

VEGETAL ASSOCIATIONS EDIFIED BY *PINUS SYLVESTRIS* L. IN NEAGRA BROȘTENILOR HYDROGRAPHIC BASIN

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Abstract: The diversity of the natural habitats specific to Neagra Broșteni hydrographical basin have favoured installation of two different types of pine phytocoenoses. Although both of these plants communities are characteristic to acid substrata, one is specific to oligotrophic peat - bogs (*Oxycocco – Sphagnetea*) and the other to mountain versants presenting acidophilous soils and accentuated slopes (*Vaccinio – Piceetea*). These vegetal associations are presented in phytosociological tables and analysed in this paper from the bioforms, floristic elements and ecological requests perspectives.

Key words: vegetal associations, *Pinus sylvestris*, Neagra Broștenilor.

Introduction

Plant communities edified by *Pinus sylvestris* are recognized for their high conservative value, their floristic composition including a lot of relict species. Due to the fact that speciality literature [5], [7], [11] presented few information about the natural distribution of this species in our research territory we have realized an phytosociological study in 2007 summer that had as result the identification of two types of pine phytocoenoses in Neagra Broșteni river basin: *Vaccinio – Pinetum sylvestris* Kleist 1929 (*Erioporo vaginati – Pinetum sylvestris* Hueck 1931) in Drăgoiasa village and *Leucobryo – Pinetum sylvestris* Matuszkiewicz 1962 *betuletosum pendulae* (Burduja et Stefan 1982) Coldea 1991 in Ortoaia and Negrișoara valleys.

Material and method

The phytosociological study has been made using the classic methods specific to Central Europe Phytosociological School. The pine phytocoenoses have been characterized through phytocoenological relevées used as sampling method in field. Each vegetal species has been quantified using Braun – Blanquet scale (presenting the abundance – dominance indices from + to 5). Phytosociological relevées have been ordered and grouped in vegetal associations on the basis of characteristic, differential and dominant species [1], [4], [9], [10]. The biological forms and floristic elements for each species are those that have been given by V. Ciocarlan [2] and the values for ecological indices (L–light, T–temperature, U–humidity, R–soil pH) have been established by H. Ellenberg [6].

Results and discussion

According to speciality literature [1], [3], [4], [7], [8] these two plant communities are subordinated to the next superior coenotaxa:

OXYCOCCO – SPHAGNETEA Br.-Bl. et R. Tx. ex Westhoff et al. 1946
SPHAGNETALIA MEDII Kästner et Flössner 1933

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Sphagnion medii Kästner et Flössner 1933

Vaccinio – Pinetum sylvestris Kleist 1929 (*Eriophoro vaginati* – *Pinetum sylvestris* Hueck 1931)

VACCINIO – PICEETEA Br.-Bl. in Br.-Bl. et al. 1939

PICEETALIA EXCELSAE Pawlowski in Pawlowski et al. 1928

Dicrano – Pinion (Libbert 1932) Matuszkiewicz 1962

Leucobryo – *Pinetum sylvestris* Matuszkiewicz 1962 *betuletosum pendulae* (Burduja et Stefan 1982) Coldea 1991

1. Ass. *Vaccinio* – *Pinetum sylvestris* Kleist 1929 (*Eriophoro vaginati* – *Pinetum sylvestris* Hueck 1931) association (**Table 1**) has been identified only in Dragoiasa village on a limited area (approximate 1,5 ha). It includes pine phytocoenoses vegetating in oligotrophic peat bogs at 1060 m altitude, presenting *Pinus sylvestris* as arboreal edifying species and *Eriophorum vaginatum* as herbaceous characteristic species. The trees stratum is dominated by *Pinus sylvestris* that is accompanied by *Picea abies*, *Sorbus aucuparia*, *Betula alba* ssp. *glutinosa* or *Betula pendula*, species realizing an average covering degree between 50% and 70%. The shrubs stratum covering varies from 10 to 40%, significant abundance – dominance indices presenting *Vaccinium myrtillus* and *Vaccinium vitis-idaea* species while in the herbs stratum *Eriophorum vaginatum* dominates (up to 60%). Besides the characteristic species to the association, to *Sphagnion* and *Sphagnetalia* alliance and order (*Drosera rotundifolia*) and *Oxycocco-Sphagnetea* vegetation class (*Andromeda polifolia*, *Oxycoccus palustris*), in the studied area are also present species from Vaccinio-Piceetea (*Sorbus aucuparia*, *Vaccinium myrtillus*, *Picea abies*). The floristic elements spectrum (**Fig. 2**) presents the preponderance of the circumpolar (44%) and Eurasiatic (31%) elements followed by the central European (13%), cosmopolite (6%) and endemic (6%) elements. The bio-forms spectrum (**Fig. 1**) reveals the prevalence of the hemicryptophytes species (44%) followed by the phanerophytes species (31%) and chamaephytes species (25%). Ecological indices spectrum (**Fig. 3**) points out the fact that in this vegetal association structure prevails the indifferent species to humidity (44%), temperature (69%) and soil reaction (56%) followed by the species preferring wet (25%) and very acid (19%) soils and characteristic to cold mountains areas (19%).

