

# Some major plant communities in the coniferous belt of the Western Rhodopes

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Received: September 15, 2005 ▷ Accepted: October 12, 2005

**Abstract.** This study contains the phytocoenological characteristics (composition, structure and distribution) of plant communities in the coniferous vegetation belt of Mt Batashka (West Rhodopes). Three formations were established there: two tree formations (nine associations) and one grass formation (one association).

**Key words:** associations, coniferous phytocoenotic formations, Western Rhodopes

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## Introduction

The study area extends to the southern slopes of Mt Batashka and Veliysko-Videnishki divide of Western Rhodopes, from the region of Golyam Beglik dam to the valley of river Dospat. Phytocoenological studies of the grassy and shrub communities and some ecological and biological studies of the dominants in that study area have been conducted by Penev (1953), Kozhuharov (1961) and Meshinev (1973, 1975). The minimum area of manifestation of the association *Piceetum myrtillosum* in the Vassil Kolarov Reserve (Western Rhodopes) has been determined (Meshinev & Apostolova 1985). Alexiev (2002) referred the region to the West Rhodopean Subregion of the Macedonian-Rhodopean Region of the Active Mysian Platform Outskirts Province. From the viewpoint of soil regionalisation, this part of the mountain relates to the West Rhodopean Mountain Province of the Balkan-Mediterranean Soil Subregion of the Mediterranean Soil Region (Ninov 2002). Dystric mountain forest soils prevail, with secondary grassing under the secondary meadows. They are developed on silicate and partially on calcareous base rock. Climatically, the Western Rhodopes belong to the Transitional Continental Region. Winter is milder than in the Temperate Continental Zone, the annual tem-

perature amplitude is lower, and the annual precipitations have two peaks (in July and November) and two lows (in August and February). The Western Rhodopes lie in a rain shadow and the annual amount of precipitations is lower than in the other regions at the same altitude (Velev 2002). Under phytogeographical division (Bondev 2002), the region of Batak falls into the Rhodopean District of the Illyrian (Balkan) Province of the European Deciduous Region.

The communities of *Picea abies* (L.) H. Karst. and *Pinus sylvestris* L. are elements of the primary vegetation, while those of *Agrostis capillaris* L. are secondary in origin.

## Methods

The geobotanical descriptions of the communities are based on the principle of dominance. The transect method was used, under which representative parts of the phytocoenoses have been described. Participation of the tree species was estimated on a ten-point scale, and that of the shrubs was judged by the coverage index (in percentage). Hult's five-point scale (in Arabic numerals) was used for the assessment of abundance of herbaceous species, while their frequency was judged by Raunkier's five-point scale (in Roman numerals).

## Results and discussion

### A. Primary vegetation

#### I. FORMATION OF *PICEA ABIES*

##### I. 1. Association *Picea abies* – *Calamagrostis arundinacea* (Table 1)

This association was studied in two habitats: the region of Balinovo (Description 1), on a southeastern slope with an inclination of 30° and at an altitude of 1650 m. The tree canopy was 0.8. The trees were about 25 m high, and with a diameter of 45–50 cm. The grassy floor had 70 % projection cover. The second description was made between the Batlu Boaz locality and Goranovtsi village. The community was studied on a northeastern slope with an inclination of 25° and at about 1600 m a.s.l. The tree canopy was 0.8, the height of the trees 20–25 m, and their diameter 35–40 cm. The grass floor had 40 % projection cover. The association was also registered by Bondev & al. (1985, 1995), Nikolov & Vulchev (2001).

