soil frost penetration.

**8<sup>th</sup> forest vegetation zone 8O - *Piceetum variohumidum mesotrophicum***

Occurrence: mountains (especially in Šumava Mts. 1000 - 1280 m); acid soil materials; gentle inclined plateaus and slope bases.

Soil: humid, alternatively humid to wet, deep, sandy-loamy, sometimes with skeleton; alternatively Cambic Stagnosols and Dystric Planosols both podzoled and histic to Gleyic Stagnosols, Stagni-Cambic Podzols and Gleyi-Cambic Podzols.

Significant often dominant or indicator species:

*Avenella flexuosa* (*Dryopteris dilatata*)  
*Calamagrostis villosa* (*Homogyne alpina*)  
*Bazzania trilobata* (*Soldanella montana*)  
*Luzula sylvatica* (*Polytrichum formosum*)  
*Oxalis acetosella* (*Vaccinium myrtillus*)  
*Sphagnum* spp.

Forest site types:

(1) *Oxalis acetosella*

Natural tree species composition: *Picea abies* 80 - 100 %, *Abies alba* ± 10 %, *Sorbus aucuparia* 0 - 10 %

Absolute height yield class: *Picea abies* 24 - 28 m

Hazards: strongly by wet, brush and windthrow, snowpack, hoarfrost; frost hollows and soil frost penetration.

**Azonal 0O - *Pinetum quercino-abietinum variohumidum mesotrophicum***

Occurrence: uplands, basins (South Bohemia and Ohře river), more wide vales; flat elevations.

Soil: loamy-sandy to sandy (slightly clay), deep, fresh humid; alternatively oligotrophic Stagni-Dystric Cambisols, Cambic Arenosols slightly stagnic, Arenic Podzols slightly stagnic, Stagni-Haplic Podzols and Gleyic Podzols.

Significant often dominant or indicator species:

*Anthoxanthum odoratum* *Melampyrum pratense*  
*Calamagrostis arundinacea* *Molinia arundinacea*  
*Calamagrostis epigeios* *Mycelis muralis*  
*Calamagrostis villosa* *Oxalis acetosella*  
*Calluna vulgaris* *Poa nemoralis*  
*Carex pilulifera* *Pteridium aquilinum*

<i>Avenella flexuosa</i>	<i>Rubus fruticosus</i> agg.
<i>Dryopteris dilatata</i>	<i>Rubus idaeus</i>
<i>Leucobryum glaucum</i>	<i>Sieglingia decumbens</i>
<i>Luzula luzuloides</i>	<i>Sphagnum</i> spp.
<i>Luzula pilosa</i>	<i>Vaccinium myrtillus</i>
<i>Maianthemum bifolium</i>	<i>Vaccinium vitis-idaea</i>

Forest site types:

- (1) *Vaccinium myrtillus*
- (2) *Avenella flexuosa* - it is known by high quality (ecotype) of *Pinus sylvestris* at Třeboň basin region
- (3) *Pinetum abietinum variohumidum mesotrophicum* - *Vaccinium myrtillus* - *Calamagrostis villosa* - southbohemian tertiary region (with covers-over sandy through clay from miocen with peat beginning) - serpentine regions - *crystallinum*
- (9) *Pinetum betulo-quercinum variohumidum mesotrophicum* - collected type of regions without *Abies alba* occurrence

Natural tree species composition:

Generally: *Pinus sylvestris* 50 %, *Quercus robur* (also *Quercus petraea* agg.) 40 %, *Abies alba* 10 %, *Picea abies* 0.5 %

In dependence on site conditions: *Pinus sylvestris* 70 - 80 %, *Quercus robur* (also *Quercus petraea* agg.) ± 20 %, *Betula pendula* ± 10 %, *Picea abies* 0 - 10 %, *Abies alba* ± 10 % (forest site type 009 is without *Abies alba* !!)

Absolute height yield class: *Pinus sylvestris* (20) 22 - 26 (28) m, *Quercus* spp. 24 m, *Picea abies* 22 - 26 (28) m, *Abies alba* 22 m

Hazards: moderately either by wet or drought, by brush, frost hollows.

### 2.3.7 Wet series (G) – *series paludosa*

Wet series (G) (series *paludosa*) is permanently influenced by ground water in comparison to stagnic series (P) (*series variohumida*). Gley horizons creation is dependent on high ground water level table through whole the year. Pedogenetic development influenced by soil nutrient richness and climate resulted to different gleysols on such wetted soils. Nutrient-richer soils dominate at G-category (*categoria paludosa mesotrophica*) (the nutrient-richest are already at V-category (*categoria humida*)). Nutrient-poorer ones, including Gleyic Podzols, are at T-category (*categoria paludosa oligotrophica*). Humification differences, phytocoenosis composition and tree species production of those (both) categories are made by these conditions.

Hygrophilous and wetland species are abundant. Communities of this series follow stagnic series by wet varieties of „fir“ communities. *Saliceto-Alneta* (willow-alder forests) and *Betuleto-Alneta* (birch-alder forests) are characteristic for such sites too. Separate determination of wetted soils is practically important for forest meliorations.

*Saliceto-Alneta* (willow-alder forests) cover communities of wetland alder stands, including their successional stages and some transitions (with ash - *Fraxinus excelsior*) on Gleysols and Histosols. They originate from overgrowing dead river arms, moorlands and pools with stagnating water. *Alnus glutinosa* domination in tree layer and *Frangula alnus* and willows (*Salix* spp.) in shrub layer are characteristic for them. *Lemna minor* covers moorlands and pool levels.

*Betuleto-Alneta* (birch-alder forests) are situated in the region of acid communities on terrain depressions with bad water outflow. They are in different forest vegetation zones. Gleysols

and Histosols make soil types. Frequent *Betula pubescens* and individuals of *Populus tremula* and *Sorbus aucuparia* naturally add domination of *Alnus glutinosa*. Herb layer is made by *Carex cinerea*, *Carex echinata*, *Carex elongata*, *Carex brizoides*, *Deschampsia caespitosa*, *Molinia coerulea* and also by differential species *Calamagrostis canescens*, *Thelypteris palustris*, *Menyanthes trifoliata*, *Carex rostrata*, *Caltha palustris*, *Comarum palustre*. Amount of mesotrophic species is lower than oligotrophic. *Sphagnum* spp. occurs too.

„*Abieta*“ („fir“) communities make waterlogged variants at this series. They differ from communities of alternatively humid soils by lower *Abies alba* abundance and higher *Equisetum sylvaticum*, *Lysimachia nemorum*, *Deschampsia caespitosa* abundances in understory. Higher abundances of wetland species (e.g. *Molinia coerulea* and *Sphagnum* spp.) are important for these communities too. There are dispersed sites (depressions) at the mosaic, accompanying (P)-series (*series variohumida*) communities.

*Abieto-Piceeta paludosa* (wet fir-spruce stands) and *Piceeta paludosa* (wet spruce stands) are the most characteristic and the most significant communities of these sites with high ground water level and its slowed outflow. Their gleyic to podzole-gleyic soils tend to histic soils. *Betula pubescens* and *Sorbus aucuparia* make tree layer with dominant *Picea abies*. *Abies alba* makes periphery, where there is no such tendency to make histic soils and it grows at lower elevations. Individual *Picea abies* and *Sorbus aucuparia* make shrub layer. Herb layer is reduced toward to moss one. *Homogyne alpina*, *Listera cordata*, *Luzula sylvatica*, *Blechnum spicant*, *Trientalis europaea*, *Calamagrostis villosa* (often dominant), *Equisetum sylvaticum*, *Lysimachia vulgaris*, *Carex brizoides*, *Dryopteris dilatata* and others make herb layer. Moss layer make peat mosses (e.g. *Sphagnum girgensohnii*, *Sphagnum nemoreum*, *Sphagnum quinquefolium*), mosses (e.g. *Polytrichum commune*, *Dicranum scoparium*, *Plagiothecium undulatum*) and only particularly liverworts (e.g. *Bazzania trilobata*). Diversity poorer, but more production variants cover climate inversion sites in lower forest vegetation zones.

### 2.3.7.1 *Categoria paludosa mesotrophica* (G – category)

Category characterizes predominantly Haplic Gleysols (humic) and Histi-Mollic Gleysols, less Cambic Gleysols and Gleyic Stagnosols. Haplic Histosols are on alder stands. Category covers nutrient-medium rich, slightly acid soils, wetted by non-stagnated, slightly percolating water at shallow depressions. Moder is typical humus form. *Picea abies* have production above standard and some significant morphologic attributes (stronger branchiness, tree gradient curve). Suitable ecotypes choice is necessary for silviculture.

*Equisetum sylvaticum*, *Carex brizoides*, *Deschampsia caespitosa*, *Senecio fuchsii*, *filices*, *Circaea alpina*, *Maianthemum bifolium*, *Oxalis acetosella*, *Calamagrostis villosa*, *Sphagnum* spp. and others make basic species combination of herb layer. Basic forest site types are: *Equisetum sylvaticum*, *magnocaricetum* (tall species of the *Carex* genus), *Calamagrostis villosa* (nutrient-poorer), *magnoherbaceum* (nutrient-richer) or ferns (*filices*). They often make mosaic with *Fraxineto-Alneta alluviale* (ash-alder floodplain forests). „Stream“ types on alluvia and more wetted types with *Alnus glutinosa* make site variants. Initially stages of *Alneta* (alder forests) have separate position. Forest function is for production. Stands have desuction ecological function (drain off the water). Natural tree species regeneration is good in canopy-opened spruce and fir stands. Drainage is directed to ground water level decreasing.

