

## Flora and vegetation of the study area at Zhůří – Hutská hora Mt.

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### Abstract

An inventory of vascular plants was carried out at Zhůří Hutská hora Mt. – an area of secondary grassland and successional woody vegetation. We paid special attention to important and protected species. Further, we mapped the main vegetation units, and suitable agricultural management was proposed on the basis of the mapping. Meadow communities of Zhůří are represented by the phytosociological alliances *Violion caninae*, *Polygono-Trisetion*, *Calthion*, *Caricion fuscae* a *Caricion rostratae*. The meadow in the SW part is overgrown by successional peaty birchwoods of the alliance *Betulion pubescentis*. The investigation confirmed 204 species of vascular plants, 18 of them enjoying legal protection.

*Key words:* vascular plants, inventory, vegetation mapping, Bohemian Forest, grassland management

### INTRODUCTION

Zhůří – Hutská hora Mt. grassland enclave belongs to the Kvilda Plains in the central part of the Bohemian Forest, and is part of zones II and III of the Šumava National Park. This enclave was chosen for our inventory because it is the site of complex research on impacts of different types of management on the functioning of mountain grassland ecosystems (see MAŠKOVÁ & al. 2001a).

Spruce-beech forest (*Callamagrostio villosae-Fagetum*), belonging to the phytosociological alliance *Luzulo-Fagion* (acidophilous beech and silver fir forest), forms the potential natural and reconstructed climax vegetation on mature silicate soils on the highland plains of Zhůří (Hutská hora Mt.). Waterlogged spruce forest with *Bazzania trilobata* (*Mastigobrio-Piceetum*), partly in complex with *Sphagnum*-rich spruce forest (*Sphagno-Piceetum*) of the alliance *Piceion excelsae* (climatic and waterlogged woodland) occurs on sites with high groundwater table (MORAVEC & NEUHÄUSL 1976, NEUHÄUSLOVÁ & al. 1998).

People gradually clearcut the forest during the settling process and started to manage treeless areas. Thanks to long-term agricultural practices, alternate communities of secondary grassland have replaced the original forest communities. MORAVEC (1965) made thorough synecological and phytosociological study of grassland communities in the central part of the Bohemian Forest. For the history of the Zhůří enclave see MAŠKOVÁ & al. (2001b). Meadows

and pastures have an important function not only for maintaining the recent character of the Bohemian Forest landscape. The meadow biotopes also provide suitable conditions for the occurrence of many plant and animal species of high conservation value.

The sustainability of these human-made biotopes and protection of their function in the landscape depend very much on further low impact agricultural management. Detailed knowledge of the recent state of the meadows, including their natural conditions, is necessary for proposing their proper management and its intensity, and to preserve or even improve the quality of secondary grassland and successional woody vegetation in the Bohemian Forest.

## MATERIAL AND METHODS

We used the classification developed for treeless communities of the Šumava NP and for the mapping of non-forest biotopes (ZELENKOVÁ 2000, see Table 1, Fig. 1). Vascular plant nomenclature follows DOSTÁL (1989), syntaxonomy follows MORAVEC & al. (1995).

For the occurrence of rare and endangered plant species, see map in Fig. 2. In view of their high number (34), the mapped species have been divided into three groups according to the degree of their endangerment. Each sign indicates a site with an increased concentration of a mapped species, which may also occur in smaller numbers in broader surroundings of that site. This way of presenting the occurrence of all valuable plant species (instead of just a few of them) was chosen in order to demonstrate the general conservation value of the plant cover in the Zhůří – Hutská hora Mt. enclave.

The recognition of the occurrence and abundance of valuable plant species in different biotopes is facilitated by our division of the plant communities of the Zhůří – Hutská hora Mt. enclave into 4 groups of grassland communities and 2 groups of woodland communities (Fig. 2 and 3). The grassland communities, except for those of ruderal biotopes, have been divided into 3 groups according to the hydric and trophic régimes in their respective biotopes (see Results).

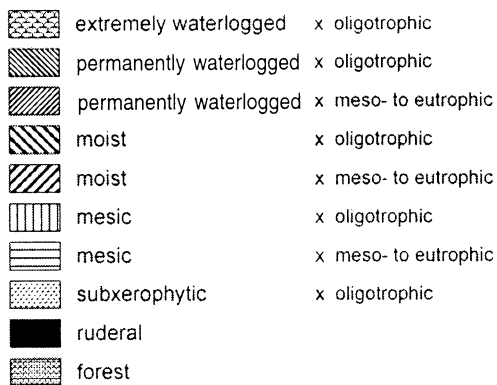
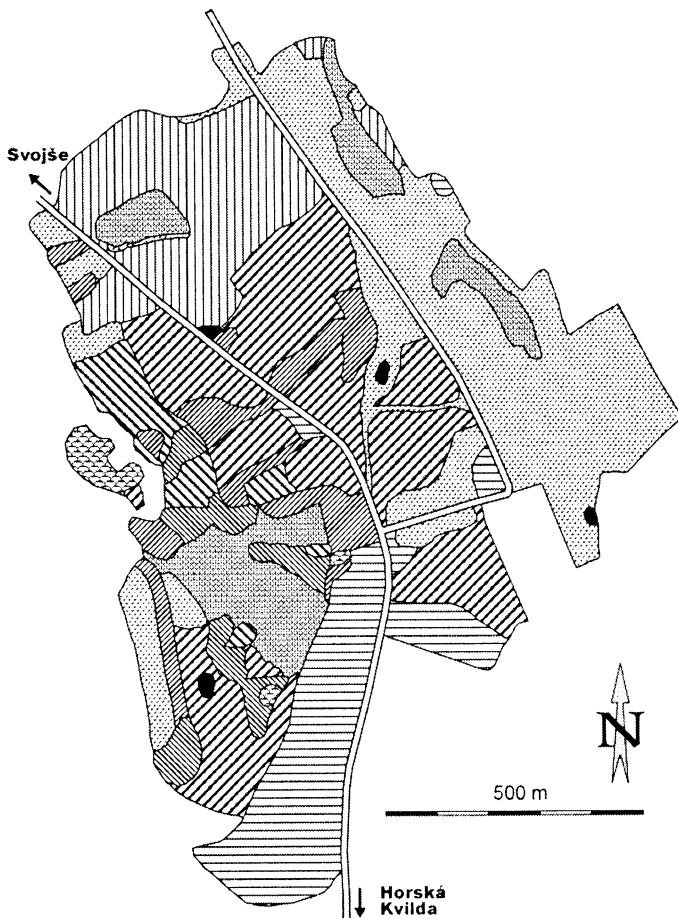
A capital letter following the name of a taxon (S, M, C, B, R) designates its recent occurrence in other vegetation types described here. An alphabetical list of all vascular plant species recorded in the Zhůří enclave is available on request from the authors of this paper.