Table 1. Association *Picea abies* – *Calamagrostis arundinacea*

Species	Description	
	1	2
<b>Trees</b>		
<i>Picea abies</i> (L.) H. Karst.	10	8
<i>Pinus sylvestris</i> L.	+	2
<b>Shrubs and bushes</b>		
<i>Juniperus communis</i> L.	5 % projection cover	5 % projection cover
<b>Gramineous</b>		
<i>Calamagrostis arundinacea</i> (L.) Roth	3-4...IV	2...III
<i>Poa nemoralis</i> L.	1.....II	1.....I
<b>Cyperaceous</b>		
<i>Luzula sylvatica</i> (Huds.) Gaudin	1.....II	1.....II
<b>Herbage</b>		
<i>Aremonia agrimonoides</i> (L.) DC.	1.....II	1.....II
<i>Campanula epigea</i> Janka	–	1.....I
<i>Cardamine bulbifera</i> (L.) Crantz	1.....I	1.....I
<i>Cruciata glabra</i> (L.) Ehrend.	1.....II	1.....II
<i>Euphorbia amygdaloides</i> L.	1.....II	–
<i>Fragaria vesca</i> L.	1-2...III	1.....I
<i>Mycelis muralis</i> (L.) Dumort.	1.....I	–
<i>Prenanthes purpurea</i> L.	–	1.....I
<i>Sanicula europaea</i> L.	1.....I	–
<i>Symphytum tuberosum</i> L.	–	1.....I

##### I. 2. Association *Picea abies* – *Vaccinium myrtillus* (Table 2).

Description 1: in the Stoichovoto locality, on a slope with inclination of 15° and southern exposition. The canopy was 0.7, tree height 25–30 m, and tree

diameter 40–50 cm. The grass floor had 25–30 % projection cover.

Description 2: under peak Manastira, at an altitude of 1700 m, on a southwestern slope with inclination of 40°. The canopy was 0.8–0.9. Tree height was 22 m, and tree diameter 35–40 cm. The grass floor had 10–15 % projection cover.

Description 3: on the way to Chatuma (the Water Chatchment), at an altitude of about 1500 m, on a western slope with inclination of 45–50°. The tree stand canopy was 0.8–0.9 and the tree height 22–24 m. The diameter of tree trunks was 40–45 cm. There was spruce undergrowth (4–5 specimens per 1 m<sup>2</sup>). The grass floor had meager species diversity and 10 % projection cover.

Description 4: between Goranovtsi and Pudarevtsi villages, at an altitude of 1700 m, on a southeastern slope with an inclination of 45°. The canopy was 0.7–0.8, tree height 18–20 m, and tree diameter 30–35 cm. The grass floor had 15–20 % projection cover. The same was established by Bondev & al. (1983, 1985) and Gorunova & Kochev (1991).

Table 2. *Picea abies* – *Vaccinium myrtillus*

Species	Description			
	1	2	3	4
<b>Trees</b>				
<i>Picea abies</i> (L.) H. Karst.	9	10	10	10
<i>Pinus sylvestris</i> L.	1	–	–	+
<b>Shrubs and bushes</b>				
<i>Juniperus communis</i> L.	5 % projection cover	–	–	1 % projection cover
<i>Vaccinium myrtillus</i> L.	40 % projection cover	35 % projection cover	70 % projection cover	55 % projection cover
<i>Vaccinium vitis-idaea</i> L.	–	5 % projection cover	5-10 % projection cover	5 % projection cover
<i>Vaccinium uliginosum</i> L.	25 % projection cover	–	–	–
<i>Bruckenthalia spiculifolia</i> (Salisb.) Rchb.	–	–	–	5 % projection cover
<b>Gramineous</b>				
<i>Brachypodium sylvaticum</i> (Huds.) Beauvais	–	–	1.....I	–
<i>Calamagrostis arundinacea</i> (L.) Roth	1.....I	1.....II	1.....II	1.....II
<i>Poa nemoralis</i> L.	1-2...III	1.....I	–	–
<i>Lerchenfeldia flexuosa</i> (L.) Schur	–	–	–	1.....II

Table 2. Continuation.