## Forest site type complexes

### 1<sup>st</sup> forest vegetation zone 1G - *Saliceto-Alnetum*

Occurrence: plateaus and terrain depressions of loamy deluvia with slightly stagnant water; margins and under ponds dam, forest marshes, wetted depressions at river vales (banks of dead river arms, moorlands and pools).

Soil: permanently wet (stagnant waters or mudding of mineral and histic soils by high ground water level), clay-loamy to loamy; predominantly Histi-Umbric Gleysols; locally Haplic Gleysols or Histi-Molic Gleysols; Gleyic Arenosols and Gleyic Dystric Fluvisols are rare; Haplic Histosols occur in mosaic.

*Significant often dominant or indicator species:*

<i>Alisma lanceolatum</i>	( <i>Solanum dulcamara</i> )
<i>Alisma plantago-aquatica</i>	( <i>Caltha palustris</i> )
<i>Carex acutiformis</i>	( <i>Deschampsia caespitosa</i> )
<i>Carex brizoides</i>	( <i>Galium palustre</i> )
<i>Carex echinata</i>	( <i>Hottonia palustris</i> )
<i>Carex elongata</i>	( <i>Lysimachia vulgaris</i> )
<i>Carex gracilis</i>	( <i>Mentha aquatica</i> )
<i>Carex remota</i>	( <i>Myosotis palustris</i> )
<i>Carex riparia</i>	( <i>Polygonum hydropiper</i> )
<i>Carex sylvatica</i>	( <i>Rorippa amphibia</i> )
<i>Iris pseudacorus</i>	( <i>Rubus caesius</i> )
<i>Lemna minor</i>	( <i>Sagittaria sagittifolia</i> )
<i>Lycopus europaeus</i>	( <i>Scirpus sylvaticus</i> )
<i>Phalaris arundinacea</i>	( <i>Scutellaria gallericulata</i> )
<i>Phragmites australis</i>	( <i>Symphytum officinale</i> )
( <i>Urtica dioica</i> )	

Forest site types:

(1) floodplain (*alluvialis*), collected type with variants:

- magnocaricetum (*Carex echinata*, *Carex riparia*)
- *Iris pseudacorus*
- bog (*Solanum dulcamara* + *Lycopus europaeus*)
- *Phragmites australis*

(2) wetland (*Alisma* spp., *Lemna minor*)

(3) initial stages

(4) transition with *Fraxinus excelsior* (or *Caricetum* - *Carex sylvatica*, *Carex remota*, *Carex elongata* + *Fraxinus angustifolia*) - transitions to *Fraxineto-Alnetum alluvialis*-*Cardamine amara* + *Chrysosplenium alternifolium* - (3L2) or *Querceto-Fraxinetum alluvialis* - (1L9)

Natural tree species composition:

Generally: *Alnus glutinosa* 60 %, *Salix* spp. 3 (*Salix alba*, *Salix fragilis*), *Populus tremula*, *Populus nigra*, *Populus alba* ± 0.5 %

1G1 (with all variants): *Fraxinus excelsior* ± 10 %, *Alnus glutinosa* 60 - 90 %, *Salix* spp. ± 40 %, (*Populus nigra*, *Populus alba*) ± 20 %

Absolute height yield class: *Alnus glutinosa* (16) 20 - 26 (30) m, *Salix* spp. (22) 24 - 26 m, *Fraxinus excelsior* 24 m, *Quercus robur* 24 - 26 m

Hazards: strongly by wet and brush; locally frost hollows; *Picea abies* cultures by rot and windthrow

**2<sup>nd</sup> forest vegetation zone 2G - *Quercetum abietinum paludosum mesotrophicum***

Occurrence: plots of terrain breaks, plateau depressions, flat hollows; lowlands; Tertiary clays and Mesozoic marls.

Soil: sandy to sandy-clay, clay to bottom, permanently wet; Cambic Gleysols to Haplic Gleysols humic; Gleyic Vertisols are rare.

Significant often dominant or indicator species:

<i>Ajuga reptans</i>	<i>Lysimachia nummularia</i>
<i>Caltha palustris</i>	<i>Maianthemum bifolium</i>
<i>Deschampsia caespitosa</i>	<i>Oxalis acetosella</i>
<i>Dryopteris dilatata</i>	<i>Plagiomnium undulatum</i>
<i>Equisetum sylvaticum</i>	<i>Ranunculus repens</i>
<i>Chaerophyllum hirsutum</i>	<i>Stachys sylvatica</i>
<i>Luzula pilosa</i>	<i>Carex brizoides</i>

Forest site types:

- (1) *Equisetum sylvaticum*
- (2) *Carex brizoides*

Natural tree species composition: *Quercus robur* 30 - 60 %, *Abies alba* 30 - 40 %, *Alnus glutinosa* ± 30 %, *Tilia platyphyllos* ± 10 %, (*Fagus sylvatica*, *Populus tremula*, *Picea abies*) 0.5 %

Absolute height yield class: *Quercus robur* (22) 28 - 28 m, *Picea abies* 28 - 32 m, *Abies alba* 24 m, *Alnus glutinosa* 22 m

Hazards: by brush; *Picea abies* cultures by windthrow and rot; frost hollows.

**3<sup>rd</sup> forest vegetation zone 3G - *Abieto-Quercetum piceosum paludosum mesotrophicum***

Occurrence: wetted plateaus depressions, flat hollows, terrain breaks; dominantly at uplands and basins.

Soil: predominantly clay at bottom, humid to wet; Haplic Gleysols to Cambic Gleysols, rare Gleyic Vertisols; all Gleysols are humic.

Significant often dominant or indicator species:

<i>Ajuga reptans</i>	<i>Avenella flexuosa</i>
<i>Calamagrostis villosa</i>	<i>Dryopteris dilatata</i>
<i>Calamagrostis arundinacea</i>	<i>Equisetum sylvaticum</i>
<i>Carex brizoides</i>	<i>Luzula pilosa</i>
<i>Carex remota</i>	<i>Maianthemum bifolium</i>
<i>Carex sylvatica</i>	<i>Oxalis acetosella</i>
<i>Deschampsia caespitosa</i>	<i>Sphagnum</i> spp.
<i>Vaccinium myrtillus</i>	

Forest site types:

- (1) *Equisetum sylvaticum*
- (2) *Carex brizoides*

Natural tree species composition:

Generally: *Quercus robur* 50 %, *Abies alba* 40 %, *Alnus glutinosa* 10 %, *Fagus sylvatica* 0.5 %, *Picea abies* 0.5 %

3G1 and 3G2: *Quercus robur* 30 - 70 %, *Abies alba* 30 - 70 %, *Picea abies* ± 10 %, *Pinus sylvestris* ± 10 %, *Tilia platyphyllos* 0.5 %, *Betula pubescens* 0.5 %, *Alnus glutinosa* ± 10 %

Absolute height yield class: *Picea abies* 22 - 28 (30) m, *Quercus robur* 20 - 26 (30) m



Hazards: by brush, locally by frost hollows (climate inversions), *Picea abies* cultures by rot and windthrow.

**4<sup>th</sup> forest vegetation zone 4G - *Querceto-Abietum piceosum paludosum mesotrophicum***

Occurrence: small plots in uplands, basins and highlands margin; plateaus depressions and hollows; Pleistocen loamy and alluvia.

Soil: different composition, deep, permanently wet; predominantly Haplic Gleysols humic to histic to Histi-Molic Gleysols; sometimes Histi-Umbric Gleysols; locally Cambic Gleysols; Gleyic Podzols and Gleyic Stagnosols are rare.

Significant often dominant or indicator species:

<i>Ajuga reptans</i>	<i>Equisetum sylvaticum</i>
<i>Calamagrostis arundinacea</i>	<i>Luzula pilosa</i>
<i>Calamagrostis villosa</i>	<i>Maianthemum bifolium</i>
<i>Carex brizoides</i>	<i>Melampyrum pratense</i>
<i>Deschampsia caespitosa</i>	<i>Molinia coerulea</i>
<i>Avenella flexuosa</i>	<i>Oxalis acetosella</i>
<i>Dryopteris dilatata</i>	<i>Sphagnum</i> spp.
<i>Vaccinium myrtillus</i>	

Forest site types:

- (1) *Equisetum sylvaticum*
- (2) *Carex brizoides*
- (3) *Calamagrostis villosa* – nutrient poorer
- (4) magnoherbaceous (*magnoherbaceum*) - nutrient-richer with transition to *Fagetum fraxinosum paludosum* (4V9)

Natural tree species composition:

Generally: *Quercus robur* 30 %, *Abies alba* 60 %, *Alnus glutinosa* 10 %, *Fagus sylvatica* 0.5 %

In dependence on site conditions: *Picea abies* ± 10 %, *Abies alba* 30 - 70 %, *Pinus sylvestris* ± 10 %, *Quercus robur* 30 - 70 %, *Tilia platyphyllos* 0.5 %, *Betula pubescens* 0.5 %, *Alnus glutinosa* ± 10 %

Absolute height yield class: *Picea abies* (20) 24 - 28 (32) m, *Abies alba* (20) 24 - 28 m, *Quercus robur* 20 - 24 (26) m, *Pinus sylvestris* 24 - 28 m, *Alnus glutinosa* 22 - 26 m.

Hazards: by brush, *Picea abies* (cultural) stands by rot and windthrow; often frost hollows.