The number of exclamation signs “!” following the name of a species indicates the degree to which that species is endangered in the Czech Republic according to the by-law No. 395/92 Sb. (!! highly endangered, ! endangered). As significant are considered those species which require special attention (e.g., species common in the Bohemian Forest, but with a limited occurrence in the Czech Republic and vice versa, and also species with marginal occurrence in the Bohemian Forest, indicator species of valuable communities, etc.). Each species is assigned the degree to which it is endangered according to IUCN classification (PROCHÁZKA & ŠTECH 2002): C1 critically endangered taxon, C2 endangered taxon, C3 vulnerable taxon, C4 valuable taxon requiring attention, C4a the same as C4, but less vulnerable.

The number of species listed in this paper is most probably not final. We suppose still other species can occur in the Zhůří enclave even if we did our best to make our list as complete as possible during repeated field surveys.

## RESULTS

For defining their suitable management, the grassland communities in the study area can be briefly categorized into seven main groups reflecting both hydric and trophic conditions of the biotopes (Table 1, Fig. 1).



**Fig. 1.** – Vegetation map of the secondary grassland and successional woody enclave of Zhůří – Hutská hora Mt. with respect to their hydric and trophic conditions.

Table 1. – Legend for the classification and mapping of biotopes and plant communities in the secondary grassland in the Zhüri – Huiská hora Mt. enclave.

Hydric régime	Trophy	Community type	Area (ha)	Corresponding codes in NATURA 2000	
				biotope	code
extremely waterlogged	oligotrophic	short sedge communities of <i>Caricion fuscae</i> alliance – <i>Carex rostrata</i> type <i>Eriophorum angustifolium</i> communities	0.19	Acidic moss-rich fens	R2.2
			0.94		R2.2
			Σ 1.13		
permanently waterlogged	oligotrophic	undifferentiated initial stages with <i>Carex echinata</i> and <i>Pinguicula vulgaris</i> communities of <i>Caricion fuscae</i> alliance – rich wetland type communities of <i>Caricion fuscae</i> alliance – <i>Eriophorum angustifolium</i> type swards of dominant <i>Juncus filiformis</i>	0.86	Acidic moss-rich fens	R2.2
			1.61		R2.2
			0.82		R2.2
			0.42	Wet <i>Cirsium</i> meadows	T1.5
			Σ 3.71		
	meso- to eutrophic	communities of <i>Calthion</i> sub-alliance communities of <i>Calthion</i> sub-alliance – <i>Scirpetum sylvatici</i> association and related communities communities of <i>Calthion</i> sub-alliance, degraded stage with <i>Juncus effusus</i> communities of <i>Filipendulion</i> sub-alliance – <i>Chaerophyllo hirsuti-Filipenduletum</i> association and related communities	2.17	Wet <i>Cirsium</i> meadows	T1.5
			0.10		T1.5
moist to damp	oligotrophic	initial stages of communities of <i>Violin caninae</i> alliance communities of <i>Caricion fuscae</i> alliance, stage with <i>Nardus stricta</i>	3.75	Vegetation of wet disturbed soils Wet <i>Filipendula</i> grasslands	T1.10
			0.32		T1.6
			Σ 6.34		
	oligotrophic	communities of <i>Caricion fuscae</i> alliance, stage with <i>Nardus stricta</i>	0.64	Submontane and montane <i>Nardus</i> grasslands Acidic moss-rich fens	T2.3.B
			2.69		R2.2
			Σ 3.33		
	meso- to eutrophic	tufted grass meadows – swards with <i>Deschampsia cespitosa</i> tufted grass meadows ( <i>Deschampsia</i> ) – swards with <i>Calamagrostis villosa</i> species-rich restored and intensely managed moist cocksfoot ( <i>Dactylis glomerata</i> ) meadows species-poor restored and intensely managed moist cocksfoot ( <i>Dactylis glomerata</i> ) meadows	18.43	Wet <i>Cirsium</i> meadows	T1.5
			0.24		T1.5
			0.10		T1.5
			2.94	Intensively managed meadows	X5
			0.56		X5
			Σ 22.27		