Table 1

Floristic element	Bioform	No. of relevé	1	2	3	4	5	K
		Plot area (m ²)	400	400	400	400	400	
Altitude (m)		1060	1060	1060	1060	1060		
Aspect		-	-	-	-	-		
Slope (°)		-	-	-	-	-		
Tree stratum covering (%)		60	65	50	60	70		
Shrubs and regeneration stratum covering (%)		30	35	40	30	10		
Herbs stratum covering (%)		25	30	60	25	10		
<i>Car. ass.</i>								
Euras.	Ph.	<i>Pinus sylvestris</i>	3	4	3	3	4	V
Euras.	Ph.	<i>Pinus sylvestris</i> juv.	+	+	1	-	-	III
Circ.	H.	<i>Eriophorum vaginatum</i>	2	3	4	2	1	V
<i>Sphagnion et Sphagnetalia medii</i>								
Circ.	H.	<i>Drosera rotundifolia</i>	+	-	-	-	-	I
<i>Oxycocco – Sphagnetea</i>								
Circ.	Ch.	<i>Andromeda polifolia</i>	+	+	-	+	-	III
Circ.	Ch.	<i>Oxycoccus palustris</i>	1	+	+	+	+	V

Vaccinio – Piceetea								
Eur. centr.	Ph.	Picea abies	1	+	+	1	-	IV
Eur. centr.	Ph.	Picea abies juv.	+	-	+	+	-	III
Circ.	Ch.	Vaccinium myrtillus	2	3	3	2	1	V
Circ.	Ch.	Vaccinium vitis-idaea	+	+	1	+	1	V
Eur. centr.	Ph.	Sorbus aucuparia	-	-	-	-	+	I
Aliae								
Euras.	H.	Potentilla erecta	+	-	+	+	-	III
End. carp.	Ph.	Betula alba ssp. glutinosa	+	+	-	+	-	III
End. carp.	Ph.	Betula alba ssp. glutinosa juv.	-	+	-	-	-	I
Euras.	Ph.	Betula pendula	-	-	+	-	-	I
Cosm.	H.	Deschampsia caespitosa	-	-	-	+	-	I
Euras.	H.	Molinia caerulea	-	-	-	+	-	I
Circ.	H.	Stellaria longifolia	-	-	-	+	-	I
Euras.	H.	Succisa pratensis	-	-	-	-	+	I

Place and date of relevées: rel. 1-5: Drăgoiasa (29. 07.2007)

Fig. 1. Bioforms spectrum
ass. Vaccinio – Pinetum sylvestris

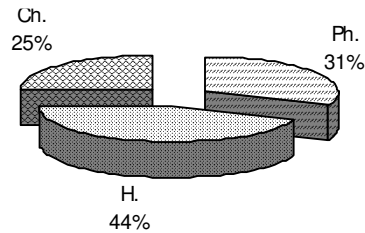


Fig. 2. Floristic elements spectrum ass.
Vaccinio – Pinetum sylvestris

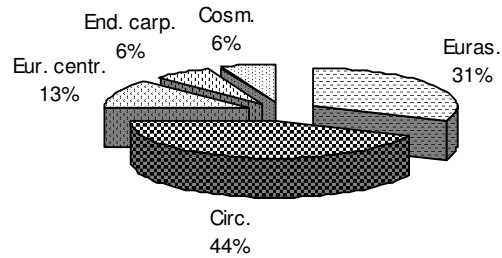
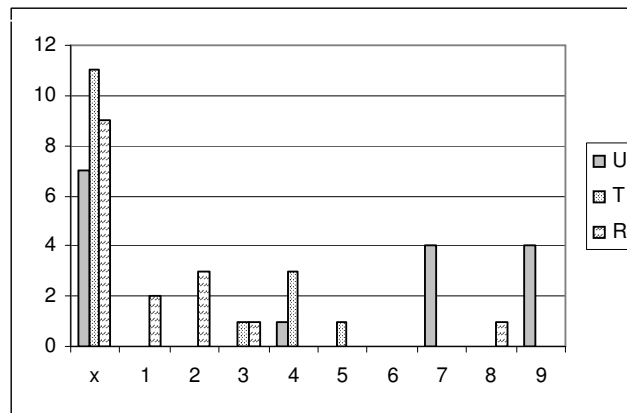