**5<sup>th</sup> forest vegetation zone 5G - *Abietum quercino-piceosum paludosum mesotrophicum***

Occurrence: highlands, promontories, climate inversion sites in uplands; hollows; wet loamy at alluvia.

Soil: deep, permanently wet, loamy, clay-loamy at bottom; predominantly Haplic Gleysols (sometimes histic) and Histi-Molic Gleysols - both humic; frequently Histi-Umbric Gleysols; less frequent - Cambic Gleysols; Dystric Planosols and Gleyic Stagnosols are rare and local.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	( <i>Deschampsia caespitosa</i> )
<i>Carex brizoides</i>	( <i>Dryopteris dilatata</i> )
<i>Equisetum sylvaticum</i>	( <i>Dryopteris filix-mas</i> )
<i>Luzula pilosa</i>	( <i>Maianthemum bifolium</i> )
<i>Oxalis acetosella</i>	( <i>Mycelis muralis</i> )

( <i>Ajuga reptans</i> )	( <i>Plagiomnium affine</i> )
( <i>Athyrium filix-femina</i> )	( <i>Polytrichum commune</i> )
( <i>Calamagrostis arundinacea</i> )	( <i>Rubus idaeus</i> )
( <i>Circaea alpina</i> )	( <i>Senecio fuchsii</i> )
( <i>Sphagnum</i> spp.)	

Forest site types:

- (1) *Equisetum sylvaticum*
- (2) *Carex brizoides*
- (3) *Calamagrostis villosa*
- (4) magnoherbaceous (*magnoherbaceum*); it is transition type to wet types of *Abieto-Fagetum fraxinosum paludosum* (5V9).

Natural tree species composition:

Generally: *Abies alba* 80 %, *Alnus glutinosa* + *Alnus incana* 10 %, *Picea abies* (*Fagus sylvatica*) 10 %

5G1 and 5G2: *Picea abies* 20 - 60 %, *Abies alba* 30 - 70 %, *Pinus sylvestris* ± 20 %, *Fagus sylvatica* 0.5 %, *Betula pubescens* 0.5 %, *Alnus glutinosa* + *Alnus incana* ± 10 %, *Acer pseudopatanus* ± 0.1 %

Absolute height yield class: *Picea abies* (22) 24 - 30 (36) m, *Abies alba* (20) 24 - 26 (36) m, *Alnus* spp. (20) 22 - 26 m.

Hazards: strongly by wet, brush and frost hollows; moderately by snowpack; *Picea abies* cultural) stands by rot and windthrow.

**6<sup>th</sup> forest vegetation zone 6G - *Piceeto-Abietum paludosum mesotrophicum***

Occurrence: highlands and lower mountain elevations; small wetted sites of hollows, alluvial terraces.

Soil: different composition (more heavy and light), permanently wet; predominantly Histi-Molic Gleysols, humic Haplic Gleysols are frequent, Histi-Umblic Gleysols are sometimes, Cambic Gleysols are rare.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	( <i>Crepis paludosa</i> )
<i>Carex brizoides</i>	( <i>Deschampsia caespitosa</i> )
<i>Equisetum sylvaticum</i>	( <i>Dryopteris dilatata</i> )
<i>Sphagnum</i> spp.	( <i>Oxalis acetosella</i> )
( <i>Ajuga reptans</i> )	( <i>Polytrichum formosum</i> )
( <i>Athyrium filix-femina</i> )	( <i>Rubus idaeus</i> )
( <i>Circaea alpina</i> )	( <i>Senecio fuchsii</i> )
( <i>Polytrichum formosum</i> )	( <i>Vaccinium myrtillus</i> )
( <i>Athyrium distentifolium</i> )	

Forest site types:

- (1) *Equisetum sylvaticum*
- (2) *Carex brizoides*
- (3) *Calamagrostis villosa*; transitions to T-category (*categoria paludosa oligotrophica*) with *Sphagnum* spp.
- (4) magnoherbaceous (*magnoherbaceum*); it has soil variety on alluvia

Natural tree species composition:

Generally: *Picea abies* 50 %, *Abies alba* 40 %, *Fagus sylvatica* (*Alnus glutinosa* + *Alnus incana*) 10 %

In dependence on site conditions: *Picea abies* 20 - 60 %, *Abies alba* 30 - 70 %, *Pinus sylvestris* ± 20 %, *Fagus sylvatica* 0.5 %, *Betula pubescens* 0.5 %, *Alnus glutinosa* + *Alnus incana* ± 10 %, *Acer pseudoplatanus* ± 0.1 %

Absolute height yield class: *Picea abies* 24 - 30 (32) m, *Abies alba* 22 - 26 (30) m, *Alnus* spp. 24 - 26 m

Hazards: by strong wet, by windthrow, snowpacks, hoarfrost and brush and locally by frost hollows and soil frost penetration.

### **7<sup>th</sup> forest vegetation zone 7G - *Abieto-Piceetum paludosum mesotrophicum***

Occurrence: mountains, rare frost hollows in uplands; small wet plots of shallow depressions, slope bottoms plateaus and hollows.

Soil: different composition, deep, ground water table is 0.3 - 0.9 m under the soil surface; predominantly Histi-Molic Gleysols; Haplic Gleysols humic histic are frequent; Gleyic Histosols are rare.

#### Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	( <i>Avenella flexuosa</i> )
<i>Carex brizoides</i>	( <i>Dicranum scoparium</i> )
<i>Dryopteris dilatata</i>	( <i>Homogyne alpina</i> )
<i>Equisetum sylvaticum</i>	( <i>Chaerophyllum hirsutum</i> )
<i>Oxalis acetosella</i>	( <i>Lysimachia vulgaris</i> )
<i>Sphagnum</i> spp.	( <i>Pleurozium schreberi</i> )
( <i>Athyrium distentifolium</i> )	( <i>Polytrichum commune</i> )
( <i>Crepis paludosa</i> )	( <i>Polytrichum formosum</i> )
( <i>Deschampsia caespitosa</i> )	( <i>Soldanella montana</i> )
( <i>Vaccinium myrtillus</i> )	

#### Forest site types:

- (1) *Equisetum sylvaticum*
- (2) *Carex brizoides*
- (3) *Calamagrostis villosa*
- (4) stream (*alluvialis*); histic alluvia
- (5) skeletal (*saxatilis*); stony Gleysols at mountains
- (7) *Oxalis acetosella*
- (9) steep slopes

#### Natural tree species composition:

Generally: *Picea abies* 80 %, *Abies alba* 20 %, (*Alnus incana* 0.5 %, *Betula pubescens* 0.5 %, *Sorbus aucuparia* 0.5 %, *Populus tremula* 0.5 %)

7G1 to 7G4 and 7G7: *Picea abies* 70 - 90 %, *Abies alba* ± 20 %, *Pinus sylvestris* 0 - 10 %, (*Betula pubescens*, *Sorbus aucuparia*, *Alnus incana*) ± 0.5 %

Absolute height yield class: *Picea abies* (22) 24 - 28 (32) m, *Abies alba* 22 (28 - 30) m

Hazards: by strong wet, by windthrow and brush, considerably by snowpack, hoarfrost, frost hollows and soil frost penetration.

### **8<sup>th</sup> forest vegetation zone 8G - *Piceetum paludosum mesotrophicum***

Occurrence: rare at mountains (Šumava, Krušné hory, Jizerské hory Mts.); plateaus close to extensive peat bogs.

Soil: deep with a high ground water level, slightly stagnating; predominantly Histi-Molic Gleysols, less Haplic Gleysols histic, rare Gleyic Podzols histic.

Significant often dominant or indicator species:

<i>Athyrium distentifolium</i>	( <i>Dryopteris dilatata</i> )
<i>Calamagrostis villosa</i>	( <i>Hypnum cupressiforme</i> )
<i>Equisetum sylvaticum</i>	( <i>Plagiomnium affine</i> )
<i>Homogyne alpina</i>	( <i>Plagiothecium undulatum</i> )
<i>Lysimachia vulgaris</i>	( <i>Pleurozium schreberi</i> )
<i>Sphagnum</i> spp.	( <i>Polytrichum commune</i> )
( <i>Crepis paludosa</i> )	( <i>Polytrichum formosum</i> )
( <i>Dicranum undulatum</i> )	( <i>Viola palustris</i> )

Forest site types:

- (1) *Equisetum sylvaticum*
- (2) *Alnus incana* - hollows
- (3) *Calamagrostis villosa* with nutrient richer ferns (*filices*) variety
- (5) skeletal (*saxatilis*); Histi-Molic Gleysols bellow the stony debris

Natural tree species composition:

Generally: *Picea abies* 90 %, (*Betula pubescens*, *Alnus incana*, *Sorbus aucuparia*) 10 %

In dependence on site conditions: *Picea abies* 90 - 100 %, *Betula pubescens* ± 10 %, *Sorbus aucuparia* 0.5 %, *Pinus mugo* ± 0.1 %

Absolute height yield class: *Picea abies* (18) 22 - 26 (28) m

Hazards: by strongly wet, by windthrow and brush; considerably by snowpack, hoarfrost, frost hollows and soil frost penetration.

**Azonal OG - *Piceeto-Pinetum paludosum* (mesotrophicum)**

Occurrence: terrain depressions and flat hollows with bad outflow properties in South-Bohemian miocene region, Nord-Bohemian chalk sandstone, West-Bohemian serpentine etc.