Table 1. – continue

Hydric régime	Trophy	Community type	Area (ha)	Corresponding codes in NATURA 2000 biotope	2000 code
mesic	oligotrophic	swards with <i>Festuca rubra</i> of <i>Cardaminopsis halleri</i> - <i>Agrostieticum</i> association	Σ 12.80	Montane <i>Trisetum</i> meadows	T1.1
	meso- to eutrophic	communities of <i>Polygonum-Trisetum</i> alliance degraded meadows of <i>Polygonum-Trisetum</i> alliance, fallow sites with <i>Hypericum maculatum</i> , <i>Agrostis tenuis</i> and <i>Holcus</i> spp. restored species-rich meadows with <i>Phleum pratense</i> , <i>Festuca pratensis</i> and <i>Dactylis glomerata</i> restored species-poor meadows with <i>Phleum pratense</i> , <i>Festuca pratensis</i> and <i>Dactylis glomerata</i>	0.28 0.12 9.71 2.57 Σ 12.68	Montane <i>Trisetum</i> meadows	T1.2 T1.2 T1.2 T1.2
subxerophytic	oligotrophic	species-poor initial communities of <i>Violin caninae</i> alliance with <i>Veronica officinalis</i> and <i>Nardus stricta</i>	1.09	Submontane and montane <i>Nardus</i> grassland	T2.3.B
		mat grass pastures of <i>Violin caninae</i> alliance	0.18		T2.3.B
		species-rich mat grass pastures of <i>Violin caninae</i> alliance, with <i>Polygala vulgaris</i> and <i>Viola canina</i>	3.35		T2.3.B
		species-poor mat grass pastures of <i>Violin caninae</i> alliance, with <i>Nardus stricta</i> and <i>Arnica montana</i>	12.01		T2.3.B
ruderal	eutrophic	degraded swards of <i>Deschampsia flexuosa</i> and <i>Agrostis tenuis</i>	7.34	Secondary submontane and montane heath	T2.3.B
		dwarf shrub communities of <i>Vaccinium</i> spp. and <i>Calluna vulgaris</i>	2.47 Σ 26.44		T8.2.B
		communities with dominant <i>Urtica dioica</i> , <i>Rubus idaeus</i> , <i>Chamerion angustifolium</i> or <i>Dactylis glomerata</i>	Σ 0.33	Herbaceous ruderal vegetation outside human settlements	X7

## The main features of dominant vegetation units

1. Subxerophytic to moist short mat grass meadows, pastures and forest edges of the alliance *Violion caninae* (denoted "S" in other lists of species)

<b>Characteristic species</b>	<b>Significant species</b>	
<i>Avenella flexuosa</i>	<i>Antennaria dioica</i> C2	<i>Fragaria vesca</i>
<i>Calluna vulgaris</i>	<i>Arnica montana</i> ! C3	<i>Hieracium murorum</i>
<i>Carex pilulifera</i>	<i>Botrychium lunaria</i> ! C2	<i>Homogyne alpina</i> (B)
<i>Dianthus deltoides</i>	<i>Coeloglossum viride</i> !! C1	<i>Knautia arvensis</i> (R)
<i>Euphrasia rostkoviana</i>	<i>Gentiana pannonica</i> !! C2	<i>Knautia dipsacifolia</i> (R)
<i>Galium pumilum</i>	<i>Juniperus communis</i> !! C3	<i>Leontodon hispidus</i>
<i>Galium saxatile</i>	<i>Leucorchis albida</i> !! C1	<i>Lotus corniculatus</i>
<i>Hieracium argillaceum</i>	<i>Pedicularis sylvatica</i> !! C3 (B)	<i>Lycopodium clavatum</i>
<i>Hypochoeris radicata</i>	<i>Pilosella aurantiaca</i> C4a (M)	<i>Maianthemum bifolium</i>
<i>Nardus stricta</i>	<i>Scorzonera humilis</i> C3	<i>Melampyrum sylvaticum</i>
<i>Omalotheca sylvatica</i>	<i>Soldanella montana</i> ! C3 (B)	<i>Pilosella cymosa</i> agg.
<i>Potentilla erecta</i> (M)	<i>Thesium pyrenaicum</i> C2	<i>Pilosella officinarum</i>
<i>Polygala vulgaris</i>		<i>Pimpinella saxifraga</i>
<i>Thymus pulegioides</i>	<b>Other species</b>	<i>Prunella vulgaris</i>
<i>Vaccinium myrtillus</i>	<i>Acetosella vulgaris</i>	<i>Rhodococcus vitis-idaea</i>
<i>Veronica officinalis</i>	<i>Calamagrostis villosa</i>	<i>Scorzoneroides autumnalis</i>
<i>Viola canina</i>	<i>Carlina acaulis</i>	<i>Silene vulgaris</i>
	<i>Cathartolinum catharticum</i>	<i>Solidago virgaurea</i>

Brief characteristic: These grassland stands were originally designated for grazing, but they were occasionally also mown. This vegetation cover often displays a high species diversity with the occurrence of several valuable species. Out of them, the members of the *Orchidaceae* require occasional cutting and grazing, to prevent broad-leaved plant species from overgrowing the stands. The stands are recently mostly unmanaged and a gradual change in their species composition has already started. The species with higher demands for open canopy are declining; some sites are also endangered by an expansion of shrub communities.