Fig. 3. Ecological indices spectrum – ass. Vaccinio – Pinetum sylvestris



2. Ass. *Leucobryo – Pinetum sylvestris* Matuszkiewicz 1962 *betuletosum pendulae* (Burduja et Stefan 1982) Coldea 1991 sub-association (**Table 2**) includes pine phytocoenoses, sporadically spread in the researched area, covering mountains versants presenting generally northern aspects and accentuate slopes (up to 50°), between 850 and 1020 m altitude, on siliceous rocks. The trees stratum is dominated by *Pinus sylvestris*, species that realize an average covering degree of 50-65% and *Betula pendula*, species characterized by an average covering degree up to 20%. In some phytocoenosis, *Picea abies* (spruce fir) is present (without becoming co-dominant or sub-dominant) and also *Fagus sylvatica*, *Sorbus aucuparia*, *Acer pseudoplatanus* can be present. Shrubs stratum flora is rich in plants species, significant abundance – dominance indices presenting *Vaccinium myrtillus*, *Vaccinium vitis - idaea* etc, while in the herbs stratum *Oxalis acetosella*, *Hieracium transsilvanicum*, *Campanula abietina*, *Orthilia secunda* and other species are present. Besides the characteristic species to the association, to *Dicrano – Pinion* alliance (*Chamaecytisus hirsutus*, *Veronica officinalis* etc.), *Piceetalia* order (*Luzula luzuloides*, *Calamagrostis arundinacea*) and *Vaccinio – Piceetea* vegetation class (*Oxalis acetosella*, *Campanula abietina*, *Sorbus aucuparia* etc.), in the studied areas are also present representative species to *Asplenieta trichomanis* (*Sedum maximum*, *Polypodium vulgare*, *Silene nutans* ssp. *dubia*, *Valeriana tripteris*) and *Quercu – Fagetea* classes (*Spiraea chamaedryfolia*, *Fagus sylvatica*, *Maianthemum bifolium*, *Euphorbia amygdaloides*, *Veronica urticifolia*, *Lonicera xylosteum* etc.). The bio-forms spectrum (**Fig. 4**) is dominated by hemicryptophyte species (49%) followed by phanerophyte (31%), chamaephyte (14%) and geophyte (6%) species. Floristic elements spectrum (**Fig. 5**) presents the preponderance of the eurasiatic (33%), central European (29%) and circumpolar (26%) species. Reduced proportions presents the European (3%), Carpathian – Balkan (3%) and endemic elements (6%). Ecological indices spectrum (**Fig. 6**) reveals that in this vegetal association composition prevails the species preferring moderate moist (42%), and acid or moderate acid soils (22%). Most of the component species are eurythermic (62%).

Table 2

Floristic element	Bioform	No. of relevé	1	2	3	4	5	K
		Plot area (m ²)	1000	1000	1000	1000	1000	
		Altitude (m)	850	900	800	950	1020	
		Aspect	NV	N	N	NE	SE	
		Slope (°)	40	35	45	25	40	
		Tree stratum covering (%)	60	65	55	60	65	
		Shrubs and regeneration stratum covering (%)	45	30	50	20	15	
		Herbs stratum covering (%)	10	15	15	10	20	
<i>Car. ass.</i>								
Euras.	Ph.	<i>Pinus sylvestris</i>	3	4	3	3	4	V
<i>Dif. subass.</i>								
Euras.	Ph.	<i>Betula pendula</i>	1	+	+	1	1	V
Euras.	Ph.	<i>Betula pendula</i> juv.	+	+	-	-	+	III
<i>Dicrano – Pinion</i>								
Eur. centr.	Ph.	<i>Chamaecytisus hirsutus</i>	1	+	+	-	+	IV
Euras.	Ch.	<i>Veronica officinalis</i>	+	+	+	+	-	IV
Euras.	H.	<i>Pyrola media</i>	-	+	-	-	-	I
<i>Piceetalia excelsae</i>								
Eur. centr.	H.	<i>Luzula luzuloides</i>	+	+	-	+	-	III
Euras.	H.	<i>Calamagrostis arundinacea</i>	+	+	+	-	+	IV