Soil: sandy to clay-sandy, histic (ground water table is 0.3 - 0.5 m under soil surface; frequently Gleyic Planosols histic and Histi-Mollic Gleysols podzoled; locally Gleyic Podzols histic.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	<i>Oxalis acetosella</i>
<i>Calluna vulgaris</i>	<i>Pleurozium schreberi</i>
<i>Carex echinata</i>	<i>Polytrichum commune</i>
<i>Carex vulpina</i>	<i>Pteridium aquilinum</i>
<i>Avenella flexuosa</i>	<i>Sphagnum</i> spp.
<i>Dicranum scoparium</i>	<i>Trientalis europaea</i>
<i>Dryopteris dilatata</i>	<i>Vaccinium myrtillus</i>
<i>Molinia coerulea</i>	<i>Vaccinium vitis-idaea</i>

Forest site types:

- (1) *Molinia coerulea*; it has variants:
  - on granite- on sandstone
  - on serpentine (700 - 800 m a.s.l.)
- (3) *Calamagrostis villosa*

(9) *Pineto-Piceetum paludosum (mesotrophicum)* - *Calamagrostis villosa*; it is high production type (sub-complex) of Southbohemian miocene region

Natural tree species composition:

Generally: *Picea abies* 60 %, *Pinus sylvastris* 30 %, *Betula pendula* (also *Betula pubescens*) 10 %

OG1 and OG3: *Picea abies* ± 40 %, *Pinus sylvestris* 60 - 80 %, *Betula pendula* (also *Betula pubescens*) 10 - 20 %, *Quercus robur* ± 0.5 %

OG9 (resp. OG 1): *Picea abies* 60 - 100 %, *Abies alba* ± 0.1 %, *Pinus sylvestris* ± 40 %, *Betula pendula* (also *Betula pubescens*) ± 10 %, *Alnus glutinosa* ± 10 %

Absolute height yield class: *Pinus sylvestris* (20) 22 - 24 (32) m, *Picea abies* (20) 22 - 26 (32) m.

Hazards: strongly by wet, brush, frost hollows and soil nutrient degradation.

### 2.3.7.2 *Categoria paludosa oligotrophica* (T – category)

Category is situated on nutrient-poor and acid soils of permanent wet by stagnating or only slow flown soil water, with inclination to produce peat. Histi-Mollic Gleysols or Gleyic Histosols, both mostly podzoled, are created. They transit to Gleyic Podzols on little bit „suitable“ sites. Category occupies plateau depressions, basins without outflow and raised bog margins. Histic raw humus - mor is a typical humus form. Production of *Picea abies* is below the standard. *Pinus sylvestris* reaches better yield class.

Tall growint mosses (*Polytrichum commune*, *Polytrichum juniperinum*), peat-mosses (*Sphagnum* spp.) and liverworts (*Bazzania trilobata*) in combination with *Molinia coerulea*, *Molinia arundinacea*, *Calamagrostis villosa*, *Equisetum sylvaticum*, *Vaccinium myrtillus*, *Vaccinium vitis-idaea*, *Dryopteris dilatata* and other oligotrophic species have a high abundance in phytocoenosis. *Eriophorum vaginatum*, *Eriophorum angustifolium*, *Vaccinium uliginosum* and other „peat“ species add at higher forest vegetation zones. *Bazzania trilobata* is frequent at higher elevations, especially at raised-bogs margins. *Pinus mugo* penetrates to stunted *Picea abies* stands and it makes *Pinus mugo* type. *Betuleto-Alnetum* (birch-alder forest) and *Piceeto-Alnetum* (spruce-alder forest) have separate positions.

*Molinia* spp., *Sphagnum* spp. and nutrient-poorer variety of *Equisetum sylvaticum* type are the dominant forest site types. *Equisetum sylvaticum* type can transit to peat-bog type.

Forest function is production and protected in extreme conditions. Stands have desuction ecological function. Natural tree species regeneration is pure only on more peat sites; *Picea abies* natural regeneration is suitable. Draining is urgent.

### Forest site type complexes

#### 1<sup>st</sup> forest vegetation zone 1T - *Betuleto-Alnetum (paludosum oligotrophicum)*

Occurrence: nutrient-poor soil materials regions; depressions of flat and gentle inclined terrains and flat hollows, where bed outflow results to wet; from lowlands to mountains (5th and 6th forest vegetation zones - *Piceeto-Alnetum*).

Soil: permanently wet, muddy, nutrient-poor, sandy-clay; dominantly Histi-Molic Gleysols; other Gleysols are considerably less presented: Haplic Gleysols, Histi-Umbic Gleysols, Gleic Arenosols and Podzolic Gleysols, some of them can be histic or muddy; Haplic Histosols and Gleyic Histosols are rare; Gleyic Podzols histic are quite rare.

Significant often dominant or indicator species:

(*Calamagrostis villosa*)                      (*Carex elongata*)

*Carex acutiformis*                      (*Carex gracilis*)

<i>Carex brizoides</i>	( <i>Carex riparia</i> )
<i>Deschampsia caespitosa</i>	( <i>Equisetum palustre</i> )
<i>Avenella flexuosa</i>	( <i>Filipendula ulmaria</i> )
<i>Dryopteris dilatata</i>	( <i>Galium palustre</i> )
<i>Equisetum sylvaticum</i>	( <i>Lysimachia nummularia</i> )
<i>Glyceria fluitans</i>	( <i>Oxalis acetosella</i> )
<i>Iris pseudacorus</i>	( <i>Oxycoccus palustris</i> )
<i>Lysimachia vulgaris</i>	( <i>Scirpus sylvaticus</i> )
<i>Molinia arundinacea</i>	( <i>Solanum dulcamara</i> )
<i>Sphagnum</i> spp.	( <i>Symphytum officinale</i> )
( <i>Aegopodium podagraria</i> )	( <i>Urtica dioica</i> )
( <i>Calamagrostis canescens</i> )	( <i>Vaccinium myrtillus</i> )
( <i>Caltha palustris</i> )	( <i>Viola palustris</i> )

Forest site types:

- (1) *Molinia arundinacea*
- (2) *Carex brizoides* + *Avenella flexuosa*
- (3) bog (*Carex acutiformis* + wetland herbs)
- (4) sand dune (flown sands) (similar to above, but on sand dunes (flown sands))
- (5) *Sphagnum* spp.
- (9) *Piceeto-Alnetum*; (*Calamagrostis villosa*, *Caltha palustris*, *Sphagnum* spp.); higher elevations with natural presence of *Picea abies*

Natural tree species composition:

Generally: *Alnus glutinosa* 80 %, *Betula pubescens* 10 %, *Picea abies* 10 %, (*Populus tremula* 0.5 %, *Sorbus aucuparia* 0.5 %, *Frangula alnus* 0.5 %, *Viburnum opulus* 0.5 %, *Salix* spp. 0.5 %)

1T1, 1T2, 1T3 and 1T5: *Picea abies* ± 40 %, *Betula pubescens* ± 20 %, *Alnus glutinosa* 60 - 80 %, (*Populus tremula*, *Sorbus aucuparia*, *Salix* spp.) 0.5 %

1T9: *Picea abies* ± 40 %, *Betula pubescens* ± 20 %, *Alnus incana* (*Alnus glutinosa*) 60 - 80 %, (*Populus tremula*, *Sorbus aucuparia*, *Salix* spp.) 0.5 %

Absolute height yield class: *Alnus* spp. 18 - 22 (30) m, *Picea abies* (18) 20 - 24 (30) m, *Betula pubescens* (12) 18 - 20 (22) m.

Hazards: strongly by wet and brush; frost hollows locally.

**2<sup>nd</sup> forest vegetation zone 2T - *Abieto-Quercetum paludosum oligotrophicum***

Occurrence: and flat hollows with bad outflow properties on nutrient-poor soil materials in low uplands; the lowest elevations of (South-Bohemian) basins.

Soil: to clay-loamy with a high ground water level; dominantly Histi-Mollic Gleysols, locally Haplic Gleysols histic podzoled and Gleyic Planosols, Cambic Gleysols are rare.

Significant often dominant or indicator species:

<i>Equisetum sylvaticum</i>	( <i>Dicranella heteromalla</i> )
<i>Molinia arundinacea</i>	( <i>Dicranum scoparium</i> )
<i>Molinia coerulea</i>	( <i>Dicranum undulatum</i> )
<i>Pteridium aquilinum</i>	( <i>Genista pilosa</i> )
<i>Sphagnum</i> spp.	( <i>Luzula pilosa</i> )
<i>Vaccinium myrtillus</i>	( <i>Maianthemum bifolium</i> )
( <i>Calamagrostis villosa</i> )	( <i>Marchantia polymorpha</i> )
( <i>Calluna vulgaris</i> )	( <i>Plagiomnium undulatum</i> )

(*Convallaria majalis*)            (*Polytrichum commune*)  
(*Deschampsia caespitosa*)    (*Polytrichum formosum*)  
(*Vaccinium vitis-idaea*)

Forest site types:

- (1) *Molinia* spp.
- (2) *Equisetum sylvaticum*
- (3) *Sphagnum* spp.

Natural tree species composition:

Generally: *Quercus robur* 60 %, *Abies alba* 20 %, *Betula pubescens* 10 %, *Pinus sylvestris* (*Picea abies*) 10 %, *Populus tremula* 0.5 %, *Frangula alnus* 0.1 %

2T1: *Quercus robur* 50 - 60 %, *Abies alba* 10 - 20 %, *Betula pubescens* 10 - 30 %, *Pinus sylvestris* ± 10 %, (*Picea abies*, *Populus tremula*) ± 0.1 %

This forest site complex differs from the below one, by basically higher *Quercus robur* abundance and by limited *Picea abies* abundance.