1	2			
<b>Cyperaceous</b>				
<i>Luzula sylvatica</i> (Huds.) Gaudin	1-2.....III	1..... I	1..... I	1.....II
<i>Chamaecytisus absinthioides</i> (Janka) Kuzmanov				
<b>Herbage</b>				
<i>Aremonia agrimonoides</i> (L.) DC.	1..... I	1..... I	-	1..... I
<i>Campanula sparsa</i> Friv.	1..... I	-	-	-
<i>Cardamine bulbifera</i> (L.) Crantz	-	1..... I	-	1..... I
<i>Crocus veluchensis</i> L.	1..... I	-	-	-
<i>Cruciata glabra</i> (L.) Ehrend.	1..... I	1..... I	1..... I	1..... I
<i>Euphorbia amygdaloides</i> Herb.	1..... I	1.....II	1..... I	1..... I
<i>Fragaria vesca</i> L.	1..... I	1.....II	-	-
<i>Geranium robertianum</i> L.	1..... I	-	-	-
<i>Melampyrum sylvaticum</i> L.	1..... I	-	-	-
<i>Mercurialis perennis</i> L.	-	1..... I	-	-
<i>Mycelis muralis</i> (L.) Dumort.	1..... I	-	-	-
<i>Oxalis acetosella</i> L.	1..... I	1.....II	1..... I	-
<i>Prenanthes purpurea</i> L.	1..... I	-	-	-
<i>Primula veris</i> L.	-	-	-	1..... I

### I.3. Association *Picea abies* + *Pinus sylvestris* – *Vaccinium vitis-idaea* (Table 3).

This association was studied in the region of the Pobit Kamuk locality, at an altitude of 1400 m, on a south-eastern slope with an inclination of 35–40°. The canopy was 0.5–0.6, tree height was 24–25 m, and tree diameter varied between 35 cm and 50 cm. There was thick spruce undergrowth (7–8 specimens per 1 m<sup>2</sup>). The grass floor had 10 % projection cover.

### I.4. Association *Picea abies* – *Vaccinium myrtillus* – *Calamagrostis arundinacea* (Table 4)

This association was covering a large area (three descriptions) on the northern slopes (inclination 35°) above river Dospat, from Stoichovoto locality, across Racha and up to Surnitsa village, at an altitude of about 1700 m. The canopy was 0.8–0.9. The tree height was 25 m and tree diameters varied between 40 cm and 50 cm. Good regeneration of the spruce has been observed (5–6 specimens per 1 m<sup>2</sup>). The grass floor had 30–40 % projection cover. The association was studied by Velcev & Indjeian (1987).

Table 3. Association *Picea abies* + *Pinus sylvestris* – *Vaccinium myrtillus*

Species	Description			
	1			
<b>Trees</b>				
<i>Picea abies</i> (L.) H. Karst.	7			
<i>Pinus sylvestris</i> L.	3			
<b>Shrubs and bushes</b>				
<i>Juniperus communis</i> L.	5 % projection cover			
<i>Vaccinium vitis-idaea</i> L.	45 % projection cover			
<i>Vaccinium myrtillus</i> L.	5 % projection cover			
<b>Gramineous</b>				
<i>Poa nemoralis</i> L.	1-2.....III			
<i>Calamagrostis arundinacea</i> (L.) Roth	1..... II			
<b>Cyperaceous</b>				
<i>Luzula sylvatica</i> (Huds.) Gaudin	1.....I			
<b>Herbage</b>				
<i>Aremonia agrimonoides</i> (L.) DC.	1.....I			
<i>Campanula sparsa</i> Friv.	1.....I			
<i>Cruciata glabra</i> (L.) Ehrend.	1..... II			
<i>Euphorbia amygdaloides</i> L.	1.....I			
<i>Mycelis muralis</i> (L.) Dumort.	1.....I			
<i>Sanicula europaea</i> L.	1.....I			

Table 4. Association *Picea abies* – *Vaccinium myrtillus* – *Calamagrostis arundinacea*