2. Mesic montane meadows of the alliance *Polygono-Trisetion*, and damp meadows with prevailing *Deschampsia cespitosa* or *Vigna brizoides* (denoted "M" in other lists of species)

<b>Characteristic species</b>	<b>Significant species</b>	
<i>Achillea millefolium</i>	<i>Crepis mollis</i> subsp. <i>hieracioides</i> C3	<i>Cerastium arvense</i> (R)
<i>Bistorta major</i> (C)	<i>Lilium bulbiferum</i> !! C2	<i>Cerastium holosteoides</i>
<i>Cardaminopsis halleri</i>	<i>Phleum rhaeticum</i> C3	<i>Galium album</i>
<i>Deschampsia cespitosa</i> (C)	<i>Phyteuma nigrum</i> C3	<i>Holcus mollis</i>
<i>Festuca rubra</i> (C)	<i>Viola saxatilis</i> subsp. <i>polychroma</i> C3	<i>Hypericum maculatum</i> (S)
<i>Melandrium sylvestris</i>		<i>Leucanthemum vulgare</i> (C)
<i>Phyteuma spicatum</i>	<b>Other species</b>	<i>Luzula campestris</i>
<i>Pimpinella major</i>	<i>Agrostis capillaris</i>	<i>Luzula luzuloides</i>
<i>Poa pratensis</i>	<i>Alchemilla monticola</i>	<i>Luzula multiflora</i> (S)
<i>Ranunculus acris</i> (C)	<i>Amoria repens</i> (R)	<i>Plantago lanceolata</i>
<i>Trisetum flavescens</i>	<i>Anthoxanthum odoratum</i> (C)	<i>Rhinanthus minor</i>
<i>Veronica serpyllifolia</i>	<i>Briza media</i>	<i>Tragopogon pratensis</i>
<i>Vigna brizoides</i> (C, R)	<i>Campanula patula</i>	<i>Trifolium pratense</i> (C, R)
	<i>Campanula rotundifolia</i> (S)	<i>Veronica chamaedrys</i>
		<i>Vicia cracca</i>

Brief characteristic: As a result of irregular management, the vegetation cover is dominated by *Bistorta major*, *Hypericum maculatum*, *Deschampsia cespitosa* and *Vignea brizoides*. The appearance of plots dominated by *Holcus mollis* is a consequence of the former fertilization regime and ploughing. At present such meadows are either mown (in July) or grazed once a year. Grazing quite often occurs too late and the leftovers, i.e., remnants of ungrazed vegetation, support the propagation of highly competitive weed species. Nonetheless, moderate grazing seems to increase the species richness of the stands, supports their balanced species composition (with increased presence of dicotyledonous herbs), and the spreading of the protected *Lilium bulbiferum*.

### 3. Mosaics of damp to wet stands

a) Eutrophic, damp, both tallgrass and shortgrass meadows of the alliance *Calthion*, oligotrophic short sedge communities of *Caricion fuscae* alliance (denoted "C" in other lists of species)

<b>Characteristic species</b>		<b>Other species</b>
<i>Acetosa pratensis</i>	<i>Juncus filiformis</i>	<i>Achillea ptarmica</i>
<i>Angelica sylvestris</i>	<i>Lathyrus pratensis</i>	<i>Ajuga reptans</i>
<i>Caltha palustris</i>	<i>Lychnis flos-cuculi</i>	<i>Cardamine amara</i>
<i>Carex nigra</i>	<i>Myosotis palustris</i>	<i>Cardamine pratensis</i>
<i>Carex panicea</i>	<i>Poa trivialis</i> (R)	<i>Carex pallescens</i>
<i>Carex rostrata</i>	<i>Scirpus sylvaticus</i>	<i>Chrysopsis aurea</i>
<i>Chaerophyllum hirsutum</i>		<i>Eriophorum angustifolium</i> (B)
<i>Cirsium heterophyllum</i> (M)	<b>Significant species</b>	<i>Geranium pratense</i>
<i>Cirsium palustre</i>	<i>Calycocorsus stipitatus</i> ! C3 (B)	<i>Glyceria fluitans</i> (B)
<i>Crepis paludosa</i>	<i>Carex nigra</i> subsp. <i>juncella</i> C4b	<i>Myosoton aquaticum</i> (R)
<i>Equisetum arvense</i>	<i>Dactylorhiza longibracteata</i> ! C4a (B)	<i>Ranunculus repens</i> (R)
<i>Equisetum palustre</i> (B)	<i>Dactylorhiza majalis</i> subsp. <i>majalis</i> ! C3 (B)	<i>Salix aurita</i> (R)
<i>Filipendula ulmaria</i>	<i>Epilobium palustre</i> C4a (B)	<i>Stellaria alsine</i>
<i>Galium uliginosum</i> (B)	<i>Mutellina purpurea</i> ! C3	<i>Stellaria graminea</i>
<i>Juncus articulatus</i>	<i>Tephroseris crista</i> C4a (B)	<i>Veronica beccabunga</i>
<i>Juncus effusus</i>	<i>Valeriana dioica</i> C4a (B)	