Absolute height yield class: *Quercus robur* 16 - 18 (20) m, *Abies alba* 20 m, *Pinus sylvestris* (16) 18 - 20 (22) m

Hazards: by wet, brush, *Picea abies* by windthrow and rot; frost hollows.

**3<sup>rd</sup> forest vegetation zone 3T - *Abieto-Quercetum piceosum paludosum oligotrophicum***

Occurrence: depressions and flat hollows with bad outflow properties at the nutrient-poor soil material regions with loamy covers-over; uplands and basins.

Soil: sandy-loamy to clay-loamy; high ground water level; predominantly Gleyic Planosols histic; occasionally Histi-Mollic Gleysols and Gleyic Stagnosols histic.

Significant often dominant or indicator species:

*Equisetum sylvaticum*            (*Dicranella heteromalla*)  
*Molinia arundinacea*          (*Dicranum scoparium*)  
*Molinia coerulea*                (*Dicranum undulatum*)  
*Pteridium aquilinum*          (*Genista pilosa*)  
*Sphagnum* spp.                    (*Luzula pilosa*)  
*Vaccinium myrtillus*            (*Maianthemum bifolium*)  
(*Calamagrostis villosa*)        (*Marchantia polymorpha*)  
(*Calluna vulgaris*)                (*Plagiomnium undulatum*)  
(*Convallaria majalis*)          (*Polytrichum commune*)  
(*Deschampsia caespitosa*)    (*Polytrichum formosum*)  
(*Vaccinium vitis-idaea*)

Lesní typy:

- (1) *Molinia* spp.; it has more production variant in Silesia
- (2) *Sphagnum* spp.

Natural tree species composition:

3T1 and 3T2: *Picea abies* ± 20 %, *Abies alba* 20 - 40 %, *Pinus sylvestris* 20 - 40 %, *Quercus robur* 10 - 60 %, *Betula pendula* ± 20 %, (*Populus tremula*, *Alnus glutinosa*) 0.5 %

Absolute height yield class: *Quercus robur* 16 - 18 (20) m, *Abies alba* 20 m, *Pinus sylvestris* (16) 18 - 20 (22) m

Hazards: strongly by wet and brush (*Molinia* spp.); *Picea abies* by windthrow and rot; frost hollows.

#### **4<sup>th</sup> forest vegetation zone 4T - *Querceto-Abietum piceosum paludosum oligotrophicum***

Occurrence: plateaus, terrain depressions, flat hollows, basins with bad outflow properties; nutrient-poor soil material regions on sand-loamy to clay-loamy sediments.

Soil: sandy-loamy to clay-loamy, high ground water level; Gleyic Planosols and Stagnic Gleysols.

Significant often dominant or indicator species:

<i>Molinia arundinacea</i>	( <i>Equisetum sylvaticum</i> )
<i>Molinia coerulea</i>	( <i>Avenella flexuosa</i> )
<i>Vaccinium myrtillus</i>	( <i>Vaccinium vitis-idaea</i> )
<i>Sphagnum</i> spp.	( <i>Polytrichum commune</i> )
<i>Pleurozium schreberi</i>	( <i>Polytrichum formosum</i> )
<i>Pteridium aquilinum</i>	( <i>Dicranum scoparium</i> )
( <i>Dicranum undulatum</i> )	

Forest site types:

(1) *Molinia* spp.

(2) *Sphagnum* spp.

(3) *Equisetum sylvaticum* - transition to *Querceto-Abietum piceosum paludosum mesotrophicum* (4G)

Natural tree species conditions:

In dependence on site conditions: *Abies alba* 20 - 50 %, *Quercus robur* 30 - 60 %, *Pinus sylvestris* ± 10 %, *Picea abies* ± 20 %, (*Populus tremula*, *Betula pubescens*) ± 10 %

Absolute height yield class: *Quercus robur* 16 - 18 (20) m, *Pinus sylvestris* (16) 18 - 20 (22) m

Hazards: by wet and brush; *Picea abies* by windthrow and rot; frost hollows.

#### **5<sup>th</sup> forest vegetation zone 5T - *Abietum quercino-piceosum paludosum oligotrophicum***

Occurrence: uplands, highlands; nutrient-poor soil materials and loamy covers-over; plateau depressions and flat hollows; bad water outflow; climate inversion sites.

Soil: wet, unaired, nutrient-poor, high ground water level; predominantly Histi-Mollic Gleysols humic and Haplic Gleysols histic and pozoled; Gleyic Podzols histic are rare.

Significant often dominant or indicator species:

<i>Equisetum sylvaticum</i>	( <i>Deschampsia caespitosa</i> )
<i>Molinia arundinacea</i>	( <i>Avenella flexuosa</i> )
<i>Molinia coerulea</i>	( <i>Dicranum scoparium</i> )
<i>Sphagnum</i> spp.	( <i>Maianthemum bifolium</i> )
<i>Vaccinium myrtillus</i>	( <i>Polytrichum commune</i> )
( <i>Polytrichum formosum</i> )	

Forest site types:

(1) *Molinia* spp.

(2) *Equisetum sylvaticum*; transition to *Abietum quercino-piceosum paludosum mesotrophicum* - *Equisetum sylvaticum* (5G1)

(3) *Sphagnum* spp.

Natural tree species composition:



In dependence on site conditions: *Picea abies* ± 20 %, *Abies alba* 20 - 40 %, *Pinus sylvestris* 20 - 40 %, *Quercus robur* 10 - 60 %, *Betula pubescens* ± 20 %, (*Alnus glutinosa* (*Alnus incana*), *Populus tremula*) 0.5 %

Absolute height yield class: *Pinus sylvestris* (18) 22 - 24 m, *Picea abies* (16) 22 - 24 (26) m, *Abies alba* 18 - 20 m

Hazards: by strong wet, by brush (*Molinia* spp.), windthrow, rot; frost hollows.

### **6<sup>th</sup> forest vegetation zone 6T - *Piceeto-Abietum paludosum oligotrophicum***

Occurrence: highlands, mountains; nutrient-poor soil material regions with pleistocene sediments covers-over; plateau depressions, gently inclined hollows with bad water outflow; climate inversion sites (e.g. Lužická highlands).

Soil: wet, unaired, nutrient-poor, sandy-loamy to clay-loamy; predominantly Haplic Gleysols histic podzoled and Histi-Mollic Gleysols podzoled; locally Histi-Haplic Podzols or Gleyic Podzols histic.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	<i>Vaccinium myrtillus</i>
<i>Molinia arundinacea</i>	( <i>Avenella flexuosa</i> )
<i>Molinia coerulea</i>	( <i>Equisetum sylvaticum</i> )
<i>Sphagnum</i> spp.	( <i>Polytrichum formosum</i> )
<i>Trientalis europaea</i>	

Forest site types:

- (1) *Molinia* spp.
- (2) *Sphagnum* spp.

Natural tree species composition:

In dependence on site conditions: *Picea abies* 70 - 90 %, *Abies alba* ± 20 %, *Pinus sylvestris* 0 - 10 %, (*Betula pubescens*, *Sorbus aucuparia*, *Populus tremula*, *Alnus incana*) ± 0.5 %

Absolute height yield class: *Pinus sylvestris* (18) 22 - 24 m, *Picea abies* (16) 22 - 24 (26) m, *Abies alba* 18 - 20 m

Hazards: strong wet, by brush and windthrow; frost hollows.

### **7<sup>th</sup> forest vegetation zone 7T - *Abieto-Piceetum paludosum oligotrophicum***

Occurrence: plateaus and under-slopes depressions and hollows, often near stream and source; acid soil materials; highlands and mountains; (elevational levels are possible to differ by sub-alpine species abundance).

Soil: deep, humid to wet (stagnating water is about 0.25 cm under soil surface); predominantly Histi-Mollic Gleysols podzoled; locally Gleyic Histosols; Gleyic Podzols make mosaic transitions to predominant soil type.

Significant often dominant or indicator species:

<i>Bazzania trilobata</i>	( <i>Dicranum undulatum</i> )
<i>Calamagrostis villosa</i>	( <i>Dryopteris dilatata</i> )
<i>Equisetum sylvaticum</i>	( <i>Eriophorum angustifolium</i> )
<i>Sphagnum</i> spp.	( <i>Eriophorum vaginatum</i> )
( <i>Blechnum spicant</i> )	( <i>Homogyne alpina</i> )
( <i>Deschampsia caespitosa</i> )	( <i>Maianthemum bifolium</i> )
( <i>Avenella flexuosa</i> )	( <i>Polytrichum commune</i> )
( <i>Dicranella heteromalla</i> )	( <i>Vaccinium uliginosum</i> )

(*Dicranum scoparium*)            (*Vaccinium myrtillus*)  
(*Vaccinium vitis-idaea*)

Forest site types:

- (1) *Sphagnum* spp.; mountain or localized by climate inversion
- (2) *Bazzania trilobata*; histic peat-bogs margins

Natural tree species composition:

In dependence on site conditions: *Picea abies* 70 - 90 %, *Abies alba* ± 20 %, *Pinus sylvestris* 0 - 10 %, (*Betula pubescens*, *Sorbus aucuparia*, *Alnus incana*) ± 0.5 %

Absolute height yield class: *Picea abies* 16 - 22 (30) m, *Abies alba* 18 m, *Pinus sylvestris* 16 - 20 m

Hazards: by strong wet (making peat), by windthrow, snowpack and hoarfrost, moderately by soil frost penetration and brush (*Calamagrostis villosa*).