Species	Description		
	1	2	3
4	2	3	4
<b>Trees</b>			
<i>Picea abies</i> (L.) H. Karst.	8	9	10
<i>Pinus sylvestris</i> L.	2	1	+
<b>Shrubs and bushes</b>			
<i>Juniperus communis</i> L.	5 % projection cover	5 % projection cover	1 % projection cover
<i>Vaccinium myrtillus</i> L.	40 % projection cover	40 % projection cover	50 % projection cover
<i>Vaccinium vitis-idaea</i> L.	10 % projection cover	15 % projection cover	5 % projection cover
<b>Gramineous</b>			
<i>Calamagrostis arundinacea</i> (L.) Roth	3 ...IV	3 ...IV	3-4 ...IV
<i>Brachypodium sylvaticum</i> (Huds.) Beauvais		1..... I	-
<i>Poa nemoralis</i> L.	1..... I	1..... I	1.... II
<b>Cyperaceous</b>			
<i>Luzula sylvatica</i> (Huds.) Gaudin	1.... II	1.... II	1.... II
<b>Herbage</b>			
<i>Aremonia agrimonoides</i> (L.) D.C.	1..... I	1.... II	1..... I
<i>Campanula epigea</i> Janka	-	-	1..... I
<i>Campanula sparsa</i> Friv.	1..... I	1..... I	1..... I
<i>Cardamine bulbifera</i> (L.) Crantz	-	1..... I	-

Table 4. Continuation.

1	2		
<i>Cruciata glabra</i> (L.) Ehrend.	1 ....II	1 ....II	1 ....II
<i>Euphorbia amygdanoides</i> L.	1 .....I	1 .....I	–
<i>Fragaria vesca</i> L.	1 .....I	1 .....I	1 ....II
<i>Oxalis acetosella</i> L.	1 ....II	1 .....I	1 .....I
<i>Rimula veris</i> L.	1 .....I	1 .....I	–
<i>Sanicula europaea</i> L.	1 .....I	–	–

### I. 5. Association *Picea abies* + *Pinus sylvestris* – *Calamagrostis arundinacea* (Table 5).

This association was discovered in the Sborishteto locality, on a southeastern slope with an inclination of 45–50° and an altitude of about 1750 m. The canopy was 0.8. The tree height was 22–23 m and the diameter of the trunks 40–50 cm. The grass floor had 35% projection cover. It was discovered by Bondev & al. (1985).

Table 5. Association *Picea abies* + *Pinus sylvestris* – *Calamagrostis arundinacea*

Species	Description
	1
<b>Trees</b>	
<i>Picea abies</i> (L.) H. Karst.	7
<i>Pinus sylvestris</i> L.	3
<b>Shrubs and bushes</b>	
<i>Juniperus communis</i> L.	5-10% projection cover
<i>Vaccinium myrtillus</i> L.	10-15% projection cover
<i>Vaccinium vitis-idaea</i> L.	5% projection cover
<b>Gramineous</b>	
<i>Calamagrostis arundinacea</i> (L.) Roth	4 .....IV
<i>Poa nemoralis</i> L.	1 .....I
<b>Cyperaceous</b>	
<i>Luzula sylvatica</i> (Huds.) Gaudin	1 .....I
<b>Herbage</b>	
<i>Aremonia agrimonoides</i> (L.) DC.	1 .....I
<i>Campanula persicifolia</i> L.	1 .....I
<i>Campanula sparsa</i> Friv.	1 .....I
<i>Cruciata glabra</i> (L.) Ehrend.	1 .....I
<i>Euphorbia amygdaloides</i> L.	1 .....I
<i>Fragaria vesca</i> L.	1 .....I
<i>Mycelis muralis</i> (L.) Dumort.	1 .....I
<i>Prenanthes purpurea</i> L.	1 .....I
<i>Sanicula europaea</i> L.	1 .....I

## II. FORMATION OF *PINUS SYLVESTRIS*

### II. 1. Association *Pinus sylvestris* – *Poa nemoralis* – *mixtoherbosa* (Table 6).

This association was studied on a considerable area (three descriptions) between Surnitsa, Chernite

Baraki and Selishte, on a southwestern slope with an inclination of 35–40°, at an altitude of about 1400 m. The canopy was 0.5–0.6. The tree height was 30–35 m and tree diameter 60–70 cm (Descriptions 1 and 2), and 15–18 m height and 25–35 cm diameter (Description 3). The grass floor had a comparatively rich species composition and 80–90% projection cover.