Brief characteristic: Managed eutrophic vegetation cover of *Calthion* alliance is not present in the Zhůří enclave. The unmanaged community is dominated by tall herbs, e.g., *Filipendula ulmaria*, *Cirsium heterophyllum*, *Scirpus sylvaticus*, *Chaerophyllum hirsutum*, and *Caltha palustris*. In spite of their dominance, one can still find several significant species there, e.g., *Dactylorhiza longibracteata* and *D. majalis* subsp. *majalis*. But these orchids are more frequent in oligotrophic communities of *Caricion fuscae* alliance, where they are accompanied by other endangered species, such as *Calycocorsus stipitatus*. Occasional mowing with the removal of the hay (once in three years) and subsequent grazing support their propagation. If the vegetation is not mown or harvested in some other manner, the expansion of dense tussock-forming grasses leads to the formation of hummocks and starts to displace other species. The sites with high groundwater table should be excluded from the treatments suggested above. Unfenced spring heads have recently been devastated by cattle grazing. Cattle grazing only partly positively influences the spreading of competitively weaker species; this occurs in sedge-moss communities of the alliance *Caricion fuscae*. Examples of such species are *Drosera rotundifolia* and *Pinguicula vulgaris*, but their occurrence is concentrated mainly in peaty birchwoods of the alliance *Betulion pubescentis*.

b) Successional peaty birchwoods of the alliance *Betulion pubescentis* (denoted “B” in other lists of species)

<b>Characteristic species</b>	<b>Significant species</b>	<b>Other species</b>
<i>Betula pendula</i> (R)	<i>Carex flava</i> C4a	<i>Equisetum fluviatile</i>
<i>Equisetum sylvaticum</i> (C)	<i>Corallorhiza trifida</i> !! C2	<i>Picea abies</i>
<i>Eriophorum vaginatum</i>	<i>Drosera rotundifolia</i> !! C3	<i>Pinus sylvestris</i>
<i>Melampyrum pratense</i> (S)	<i>Oxycoccus palustris</i> ! C3	<i>Pyrola minor</i>
<i>Molinia caerulea</i> (C)	<i>Pinguicula vulgaris</i> !! C2	<i>Vigna cinerea</i>
<i>Trientalis europaea</i>		<i>Vigna echinata</i>
<i>Vaccinium uliginosum</i> (S)		<i>Viola palustris</i> (C)

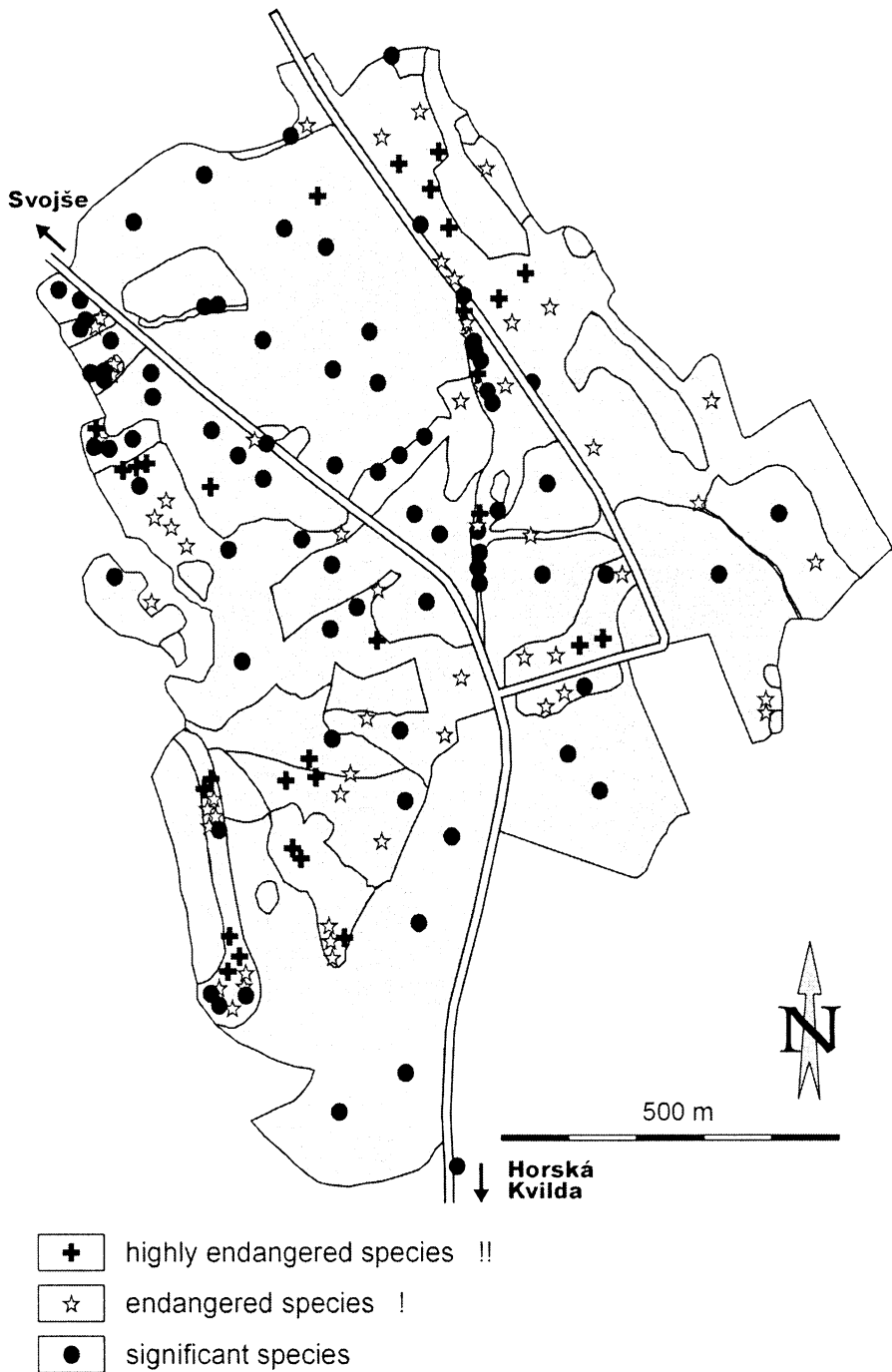
Brief characteristic: A moss layer of numerous species belonging to the *Sphagnales* and *Polyptrichales* is developed. A relatively numerous population of the endangered *Corallorhiza trifida* orchid is present in the herb layer. *Oxycoccus palustris* is frequent on peat hummocks. *Drosera rotundifolia* and *Pinguicula vulgaris* occur in *Sphagnum* stands disturbed by red deer (*Cervus elaphus*).