**8<sup>th</sup> forest vegetation zone 8T - *Piceetum paludosum oligotrophicum (humilis)***

Occurrence: small plots on plateaus, depressions and in saddles, on stream slopes and at mountain peat-bogs margins, where soil and climate conditions strongly limit grow of *Picea abies*.

Soil: stagnating ground water, histic, nutrient-poor; by mosaic: Gleyic Podzols, Histi-Haplic Podzols, Histi-Mollic Gleysols and Gleyic Histosols.

*Significant often dominant or indicator species:*

*Bazzania trilobata*            (*Dicranella heteromalla*)  
*Calamagrostis villosa*       (*Dicranum undulatum*)  
*Molinia arundinacea*       (*Equisetum sylvaticum*)  
*Molinia coerulea*            (*Galium saxatile*)  
*Sphagnum* spp.                (*Gentiana asclepiadea*)  
*Vaccinium myrtillus*         (*Homogyne alpina*)  
(*Deschampsia caespitosa*)    (*Polytrichum commune*)  
(*Avenella flexuosa*)          (*Polytrichum formosum*)  
(*Vaccinium vitis-idaea*)

Forest site types:

- (1) *Molinia* spp.; not clear-cut type in Krušné hory Mts.
- (2); predominantly on peat-bogs margins (*Bazzania trilobata* lacks in Krkonoše Mts.)
- (3) *Bazzania trilobata* swamp; swamp margins in Šumava Mts. with *Equisetum palustre*
- (4) *Pinus mugo* - near the timberline

Natural tree species composition:

Generally: *Picea abies* 80 % *Betula pubescens* (*Sorbus aucuparia*) 20 %

8T1 to 8T3: *Picea abies* 80 - 100 %, *Abies alba* ± 0.1 %, *Pinus sylvestris* ± 0.5 %, (*Pinus mugo* ± 0.5 %), *Betula pubescens* ± 10 %, *Sorbus aucuparia* ± 10 %, (*Pinus rotundata* ± 0.5 %)

Absolute height yield class: *Picea abies* (12) 14 - 18 (20) m, *Pinus rotundata* (4) 6 - (6) 12 m

Hazards: by strong wet, by windthrow, hoarfrost and snowpack; moderately by brush; heavy reforested wetlands belong to protected forests.

**Azonal 0T - *Betuleto-Pinetum (paludosum oligotrophicum)***

Occurrence: sandstone plateaus (North Bohemia), basins (South Bohemia), less uplands; terrain depressions and flat hollows with unsuitable outflow properties.

Soil: sandy to clay-sandy, nutrient-poor, ground water table is 0.3 - 0.5 m under soil surface; Gleyic Podzols histic; Histi-Mollic Gleysols podzoled; locally Gleyic Stagnosols histic.

*Significant often dominant or indicator species:*

<i>Calluna vulgaris</i>	( <i>Cetraria</i> spp.)
<i>Eriophorum vaginatum</i>	( <i>Cladonia</i> spp.)
<i>Ledum palustre</i>	( <i>Avenella flexuosa</i> )
<i>Molinia arundinacea</i>	( <i>Dicranum scoparium</i> )
<i>Oxycoccus palustris</i>	( <i>Dicranum undulatum</i> )
<i>Sphagnum</i> spp.	( <i>Leucobryum glaucum</i> )
<i>Vaccinium uliginosum</i>	( <i>Oxalis acetosella</i> )
<i>Vaccinium vitis-idaea</i>	( <i>Pteridium aquilinum</i> )
( <i>Calamagrostis villosa</i> )	( <i>Vaccinium myrtillus</i> )
<i>Molinia coerulea</i>	

Forest site types:

(1) *Quercus robur* (with *Calluna vulgaris*, resp. *Vaccinium vitis-idaea*); on kaolinic Podzols

(2) *Ledum palustre*

(3) *Molinia* spp.

Types 2 and 3 are typical for Tertiary basins

(5) *Betuleto-Pinetum paludosum-Molinia* spp.

Natural tree species composition:

OT1 to OT3: *Picea abies* ± 40 %, *Pinus sylvestris* 60 - 80 %, *Betula pubescens* 10 - 20 %, *Quercus robur* ± 0.5 %

OT5: *Pinus sylvestris* 80 %, *Betula pubescens* 20 %, *Quercus robur* 0.5 %, *Picea abies* 0.1 %

Absolute height yield class: *Pinus sylvestris* 14 - 18 (20) m, *Betula pubescens* 10 - 16 (18) m, *Picea abies* 20 m

Hazards: by strong wet, windthrow, brush, frost hollows and soil nutrient degradation; extreme localities belong to protected forests.

### 2.3.7.3 *Categoria turfosa* (R – category)

This category is sometime published as a separate series (R) with one category R. This category is delimited by histic soils with turf layer at least 0.5 m thick. Natural communities are made by spruce (*Picea abies*) (turf, relict), turf pine (*Pinus sylvestris*) and dwarf pine (*Pinus mugo*) stands. Turf communities determinate different successional stages of sub-mountain, mountain and sub-alpine conditions.

*Pineta relicta* (relict pine forests) cover several successional stages with the most typical communities with *Pinus rotundata* abundance. *Pineta rotundatae turfosa* - as its sub-category - are on live and dying away parts of sub-mountain peats. *Sphagnum* spp., *Aulacomnium palustre*, *Polytrichum strictum* *Polytrichum commune* dominate in moss layer. *Eriophorum vaginatum* dominates and *Oxycoccus palustris*, *Andromeda polifolia*, *Melampyrum pratense*, *Vaccinium vitis-idaea*, *Vaccinium uliginosum*, *Vaccinium myrtillus* and *Calluna vulgaris* are frequent in herb layer. *Ledum palustre* is characteristic for Třeboň basin region. *Vaccinium myrtillus* dominates in dying away stage of the peat. Turf pine forest is the last phase of this sub-mountain peat, where *Pinus sylvestris* and small shrubs change *Pinus rotundata* and mosses make understory look.

*Piceeta relictata turfosa* (relict spruce forest) and *Pineto-Piceeta turfosa* (pine-spruce peat forests) connect phytocoenologically not clear communities dead or meliorated peats of sub-mountain zone. They make heavy differentiated transitions to *Piceeta turfosa* (peat spruce forests).

*Piceeta turfosa* (peat spruce forests) are very wet *Piceeta paludosa* (wet spruce forests) and they are similar to next mentioned community with stunted spruce (*Picea abies*). Species of spruce climax forests are rare. Peat species (*Eriophorum vaginatum*, *Vaccinium uliginosum*, *Sphagnum* spp.) are frequent. *Bazzania trilobata* lacks.

*Mughetum turfosum* (peat dwarf pine forest) is community with characteristic feature made by *Pinus rotundata* and *Pinus mugo*. Peat lakes are there too. Pine populations, abundant on peat, make hybrid swarms.

Small shrubs - *Vaccinium uliginosum*, *Vaccinium myrtillus*, *Vaccinium vitis-idaea*, *Empetrum nigrum*, *Empetrum hermaphroditum* and *Calluna vulgaris* - are dominating in understory. Peat species (*Eriophorum vaginatum*, *Eriophorum angustifolium*, *Oxycoccus palustris*, *Andromeda polifolia*, *Polytrichum striatum*, *Aulacomnium palustre* and different species of the *Sphagnum* genus) are abundant.

Category has two sub-categories in principle:

Poor sub-category R - is made by *Picea abies* and *Pinus sylvestris* in lower vegetation zones and by *Pinus mugo* in highest ones. Oligotrophic Mesic Histosols, Fibric Histosols and Gleyic Histosols are soil types. Transitions to Histi-Mollic Gleysols are rare.

*Vaccinium myrtillus*, *Molinia* spp., *Sphagnum* spp., *Calamagrostis villosa*, *Eriophorum vaginatum* are significant forest site types. Forest function is soil protection. Some types are for production. Stands have desuction ecological function. Natural tree species regeneration is good after open canopy. Melioration on greater peat is small effective. It influences short distance only.

Medium-rich sub-category R+ contents forest site types often even on mesotrophic Mesic Histosols. It is characterized by *Picea abies* production above standard and vegetation composition. *Oxalis acetosella*, *Dryopteris dilatata*, *Athyrium filix-femina* are characteristic understory species. *Circaea alpina*, *Equisetum sylvaticum*, *Calamagrostis villosa*, *Carex brizoides*, *Senecio fuchsii*, *Deschampsia caespitosa*, *Petasites albus*, *Impatiens noli-tangere*, *Caltha palustris*, *Crepis paludosa* and *Lysimachia nemorum* are other present species.

*Oxalis acetosella* is basic forest site type. Magnoherbaceous and fern types are nutrient-richer. *Alnus glutinosa* (resp. *Alnus incana*) is more wet type. *Calamagrostis villosa* and *Avenella flexuosa* are nutrient-poorer types.

### **Forest site type complexes**

#### **3<sup>rd</sup> forest vegetation zone 3R - *Piceetum relictum turfosum acidophilum***

Occurrence: plateaus, depressions, slight hollows; rectangular sandstone regions and sand sediments of Southbohemian basins.

Soil: turf; predominantly oligotrophic Mesic Histosols.

