

Vegetation of seasonal roads in calamity spruce forests of Nálepko (Slovenské rudohorie Mts.)

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ŠOMŠÁK L. & VYKOUKOVÁ I. (2001): Vegetation of seasonal roads in calamity spruce forests of Nálepko (Slovenské rudohorie Mts.). – Thaiszia – J. Bot. 10: 165-170. – ISSN 1210-0420.

ABSTRACT: Association *Carici leporinae - Agrostietum tenuis* HADAČ et SÝKORA in SÝKORA 1971, typical representant of phytocoenoses on overgrowing and again destructed forest roads of calamity region of Nálepko surroundings (Slovenské rudohorie Mts.) is characterized. This community is included into the class *Plantaginetea majoris*. It is the second datum about phytocoenological composition of this community in Slovakia.

KEYWORDS: plant communities, calamity mass dying of spruce, Slovenské rudohorie Mts.

Introduction

Secondary spruce forests of the Nálepko village cadaster, and even almost the whole Hnilecká dolina valley are affected by calamity, which leads to entire disintegration of forest stands (ŠOMŠÁK et al. 1995). In the consequence of permanent carrying out of wood by tractors an abundant network of seasonal roads arises here, on which the vegetation having all signs of communities belonging to the class *Plantaginetea majoris* R. Tx. et Preising in Tx. 1950 developed.

Brief characteristic of territory

Communities of forest roads are characterized from stand complexes of the Tichá voda valley. Tichá voda brook flows into the river Hnilec about 2 km below village Nálepko (Slovenské rudohorie Mts., part Volovské vrchy Mts.). The majority of forest stands is formed by secondary spruce forests. They were planted here, or regenerated secondarily on the habitats of the association *Circaeo alpini* - *Abietetum* ŠOMŠÁK 1982, *Dentario glandulosae* - *Abietetum* W. MATUSZKIEWICZ 1964, *Luzulo* - *Fagetum* MEUSEL 1937, *Poo chaixii* - *Fagetum* ŠOMŠÁK 1979. The oldest rocks of the studied territory are formed by the complexes of Vlachov layers of the Gelnica group (BAJANÍK et al. 1984, DANIEL 1984). The youngest members of gemericum are smaller figures of the "Peking" granits. In majority of cases, acid soils arise from these rocks.

Dystric Cambisols with the symptoms of podzolic processes are the prevailing types of soils here (JURÁNI 1997). They are variously deep, skeleton, frequently up to ranker. They are strongly to very strongly acid with pH-H₂O between 3.7 and 4.0. They are considerably influenced by high content of mercury (Hg) and arsenic (As), which besides the other can be a cause of the calamity decline of spruce. Effects of extremely acid soils on vegetation are strengthened here by high content of active aluminium (Al), which occurred in the soils of the territory studied in quantities about 750 mg/kg (DLAPA, JURÁNI & KUBOVÁ 1997).

Continual mass dying of the main tree species - *Picea abies* results in repeating export of wood from these stands. An abundant network of seasonal, less frequented forest roads arises in this way. The area of this network is considerable. In the studied stands, with an area about 400 ha, these roads represent almost 50 ha.

The altitude of the studied phytocoenoses varies between 600 to 850 m above sea level. The main orientation of the slopes is to NW, less to NE. Average annual sum of precipitations for the period 1901-1950 is 789 mm, for the period 1951-1980 a little less (765 mm). Average air temperature is 6.3°C (NIŽŇANSKÝ 1995).

Aim and methods

The aim of this work was to characterize the vegetation of seasonal forest roads in the stands affected by mass dying of spruce.

Phytocoenological material from the field was obtained in 1996 and was analysed by the Zürich-Montpellier School method. Nomenclature of plants is according to DOSTÁL (1989).

Floristic-phytocoenological conditions

Vegetation of seasonal roads can be grouped in two groups. The first group is formed by species, which are preserved on the areas destroyed by car wheels,

where sediments are accumulated frequently by rain water. The character of these sediments, mainly their texture together with humidity, determines the selection of plant species. The following species are present the most frequently: *Plantago major*, *Prunella vulgaris*, *Agrostis stolonifera*, *Sagina procumbens*, *Omalotheca sylvatica*, *Tussilago farfara*, on more humid sediments and finer deposits *Mentha arvensis*, *Juncus effusus*, *Juncus articulatus*, *Ranunculus repens*, *Stellaria alsine*, *Deschampsia caespitosa* and others. In more advanced stadium of succession *Amoria repens* and even *Agrostis capillaris* are present here.

The second group of plants is formed by the species that are bount to less disturbed phytocoenoses: *Scorzoneroides autumnalis*, *Achillea millefolium*, *Lotus corniculatus*, *Veronica officinalis*, *Vignea leporina*, *Hypericum maculatum*, *Ranunculus acris*, *Alchemilla monticola*, *Trifolium pratense* and others.