Table 6. Association *Pinus sylvestris* – *Poa nemoralis* – *mixtoherbosa*

Species	Description		
	1	2	3
<b>Trees</b>			
<i>Pinus sylvestris</i> L.	10	9	9
<i>Picea abies</i> (L.) H. Karst.	+	1	1
<b>Shrubs and bushes</b>			
<i>Juniperus communis</i> L.	5% projection cover	1-2% projection cover	–
<i>Vaccinium myrtillus</i> L.	5% projection cover	10% projection cover	–
<i>Vaccinium vitis-idaea</i> L.	–	–	5% projection cover
<b>Gramineous</b>			
<i>Poa nemoralis</i> L.	3 ...IV	3 ...IV	4 ... V
<i>Agrostis capillaris</i> L.	1 .....I	–	–
<i>Brachypodium sylvaticum</i> (Huds.) Beauvais	–	–	1 ....II
<i>Calamagrostis arundinacea</i> (L.) Roth	1-2 ...III	1-2 ...III	1 .....I
<b>Cyperaceous</b>			
<i>Luzula sylvatica</i> (Huds.) Gaudin	1-2 ...III	1-2 ...III	1 ....II
<b>Leguminous</b>			
<i>Trifolium alpestre</i> L.	1 .....I	1 ....II	–
<b>Herbage</b>			
<i>Aremonia agrimonoides</i> (L.) DC.	1 ....II	1 ....II	1 .....I
<i>Campanula sparsa</i> Friv.	1 .....I	–	–
<i>Cardamine bulbifera</i> (L.) Crantz	–	1 .....I	–
<i>Cruciata glabra</i> (L.) Ehrend.	1 ....II	1 ....II	1 .....I
<i>Digitalis viridiflora</i> Lindl.	1 .....I	1 .....I	–
<i>Euphorbia amygdaloides</i> L.	1 ....II	1 ....II	1 ....II
<i>Fragaria vesca</i> L.	1 .....I	1 ....II	2-3 ...IV
<i>Galium verum</i> L.	1 ....II	–	–
<i>Hypericum perforatum</i> L.	1 .....I	1 .....I	–
<i>Myosotis sylvatica</i> Hoffm.	–	1 .....I	–
<i>Plantago lanceolata</i> L.	1 .....I	–	–
<i>Primula veris</i> L.	–	1 .....I	1 .....I
<i>Prunella vulgaris</i> L.	–	–	1 .....I
<i>Sanicula europaea</i> L.	1 .....I	1 ....II	–
<i>Senecio nemorensis</i> L.	1 .....I	–	–
<i>Symphytum tuberosum</i> L.	–	1 .....I	–

## II. 2. Association *Pinus sylvestris* – *Vaccinium vitis-idaea* – *mixtoherbosa* (Table 7)

**Table 7.** Association *Pinus sylvestris* – *Vaccinium vitis-idaea* – *mixtoherbosa*

Species	Description		
	1	2	3
<b>Trees</b>			
<i>Pinus sylvestris</i> L.	10	10	9
<i>Picea abies</i> (L.) H. Karst.	+	+	+
<b>Shrubs and bushes</b>			
<i>Vaccinium vitis-idaea</i> L.	70 % projection cover	60 % projection cover	60 % projection cover
<i>Vaccinium myrtillus</i> L.	5 % projection cover	10 % projection cover	–
<i>Juniperus communis</i> L.	–	–	5 % projection cover
<b>Gramineous</b>			
<i>Brachypodium sylvaticum</i> (Huds.) Beauvais	1-2...III	2...III	1-2...III
<i>Calamagrostis arundinacea</i> (L.) Roth	–	1....II	1....II
<i>Dactylis glomerata</i> L.	–	1.....I	1.....I
<i>Poa nemoralis</i> L.	1....II	1....II	1....II
<b>Cyperaceous</b>			
<i>Luzula sylvatica</i> (Huds.) Gaudin	1....II	1-2...III	1....II
<b>Leguminous</b>			
<i>Trifolium alpestre</i> L.	1.....I	1....II	1....II
<b>Herbage</b>			
<i>Aremonia agrimonoides</i> (L.) DC.	–	1.....I	1.....I
<i>Campanula epigea</i> Janka	1.....I	–	1.....I
<i>Campanula sparsa</i> Friv.	1.....I	1.....I	–
<i>Cruciata glabra</i> (L.) Ehrend.	1....II	1....II	1....II
<i>Digitalis viridiflora</i> Lindl.	–	1.....I	–
<i>Euphorbia amygdaloides</i> L.	1.....I	1....II	1....I
<i>Fragaria vesca</i> L.	1....II	1....II	1....II
<i>Galium verum</i> L.	–	–	1.....I
<i>Hypericum perforatum</i> L.	1.....I	–	1.....I
<i>Knautia arvensis</i> (L.) Coult.	–	–	1.....I
<i>Myocotis sylvatica</i> Hoffm.	–	1.....I	–
<i>Primula veris</i> L.	–	–	1.....I
<i>Prunella vulgaris</i> L.	1.....I	1.....I	1.....I
<i>Ranunculus montanus</i> Willd.	–	1.....I	–
<i>Sanicula europaea</i> L.	1.....I	1.....I	1.....I
<i>Senecio nemorensis</i> L.	–	1.....I	–
<i>Veronica chamaedrys</i> L.	1.....I	–	–