#### Significant often dominant or indicator species:

<i>Molinia arundinacea</i>	( <i>Carex cinerea</i> )
<i>Molinia coerulea</i>	( <i>Carex echinata</i> )
<i>Oxalis acetosella</i>	( <i>Carex nigra</i> )
<i>Sphagnum</i> spp.	( <i>Avenella flexuosa</i> )
<i>Vaccinium myrtillus</i>	( <i>Dryopteris dilatata</i> )
<i>Vaccinium vitis-idaea</i>	( <i>Leucobryum glaucum</i> )
( <i>Bazzania trilobata</i> )	( <i>Lycopodium annotinum</i> )
( <i>Calamagrostis villosa</i> )	( <i>Polytrichum commune</i> )

(*Trientalis europaea*)

Forest site types:

- (1) *Vaccinium myrtillus*
- (2) *Molinia* spp.; with more production
- (3) *Sphagnum* spp.; nutrient poorer transition to *Pineto-Piceetum turfosum acidophilum* - *Vaccinium myrtillus* (5R1); on Histi-Molic Gleysols type it transits to *Abieto-Quercetum piceosum paludosum oligotrophicum* (3T)

Natural tree species composition:

Generally: *Picea abies* 60 %, *Pinus sylvestris* 20 %, *Betula pubescens* 20 %  
3R1 (3R2): *Picea abies* 30 - 80 %, *Pinus sylvestris* 10 - 70 %, *Betula pubescens* ± 20 %, (*Alnus glutinosa*, *Populus tremula*) 0.5 %

Absolute height yield class: *Picea abies* 20 - 24 m, *Betula pubescens* 18 - 22 m

Hazards: by desiccation and brush; *Picea abies* stands by windthrow; frost hollows.

**4<sup>th</sup> forest vegetation zone 4R - *Piceetum relictum turfosum mesotrophicum***

Occurrence: as relict beyond natural *Picea abies* region; basins, uplands, highlands - where it transit to forest site type complex 6R (*Piceetum turfosum mesotrophicum*) at the altitude of about 600 m

Soil: transitional peat (mesotrophic) often with higher proportion of mineral elements; predominantly Mesic Organosols or mesotrophic Gleyic Organosols; Haplic Histosols are rare; Histi-Mollic Gleysols are locally in mosaic.

Significant often dominant or indicator species:

<i>Ajuga reptans</i>	<i>Luzula pilosa</i>
<i>Athyrium filix-femina</i>	<i>Lysimachia vulgaris</i>
<i>Calamagrostis villosa</i>	<i>Maianthemum bifolium</i>
<i>Carex brizoides</i>	<i>Mnium hornum</i>
<i>Circaea alpina</i>	<i>Mycelis muralis</i>
<i>Avenella flexuosa</i>	<i>Oxalis acetosella</i>
<i>Dryopteris dilatata</i>	<i>Senecio fuchsii</i>
<i>Equisetum sylvaticum</i>	<i>Vaccinium myrtillus</i>

Forest site types:

- (1) šťavelový (*Oxalis acetosella*)
- (2) alder (*Alnus glutinosa*, rare *Alnus incana*)
- (3) *Calamagrostis villosa*; transition to *Piceetum turfosum mesotrophicum-Avenella flexuosa* (6R4)

Natural tree species composition:

4R1 to 4R3: *Picea abies* 60 - 100 %, *Abies alba* ± 0.5 %, *Pinus sylvestris* ± 40 %, *Betula pubescens* ± 10 %, *Alnus glutinosa* ± 10 %

Absolute height yield class: *Picea abies* 24 - 26 (34) m, *Alnus glutinosa* 18 - 24 m.

Hazards: moderately to strongly by desiccation, windthrow and brush; by frost hollows in climate inversion sites.

**5<sup>th</sup> forest vegetation zone 5R - *Pineto-Piceetum turfosum acidophilum***

Occurrence: nutrient-poor soil materials; higher uplands and highlands, mountain plateaus (Krušné hory and Šumava Mts.).

Soil: developmental range from histic wetlands to poor peat bogs; predominantly Gleyic Histosols and Mesic Histosols; Histi-Mollic Gleysols locally in mosaic.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	( <i>Equisetum sylvaticum</i> )
<i>Avenella flexuosa</i>	( <i>Homogyne alpina</i> )
<i>Molinia arundinacea</i>	( <i>Lycopodium annotinum</i> )
<i>Molinia coerulea</i>	( <i>Lysimachia vulgaris</i> )
<i>Sphagnum</i> spp.	( <i>Oxalis acetosella</i> )
<i>Trientalis europaea</i>	( <i>Polytrichum commune</i> )
<i>Vaccinium myrtillus</i>	( <i>Polytrichum formosum</i> )
( <i>Dicranum scoparium</i> )	( <i>Pteridium aquilinum</i> )
( <i>Dryopteris dilatata</i> )	( <i>Vaccinium uliginosum</i> )
( <i>Vaccinium vitis-idaea</i> )	

Forest site types:

(1) *Vaccinium myrtillus*; it has variants:

- *Calamagrostis villosa* + *filices*; transitions to *Piceeto-Pinetum paludosum* (mesotrophic)-  
*Calamagrostis villosa* (OG3)

- with mineral springs (Karlovarská highland)

(2) *Sphagnum* spp.; on nutrient-poor sandstones

Natural tree species composition:

5R1 and 5R2: *Picea abies* 30 - 80 %, *Pinus sylvestris* 10 - 70 %, *Betula pubescens* ± 20 %, (*Alnus glutinosa* (*Alnus incana*), *Populus tremula*) 0.5 %

Absolute height yield class: *Picea abies* (16) 20 - 22 (24) m, *Pinus sylvestris* 16 - 20 (24) m.

Hazards: strongly by desiccation, moderately by snowpack, locally by brush.

### **6<sup>th</sup> forest vegetation zone 6R - *Piceetum turfosum mesotrophicum***

Occurrence: mountains and highlands (700 - 1150 m); flat hollows and depressions; source slopes, slope breaks.

Soil: high ground water level (0.3 - 0.5 m under the soil surface) with 50 cm thick turf at least; predominantly mesotrophic Mesic Histosols; oligotrophic Mesic Histosols and mesotrophic Gleyic Histosols are rare; Histi-Mollic Gleysols are in mosaic.

Significant often dominant or indicator species:

<i>Athyrium filix-femina</i>	<i>Impatiens noli-tangere</i>
<i>Calamagrostis villosa</i>	<i>Luzula pilosa</i>
<i>Caltha palustris</i>	<i>Luzula sylvatica</i>
<i>Carex remota</i>	<i>Lycopodium annotinum</i>
<i>Circaea alpina</i>	<i>Maianthemum bifolium</i>
<i>Crepis paludosa</i>	<i>Oxalis acetosella</i>
<i>Deschampsia caespitosa</i>	<i>Petasites albus</i>
<i>Avenella flexuosa</i>	<i>Polytrichum commune</i>
<i>Dicranum scoparium</i>	<i>Polytrichum formosum</i>
<i>Doronicum austriacum</i>	<i>Sphagnum</i> spp.
<i>Dryopteris dilatata</i>	<i>Stellaria nemorum</i>
<i>Equisetum sylvaticum</i>	<i>Trientalis europaea</i>
<i>Galeobdolon luteum</i>	<i>Urtica dioica</i>
<i>Homogyne alpina</i>	<i>Vaccinium myrtillus</i>

Forest site types:

- (1) *Oxalis acetosella*; it has variety with ferns (*filices*)
- (2) alder; (often with *Alnus incana*)
- (3) magnoherbaceous (*magnoherbaceum*); (*Equisetum sylvaticum*, *Petasites albus*)
- (4) *Avenella flexuosa*; nutrient-poorer transition to *Piceetum turfosum acidophilum-Calamagrostis villosa* (7R1)

Natural tree species composition:

In dependence on site conditions: *Picea abies* 60 - 100 %, *Abies alba* ± 0.1 %, *Pinus sylvestris* ± 40 %, *Betula pubescens* ± 10 %, *Alnus glutinosa* (*Alnus incana*) ± 10 %

Absolute height yield class: *Picea abies* (22) 24 - 28 (34) m, *Alnus* spp. 20 - 22 (24) m

Hazards: strongly by desiccation and windthrow; moderately by brush, hoarfrost and snowpack; frost hollows.

**7<sup>th</sup> forest vegetation zone 7R - *Piceetum turfosum acidophilum***

Occurrence: flat hollows, plateaus, depressions; crystallinicum and sandstones; mountains (Krušné hory, Jizerské hory and Šumava Mts.), less highlands.

Soil: turf thickness 0.5 - 1.5 m; frequently oligotrophic Fibric Histosols; Gleyic Histosols are rare; Histi-Mollic Gleysols are in mosaic.

Significant often dominant or indicator species:

<i>Bazzania trilobata</i>	<i>Molinia coerulea</i>
<i>Calamagrostis villosa</i>	<i>Polytrichum commune</i>
<i>Avenella flexuosa</i>	<i>Potentilla erecta</i>
<i>Dicranum scoparium</i>	<i>Sphagnum</i> spp.
<i>Equisetum sylvaticum</i>	<i>Vaccinium myrtillus</i>
<i>Homogyne alpina</i>	<i>Vaccinium vitis-idaea</i>
<i>Lycopodium annotinum</i>	( <i>Soldanella montana</i> )

Forest site types:

- (1) *Calamagrostis villosa*
- (2) *Vaccinium myrtillus*; it has nutrient poorer variants at Krušné hory Mts.:
  - *Bazzania trilobata*
  - *Vaccinium vitis-idaea*
- (3) *Molinia* spp.
- (4) *Dryopteris dilatata*
- (5) *Sphagnum* spp.