On the roads with small traffic the species of cut-clearings are present and *Calamagrostis arundinacea* together with *Avenella flexuosa* and *Luzula luzuloides* prevail.

On the basis of comparison with literature (SÝKORA 1971) it is possible to include these phytocoenoses to the association *Carici leporinae - Agrostietum tenuis* HADAČ et SÝKORA in SÝKORA 1971. Regarding the above-mentioned assembling of cut-clearing species on less broken roads, this association was proposed in two variants: typical variant (relevés n. 1-8) and variant with *Calamagrostis arundinacea* with differential species of the second variant *Calamagrostis arundinacea*, *Avenella flexuosa* and *Luzula luzuloides*.

In the review of known communities of Slovakia (MUCINA & MAGLOCKÝ 1985) this community is included to the suballiance *Saginion procumbentis* R.TX. et OHBA in GEHU et al. 1972, alliance *Polygonion avicularis* BR.-BL. 1931, order *Potentillo - Polygonetalia avicularis* R.TX. 1947 em. OBERD. in OBERD. et al 1967 and the class *Plantaginetea majoris* R.TX. at PREISING in R.TX. 1950.

The association *Carici leporinae - Agrostietum tenuis* was described for the first time by HADAČ & SÝKORA from the North Bohemia (SÝKORA 1971). This community is, in comparison with phytocoenoses in the Slovenské rudohorie mountains, without essential differences.

Some typical oceanic-suboceanic elements (*Blechnum spicant*), mountain species (*Calamagrostis villosa*) occuring in the phytocoenological table of the original description (SÝKORA 1971) are missing in the conditions of the Slovenské rudohorie mountains, or they are localized in higher altitudes, where climax spruce forests occur (*Calamagrostis villosa*). Description of this community from Slovakia (Bukovské vrchy hills) appeared during the work on this paper. These authors (HADAČ et al. 1997) characterized five phytocoenological relevés. Phytocoenoses from the Slovenské rudohorie Mts. are very similar. These communities in the Slovenské rudohorie Mts. are close to vegetation of cut-clearings (the class *Epilobietea*). It is characterized as variant with *Calamagrostis arundinacea*.

Tab. 1. Association *Carici leporinae-Agrostietum tenuis* HADAČ et SÝKORA in SÝKORA 1971

Number of relevés	1	2	3	4	5	6	7	8	9	10	Constancy
altitude above sea level [m]	680	700	730	870	900	880	690	700	720	720	
exposition	N	NW	N	N	N	N	NE	N	NW	NE	
slope [°]	25	1-2	6	1	6	10	3	6	4	12	
cover, herb layer[%]	75	75	90	100	100	100	100	90	75	100	
number of species	24	16	21	23	19	18	21	27	29	20	
Diagnostic species of the association:											
<i>Agrostis capillaris</i>	3.2	2.3	4.4	5.5	5.5	3.3	3.3	3.3	3.2	2.3	V
<i>Plantago major</i>	2.3	2.2	2.1	1.2	2.2	2.1	2.2	+2	2.1	1.1	V
<i>Amoria repens</i>	1.2	2.3	1.2	3.2	3.4	4.4	2.3	3.2	+	3.2	V
<i>Veronica officinalis</i>	+	+	+2	1.1	1.2	+2	1.2	+2	1.2	+2	V
<i>Prunella vulgaris</i>	3.2	1.1	+	2.1	2.2	2.1	.	2.1	+	2.1	V
<i>Scorzonerooides autumnalis</i>	1.2	1.2	1.2	2.1	2.1	.	+	1.1	+	.	IV
<i>Vignea leporina</i>	.	2.2	2.2	+2	1.2	+2	1.2	+2	2.2	.	IV
<i>Ranunculus repens</i>	1.2	.	2.2	r	+2	.	2.3	.	r	+2	IV
Differential species of variant <i>Calamagrostis arundinacea</i> :											
<i>Calamagrostis arundinacea</i>	.	.	+2	.	.	r	.	.	4.3	4.4	II
<i>Luzula luzuloides</i>	.	.	.	.	.	.	.	+2	2.2	3.2	II
<i>Avenella flexuosa</i>	.	.	.	r	.	r	.	.	1.2	1.2	II
Other species:											
<i>Mentha arvensis</i>	2.2	1.1	1.2	1.1	1.1	1.1	1.1	.	.	.	III
<i>Juncus effusus</i>	1.2	1.2	2.2	.	r	.	+	.	.	.	III
<i>Deschampsia caespitosa</i>	1.2	.	.	+2	r	+2	.	+2	.	.	III
<i>Achillea millefolium</i>	1.1	.	.	2.2	2.1	.	.	+	1.1	.	III
<i>Hypericum maculatum</i>	.	+2	r	+2	.	r	.	1.1	1.1	.	III
<i>Trifolium pratense</i>	.	.	.	+2	r	+	.	+2	+2	.	III
<i>Salix caprea</i>	r	.	r	.	.	.	.	+	1.1	r	III
<i>Lotus corniculatus</i>	+2	+2	.	.	.	.	.	2.2	r	.	II
<i>Fragaria vesca</i>	.	.	.	.	.	.	1.2	1.2	r	1.2	II
<i>Poa annua</i>	.	r	2.2	+	.	.	.	r	.	.	II
<i>Ranunculus acris</i>	.	.	r	1.1	.	+	.	r	.	.	II
<i>Alchemilla monticola</i>	.	.	.	1.2	.	2.2	2.2	.	r	.	II
<i>Omalotheca sylvatica</i>	.	.	.	r	+	.	.	+	.	.	II
<i>Stellaria graminea</i>	r	.	.	1.2	.	.	+	.	.	+2	II
<i>Taraxacum officinale</i>	.	r	r	.	.	r	.	+	.	.	II
<i>Sagina procumbens</i>	1.1	.	.	.	.	+	.	r	.	.	II
<i>Juncus articulatus</i>	r	+	.	.	.	.	.	1.2	.	.	II
<i>Potentilla erecta</i>	.	.	.	r	.	.	r	.	r	.	II
<i>Rubus idaeus</i>	.	.	.	.	r	.	+	.	.	+	II
<i>Campanula patula</i>	.	.	.	.	.	r	.	r	.	+	II
<i>Tussilago farfara</i>	.	.	.	.	.	.	+	r	r	.	II
<i>Picea abies</i>	.	.	.	.	.	.	.	+	r	+	II
<i>Myosotis palustris</i>	+	.	.	.	.	.	+2	.	.	.	I
<i>Trifolium medium</i>	+2	+2	.	.	.	.	.	.	.	.	I
<i>Ranunculus flammula</i>	.	+2	.	.	.	.	1.2	.	.	.	I
<i>Acetosella vulgaris</i>	.	.	.	+	.	r	.	.	.	.	I
<i>Carex pallescens</i>	.	.	+	.	r	.	.	.	.	.	I
<i>Cerastium holosteoides</i>	r	.	.	.	.	.	.	.	r	.	I
<i>Persicaria * brittingeri</i>	r	.	.	.	.	.	.	.	r	.	I