4. Communities of disturbed sites (denoted “R” in other lists of species)

<b>Significant species</b>		
<i>Cicerbita alpina</i> C4a	<i>Cynosurus cristatus</i>	<i>Poa nemoralis</i>
<i>Doronicum austriacum</i> ! C4a	<i>Cystopteris fragilis</i>	<i>Populus tremula</i>
<i>Gentianopsis ciliata</i> C3	<i>Dactylis glomerata</i> (M, C)	<i>Prenanthes purpurea</i>
<i>Ranunculus platanifolius</i> C4a	<i>Elytrigia repens</i>	<i>Pulmonaria officinalis</i>
	<i>Epilobium ciliatum</i>	<i>Rubus idaeus</i>
	<i>Fagus sylvatica</i>	<i>Rumex obtusifolius</i>
<b>Other species</b>	<i>Galeobdolon luteum</i>	<i>Sagina procumbens</i>
<i>Acer pseudoplatanus</i>	<i>Galeopsis bifida</i>	<i>Salix aurita</i> (C)
<i>Aegopodium podagraria</i>	<i>Galeopsis tetrahit</i>	<i>Salix caprea</i>
<i>Alopecurus pratensis</i> (M, C)	<i>Geum urbanum</i>	<i>Sambucus racemosa</i>
<i>Anthriscus sylvestris</i>	<i>Heracleum sphondylium</i>	<i>Senecio ovatus</i> (S)
<i>Arrhenatherum elatius</i>	<i>Imperatoria ostruthium</i>	<i>Sorbus aucuparia</i>
<i>Calamagrostis epigeios</i>	<i>Linaria vulgaris</i>	<i>Tanacetum vulgare</i>
<i>Carum carvi</i>	<i>Luzula sylvatica</i>	<i>Taraxacum officinale</i> (M)
<i>Chamerion angustifolium</i>	<i>Medicago lupulina</i>	<i>Tussilago farfara</i>
<i>Chenopodium bonus-henricus</i>	<i>Moehringia trinervia</i>	<i>Urtica dioica</i>
<i>Conyza canadensis</i>	<i>Phleum pratense</i> (M)	<i>Vicia sepium</i>
<i>Coronilla varia</i>	<i>Plantago media</i>	<i>Vigna ovalis</i>

Brief characteristic: As the whole area has been exposed to a long-term human impact, one can find there plant stands which do not fit in the framework of communities given sub 1–3. The habitats are mainly ruined and dilapidated houses with their proximate neighbourhood, ditches along roads and stone heaps. They are frequently occupied by some synanthropic species unintentionally introduced from gardens, e.g., *Imperatoria ostruthium* or *Doronicum austriacum*. The occurrence of the calcicole *Gentianopsis ciliata* was recorded in a ditch of the main road because limestone forms its subbase. Fig. 2 documents the occurrence of significant and endangered vascular plant species in the biotope and vegetation types (Fig. 3).





**Fig. 2.** – The occurrence of significant and endangered (protected by law) vascular plant species in the Zhůří – Huťská hora Mt. enclave.