Natural tree species composition::

7R4: *Picea abies* 90 %, *Betula pubescens* 10 %, *Sorbus aucuparia* 0.5 %

7R1, 7R2, 7R3 and 7R5: *Picea abies* 90-100 %, *Abies alba* ± 0.1 %, *Pinus sylvestris* ± 0.5 %, *Betula pubescens* ± 10 %, *Sorbus aucuparia* 0.5 %

Absolute height yield class: *Picea abies* 20 - 24 m

Hazards: strongly by windthrow, snowpack, (desiccation) wet, and hoarfrost; moderately by brush; frost hollows.

**8<sup>th</sup> forest vegetation zone 8R - *Piceetum turfosum (montanum)***

Occurrence: higher mountain sites (Šumava, Krušné hory, Jeseníky, Krkonoše and Jizerské hory Mts.), plateaus, depressions, gentle slopes; crystallinicum region.

Soil: peat-bogs or wetlands with ground water table 0.15 - 0.30 m under soil surface; almost dominantly oligotrophic Fibric Histosols; Histi-Mollic Gleysols are quite rare.

Significant often dominant or indicator species:

<i>Calamagrostis villosa</i>	( <i>Carex pauciflora</i> )
<i>Dryopteris dilatata</i>	( <i>Avenella flexuosa</i> )
<i>Equisetum sylvaticum</i>	( <i>Homogyne alpina</i> )
<i>Eriophorum angustifolium</i>	( <i>Luzula sylvatica</i> )
<i>Oxalis acetosella</i>	( <i>Lycopodium annotinum</i> )
<i>Polytrichum commune</i>	( <i>Molinia arundinacea</i> )
<i>Sphagnum</i> spp.	( <i>Molinia coerulea</i> )
<i>Vaccinium uliginosum</i>	( <i>Oxycoccus palustris</i> )
<i>Vaccinium myrtillus</i>	( <i>Polytrichum commune</i> )
( <i>Calluna vulgaris</i> )	( <i>Polytrichum striatum</i> )
( <i>Carex nigra</i> )	( <i>Trientalis europaea</i> )
( <i>Vaccinium vitis-idaea</i> )	

Forest site types:

- (1) *Eriophorum angustifolium*; characteristic type with stunted *Picea abies*
- (2) *Calamagrostis villosa*
- (3) *Vaccinium myrtillus*
- (4) *Oxalis acetosella*

Natural tree species composition:

8R1 to 8R4: *Picea abies* 90 - 100 %, *Betula pubescens* ± 10 %, *Sorbus aucuparia* 0.5 %, *Pinus mugo* ± 0.5 %

Absolute height yield class: *Picea abies* (2) 14 - 18 (24) m

Hazards: by hoarfrost, snowpack and windthrow; stand stability possible increases by suitable ecotypes.

**9<sup>th</sup> forest vegetation zone 9R - *Mughetum turfosum***

Occurrence: in *Pinus mugo* (Šumava, Krušné hory, Jizerské hory and Krkonoše Mts), less frequent shrubby *Pinus rotundata* (Krušné hory Mts.), undulated plateaus (Šumava Mts.) and basins bottom; in the altitudes of about 900 - 1150 m

Soil: peat bog turf, often with pools; very wet; oligotrophic Fibric Histosols only.

Significant often dominant or indicator species:

<i>Andromeda polifolia</i>	<i>Oxalis acetosella</i>
<i>Calluna vulgaris</i>	<i>Polytrichum commune</i>
<i>Dicranum scoparium</i>	<i>Sphagnum</i> spp.
<i>Empetrum nigrum</i>	<i>Vaccinium uliginosum</i>
<i>Eriophorum angustifolium</i>	<i>Vaccinium myrtillus</i>
<i>Vaccinium vitis-idaea</i>	

Forest site types:

- (1) peat-bog dwarf pine (*Pinus mugo*)
- (2) peat-bog *Pinus rotundata* and its hybrids with *Pinus mugo*

Natural tree species composition:

9R1: *Pinus mugo* 80 - 100 %, *Picea abies* 0 - 20 %



9R2: *Pinus rotundata* (resp. hybrids) 30 - 50 %, *Pinus mugo* 60 - 80 %, *Picea abies* ± 10 %, *Betula pubescens* ± 20 %, *Sorbus aucuparia* 0.5 %

Absolute height yield class: *Pinus rotundata* 2 - 4 m, *Picea abies* 4 - 8 (14) m

Hazards: by hoarfrost, snowpack and brush.

### **Azonal 0R - *Pinetum turfosum***

Occurrence: plateaus and flat hollows (former water streams) with bad outflow properties at basins (South Bohemia) and highlands.

Soil: transitional turf of different thickness (0.5 - 8.0 m) with ground water table 0.1 - 0.4 m under soil surface; predominantly oligo- and mesotrophic Fibric Histosols and oligo- and mesotrophic Mesic Histosols; locally Gleyic Histosols.

Significant often dominant or indicator species:

<i>Molinia arundinacea</i>	<i>Calluna vulgaris</i>
<i>Oxycoccus palustris</i>	<i>Avenella flexuosa</i>
<i>Polytrichum striatum</i>	<i>Dryopteris dilatata</i>
<i>Potentilla erecta</i>	<i>Eriophorum angustifolium</i>
<i>Sphagnum</i> spp.	<i>Ledum palustre</i>
<i>Vaccinium uliginosum</i>	<i>Leucobryum glaucum</i>
<i>Vaccinium myrtillus</i>	<i>Lycopodium annotinum</i>
<i>Vaccinium vitis-idaea</i>	

Forest site types:

(1) *Pinetum piceosum turfosum-Vaccinium myrtillus*

(2) *Pinetum piceosum turfosum-Ledum palustre*

(3) *Pinetum piceosum turfosum-Sphagnum* spp.

(5) *Pinetum rotundatae turfosum-Vaccinium myrtillus*

(6) *Pinetum rotundatae turfosum-Ledum palustre*

(9) *Pineto-Betuletum-Eriophorum* spp.; transition to live peat-bogs

Impoverished stages of (partly) meliorated peat bogs are made by *Calluna vulgaris* domination.

Natural tree species composition:

0R5 and 0R6: *Pinus rotundata* (*Pinus sylvestris*) 80 %, *Betula pubescens* 20 %, *Picea abies* 0.5 %

0R1 to 0R3: *Picea abies* ± 20 %, *Pinus sylvestris* 70 - 90 %, *Betula pubescens* ± 20 %, *Pinus rotundata* (ev. hybrids with *Pinus sylvestris*) ± 0.5 %

0R9: *Picea abies* 0.5 %, *Pinus rotundata* 80 - 100 %, *Pinus sylvestris* ± 10 %, *Betula pubescens* ± 20 %

Absolute height yield class: *Pinus sylvestris* (10) 14 - 18 (22) m, *Pinus rotundata* (8) 12 - 14 (18) m, *Pinus mugo* 4 m, *Betula pubescens* 12 - 18 m, *Picea abies* 16 - 18 (20) m

Hazards: by strong wet (or by melioration), hoarfrost, brush and peat exploitation; frost hollows.

S.	Extreme			Acid			Nutrient-rich						Maple			Ash			Stagnic			Wet			
Categories	xerothermica	humilis	saxatilis	oligotrophica	acidophila	lapidosa acidophila	illimerosa acidophila	oligo-mesotrophica	lapidosa mesotrophica	subxerothermica	mesotrophica	calcaria	illimerosa mesotrophica	deluvia	acerosa lapidosa	acerosa saxatilis	alluvialis	vallidosa	humida	variohumida mesotrophica	variohumida acidophila	variohumida oligotrophica	paludosa oligotrophica	paludosa mesotrophica	turfosa
	X	Z	Y	M	K	N	I	S	F	C	B	W	H	D	A	J	L	U	V	O	P	Q	T	G	R
9		9Z	9Y	9K																					9R
8		8Z	8Y	8M	8K	8N		8S	8F									8V	8O	8P	8Q	8T	8G	8R	
7		7Z	7Y	7M	7K	7N		7S	7F	7B				7A	6J	6L	7V		7O	7P	7Q	7T	7G	7R	
6		6Z	6Y	6M	6K	6N	6I	6S	6F	6B		6H	6D	6A	5J	5L	5U	6V	6O	6P	6Q	6T	6G	6R	
5		5Z	5Y	5M	5K	5N	5I	5S	5F	5C	5B	5W	5H	5D				5A	5U	5V	5O	5P	5Q	5T	5G
4	4X	4Z	4Y	4M	4K	4N	4I	4S	4F	4C	4B	4W	4H	4D	4A	3J	3L	3U	4V	4O	4P	4Q	4T	4G	4R
3	3X	3Z	3Y	3M	3K	3N	3I	3S	3F	3C	3B	3W	3H	3D	3A				3V	3O	3P	3Q	3T	3G	3R
2	2X	2Z	2Y	2M	2K	2N	2I	2S		2C	2B	2W	2H	2D	2A	1J	1L	1U	2V	2O	2P	2Q	2T	2G	
1	1X	1Z		1M	1K	1N	1I	1S		1C	1B	1W	1H	1D	1A				1V	1O	1P	1Q	1T	1G	
0	0X	0Z	0Y	0M	0K	0N		0C											0O	0P	0Q	0T	0G	0R	