<i>Vaccinio – Piceetea</i>								
Circ.	Ch.	<i>Vaccinium myrtillus</i>	3	2	3	1	1	V
Circ.	Ch.	<i>Vaccinium vitis-idaea</i>	+	+	+	+	1	V
Eur. centr.	Ph.	<i>Sorbus aucuparia</i>	+	+	-	+	+	IV
Eur. centr.	Ph.	<i>Picea abies</i>	+	-	+	+	-	III
Circ.	H.	<i>Oxalis acetosella</i>	+	+	+	+	1	V
Eur. centr.	H.	<i>Abies alba</i>	-	+	+	-	-	II
Circ.	Ch.	<i>Orthilia secunda</i>	-	+	-	+	-	II
Carp.-balc.	H.	<i>Campanula abietina</i>	-	+	-	-	+	II
<i>Asplenietea trichomanis</i>								
Eur.	H.	<i>Sedum maximum</i>	+	+	-	+	+	IV
Circ.	G.	<i>Polypodium vulgare</i>	+	-	+	+	-	III
End. carp.	H.	<i>Silene nutans ssp. dubia</i>	+	-	+	-	-	II
Eur. centr.	H.	<i>Valeriana tripteris</i>	-	+	+	-	+	III
<i>Quercu – Fagetea</i>								
Euras.	Ph.	<i>Spiraea chamaedryfolia</i>	+	+	-	-	+	III
Eur. centr.	Ph.	<i>Fagus sylvatica</i>	+	+	+	-	-	III
Euras.	G.	<i>Maianthemum bifolium</i>	+	+	-	-	+	III
Circ.	H.	<i>Poa nemoralis</i>	-	+	+	+	+	IV
Eur. centr.	H.	<i>Veronica urticifolia</i>	-	-	+	+	+	III
Eur. centr.	Ch.	<i>Euphorbia amygdaloides</i>	-	-	+	+	-	II
Euras.	Ph.	<i>Lonicera xylosteum</i>	-	-	-	-	+	I
<i>Aliae</i>								
End. carp.	H.	<i>Dianthus tenuifolius</i>	+	-	+	+	-	III
Circ.	H.	<i>Solidago virgaurea</i>	+	-	+	-	-	II
Euras.	H.	<i>Salvia glutinosa</i>	+	+	+	-	+	IV
Eur. centr.	H.	<i>Gentiana asclepiadea</i>	-	+	+	-	+	III
Euras.	H.	<i>Fragaria vesca</i>	-	+	-	-	+	II
Circ.	Ph.	<i>Rubus idaeus</i>	-	-	+	-	+	II
Euras.	H.	<i>Origanum vulgare</i>	-	-	-	+	-	I
Circ.	Ph.	<i>Sambucus racemosa</i>	-	-	+	-	+	II
Euras.	H.	<i>Senecio ovatus</i>	-	-	-	-	+	I
Eur. centr.	H.	<i>Cirsium erisithales</i>	-	-	-	-	+	I

Place and date of relevées: rel. 1,2: Neagra Brosteni (3.07.2007); rel. 3,4: Capraria rivulet (4.07.2007); rel. 5: Negrisoara rivulet (4.07.2007)

Fig. 4. Bioforms spectrum subass. *Leucobryo – Pinetum sylvestris betuletosum pendulae*

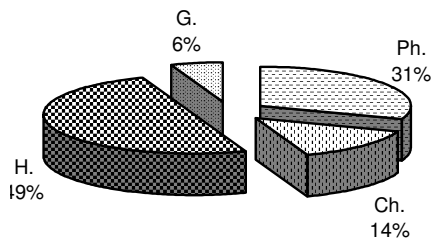


Fig. 5. Floristic elements spectrum subass. *Leucobryo – Pinetum sylvestris betuletosum pendulae*

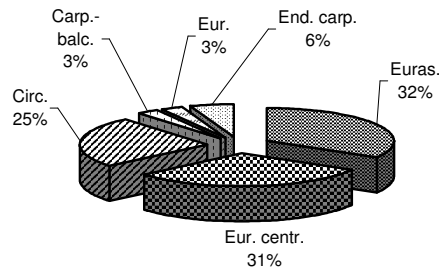
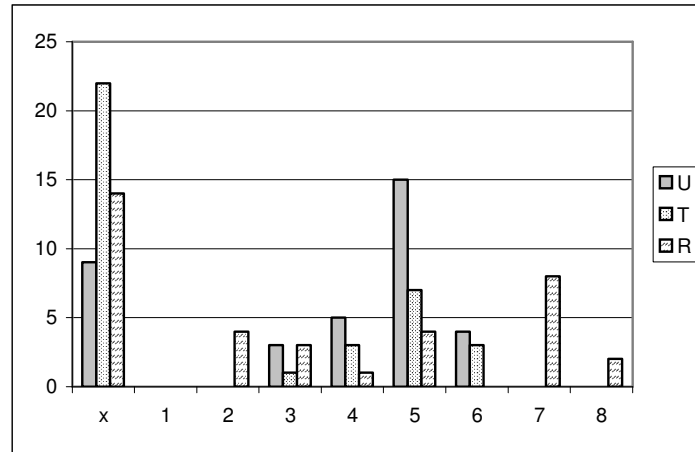


Fig. 6. Ecological indices spectrum – subass. Leucobryo – Pinetum sylvestris betuletosum pendulae



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