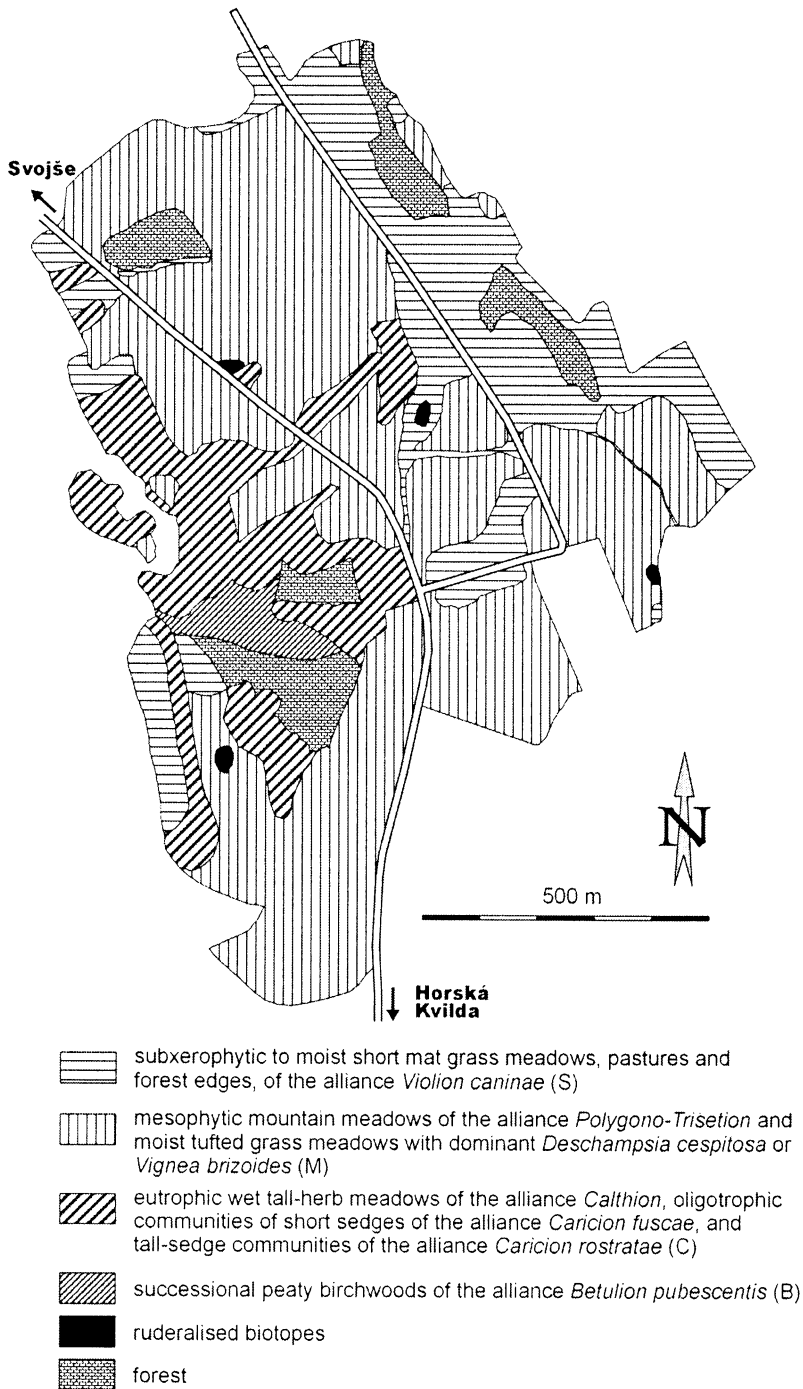


Fig. 3. – Biotope and plant community types in the Zhůří – Huťská hora Mt. enclave.

## Proposal for suitable agricultural management

The Management Plan of the Šumava National Park gives common guidelines for the establishment of suitable management in the anthropogenic grassland (ZELENKOVÁ 2000). The definition of a suitable management should also reflect the feasibility of that management and its practical aspects. Such a management is not absolutely subjected to the principles of nature conservation emphasising only strict protection of species and improvement of the diversity of all communities. Neither is a suitable management an ideal solution from the point of view of a farmer who aims at maximum economical efficiency of agricultural activities.

The management, which we consider as optimal, tries to compromise between the two relatively contradictory goals. It aims primarily at an improvement of the quality and sustainability of secondary grassland in the Bohemian Forest.

An example of a management proposal for the Zhůří enclave, reflecting the above described attributes is given in Fig. 4.

## DISCUSSION

The Zhůří – Hutská hora Mt. enclave has passed through a historical development, which is different from that of other settlements on the Kvilda Plains. The other villages surrounding Zhůří were depopulated only partially during two transfer waves, before and after World War II, respectively, because two (Czech and German) ethnics were originally living there. This fact ensured the continuity of farming tradition. On the other hand, the Zhůří settlement was originally completely inhabited by the German ethnic, and the expatriation of these people after World War II caused total depopulation of the area and resulted in a breakdown of the landscape management. In the mid 1950s, a military base was established here and from that time on for more than 40 years the enclave was partly used for military purposes, and partly agriculturally managed (MAŠKOVÁ & al. 2001b). Despite the fact that a part of the area has been devastated by different kinds of military activities, unfavourable agricultural practices not excluding, the rest of the enclave has escaped such a fate. The absence of any permanent settlement and of associated negative activities, e.g., eutrophication and spreading of weed communities, has contributed to the preservation of some valuable biotopes. A unique mosaic of heterogeneous communities with the occurrence of many vital populations of significant species has therefore survived in the Zhůří – Hutská hora Mt. enclave. The whole enclave is now considered as one of the most valuable areas of secondary grassland in the region.

The mapping of plant communities in the whole enclave (88.7 ha) has yielded the following results: subxerophytic communities cover 26.4% of total area of the enclave and are dominated by the alliance *Violion caninae*, mesic communities with prevailing *Polygono-Trisetion* alliance cover 25.5% of the enclave, *Deschampsia cespitosa* dominates frequently in the communities of moist and damp sites (22.3%), permanently wet sites are mainly occupied by communities of the alliances *Caricion fuscae* and *Calthion* (10.0%), and *Carex rostrata* is dominant on extremely wet sites (1.1%).