Rare species:

Agrostis stolonifera 3 (+.2), *Ajuga reptans* 10 (r), *Betula pendula* 8 (+), *Calamagrostis epigeios* 8 (+), *Cirsium arvense* 1 (+), *Cirsium palustre* 7 (+), *Cruciata glabra* 8 (+), *Digitalis grandiflora* 3 (r), *Epilobium montanum* 1 (r), *Euphrasia rostkoviana* 1 (+), *Galeopsis tetrahit* 3 (r), *Hieracium murorum* 9 (r), *Lapsana communis* 5 (r), *Linaria vulgaris* 5 (r), *Lolium perenne* 7 (+), *Lysimachia nummularia* 10 (+.2), *Lysimachia vulgaris* 10 (+.2), *Maianthemum bifolium* 9 (+.2), *Mycelis muralis* 9 (r), *Myosotis sylvatica* 9 (r), *Phleum phleoides* 7 (+), *Picris hieracioides* 3 (r), *Pilosella officinarum* 10 (+.2), *Plantago lanceolata* 7 (+), *Polemonium caeruleum* 6 (r), *Rumex crispus* 6 (r), *Senecio vulgaris* 9 (r), *Scleranthus annuus* 5 (1.1), *Sorbus aucuparia* 10 (r), *Stellaria alsine* 1 (r), *Vigna muricata* 4 (r), *Viola arvensis* 4 (r).

Localities of relevés:

1. Nálepko, Záhajnica, complex of forests to the North from the hill Chajzerka. Area of relevé 1.2m x 6m, 16. 7. 1996.
2. Dtto, Area of relevé 3m x 6m, 16. 7. 1996.
3. Dtto, to the West from the hill Chajzerka, area of relevé 3m x 6m, 16. 7. 1996.
4. Henclová, Zadný Jarok - "Chotár", area of relevé 4m x 8m, 16. 7. 1996.
5. Dtto, area of relevé 5m x 5m, 17. 7. 1996.
6. Nálepko, Záhajnica, to the West from the hill Chajzerka, area of relevé 3m x 8m, 20. 7. 1996.
7. Nálepko, Záhajnica, to the North from the hill Zmrzlý vrch, area of relevé 3m x 8m, 20. 7. 1996.
8. Dtto, area of relevé 3m x 8m, 20. 7. 1996.
9. Dtto, to the NW from the hill Chajzerka, area of relevé 1m x 10m, 16. 7. 1996.
10. Dtto, to the East from the hill Chajzerka, area of relevé 1m x 10m, 16. 7. 1996.

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Received: 9 June 2000
Revised: 17 October 2000
Accepted: 17 October 2000