The Zhůří – Hutská hora Mt. enclave belongs to the Kvilda Plains (Kvildské pláně) area within the central Bohemian Forest. This fact is reflected in the composition of the enclave's vegetation. Remarkable is a rather even representation of the three main groups of grassland biotopes and plant communities within the enclave, which therefore hosts high number and great variety of plant species. Among them are also such species that occur with high frequency in the Bohemian Forest (within the context of the Czech Republic), but are rather rare and endangered in the rest of Central Europe. Examples of such species are *Pinguicula vulgaris*, *Soldanella montana*, *Calycocorsus stipitatus*, and also *Phyteuma nigrum*, which is endemic

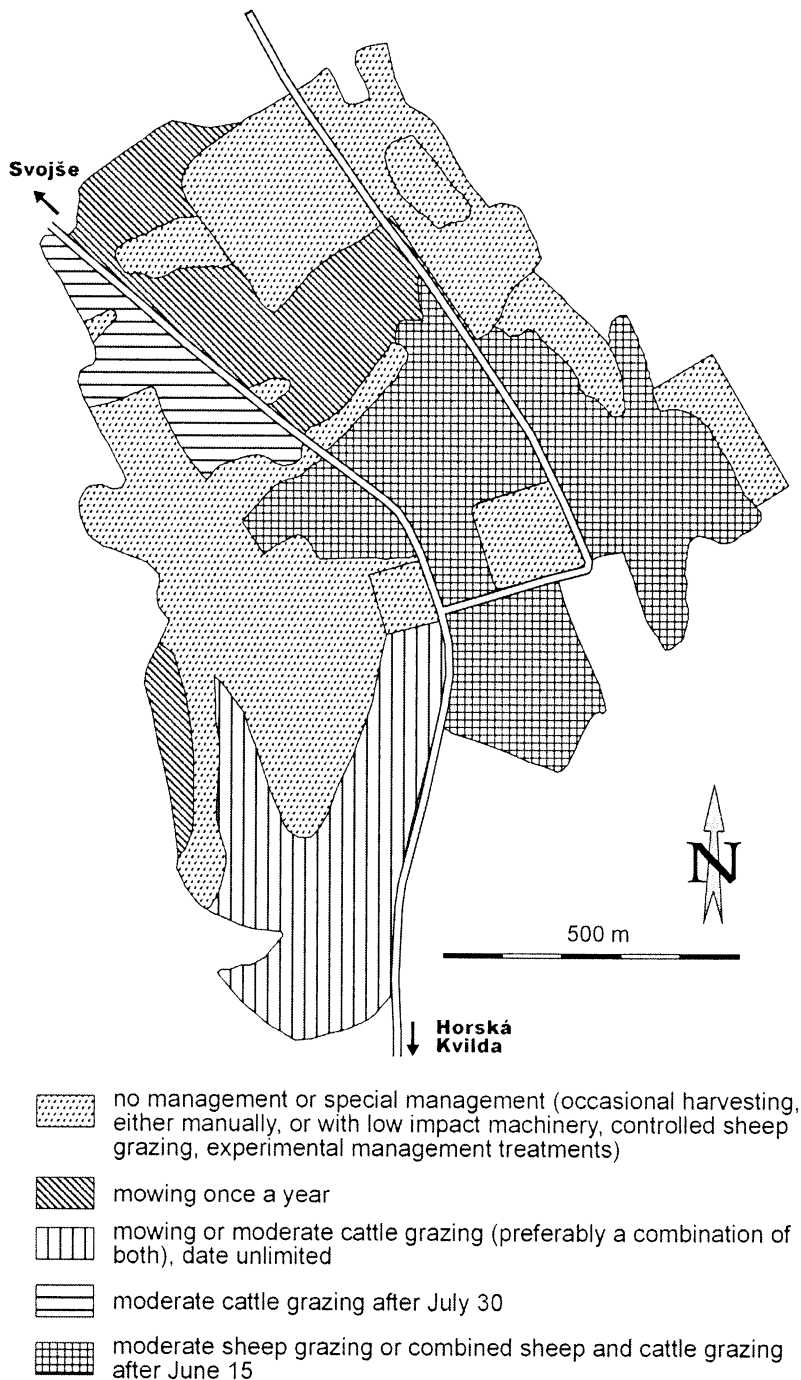


Fig. 4. – Proposal for optimised agricultural management of the Zhůří – Hutská hora Mt. enclave.

to the southern part of the Subatlantic phytogeographical province and western part of the Hercynian subprovince classification (PROCHÁZKA & ŠTECH 2002). *Gentiana pannonica*, a species which occurs predominantly in the Bohemian Forest (within the context of the Czech Republic) is widely scattered over the whole Zhůří – Huťská hora Mt. enclave. But the Zhůří population of this species is not as numerous as its populations around the villages of Kvilda, Horská Kvilda and Modrava (also in central Bohemian Forest). Two orchid species populations of Zhůří, namely those of *Coeloglossum viride* and *Corallorhiza trifida*, are exceptionally vital and numerous (hundreds of individual plants), even in comparison with other populations of these species occurring on the Kvilda Plains and in other areas in the Bohemian Forest.

The inventory confirmed 204 species of vascular plants. 18 of them enjoying legal protection (9 highly endangered, 9 endangered); 16 species are classified as significant (taxons of higher importance which deserve special attention). 29 significant and endangered species display non-point occurrence in the communities, 5 species were present at only one site in the Zhůří enclave.

With respect to the specific character of the study area, it would be desirable to practice a low impact agricultural management in the whole enclave; the management of each particular site should be adjusted to the actual condition of its plant cover.

An ecological farm, built on the site of dilapidating military buildings would perhaps be the most appropriate solution. The restoration of the former settlement of Zhůří, which has also been proposed in connection with increasing tourist attractiveness of the Bohemian Forest, would bring about a number of undesirable irreversible changes in the vegetation of the Zhůří (Huťská hora) enclave. The construction of new houses, either for permanent dwellers or for tourists, with the necessary infrastructure, could eventually result in the destruction of one of the most valuable mountain grassland biotopes of the Kvilda plains in the central part of the Bohemian Forest.

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