**Description 1:** in the Meandrite locality, at an altitude of 1600 m, on an eastern slope with an inclination of 25°. The canopy was 0.8. The tree height was 18–20 m and tree diameter varied from 10–20 cm up to 35 cm. The grass floor had 20 % projection cover.

**Description 2:** around Chernovruh locality, at an altitude of 1550 m, on a northeastern slope with an inclination of 35–40°. The tree stand was 20–22 m high and its canopy was 0.7–0.8. The prevailing diameter of the trunks was 20–30 cm. The grass floor had 25–30 % projection cover.

**Description 3:** above Selishte, at 1400 m a.s.l. A coenosis of this association grows on an eastern slope with an inclination of 45°. The tree stand was 20–22 m high and its canopy was 0.7–0.8. The trunks had diameter of 25–30 cm (maximum 45 cm). The grass floor had 30 % projection cover.

## II. 3. Association *Pinus sylvestris* – *Vaccinium myrtillus* – *mixtoherbosa* (Table 8)

The association was studied in the region of Batlu Boaz locality, at an altitude of 1600 m, with an eastern exposition of the slope and an inclination of 25°. The canopy was 0.7–0.8. The trees were 20–22 m high and with diameter of 30–35 cm. The grass floor had 35–40 % projection cover. The association was also established by Nikolov & Vulchev (2001).

**Table 8.** Association *Pinus sylvestris* – *Vaccinium myrtillus* – *mixtoherbosa*

Species	Description
	1
<b>Trees</b>	
<i>Pinus sylvestris</i> L.	8
<i>Picea abies</i> (L.)H. Karst.	2
<b>Shrubs and bushes</b>	
<i>Juniperus communis</i> L.	1-2 % projection cover
<i>Vaccinium myrtillus</i> L.	40 % projection cover
<i>Vaccinium vitis-idaea</i> L.	5 % projection cover
<b>Gramineous</b>	
<i>Agrostis capillaris</i> L.	1 .....I
<i>Brachypodium sylvaticum</i> (Huds.) Beauvais	1 .....I
<i>Calamagrostis arundinacea</i> (L.) Roth.	2 .....III
<b>Herbage</b>	
<i>Aremonia agrimonoides</i> (L.) DC.	1-2 .....III
<i>Cardamine bulbifera</i> (L.) Crantz	1 .....I
<i>Cruciata glabra</i> (L.) Ehrend.	1-2 .....III
<i>Euphorbia amygdaloides</i> L.	1 ..... II
<i>Fragaria vesca</i> L.	1 ..... II
<i>Hypericum perforatum</i> L.	1 .....I
<i>Oxalis acetosella</i> L.	1 ..... II
<i>Prenanthes purpurea</i> L.	1 .....I
<i>Prunella vulgaris</i> L.	1 .....I



#### II.4. Association *Pinus sylvestris* + *Picea abies* – *Calamagrostis arundinacea* (Table 9)

*Description 1:* between the Batlu Boaz and Komita localities, at 1600 a.s.l., on a southeastern slope with an inclination of 35°. The trees were 20–22 m high and with a diameter of 30–35–40 cm. The canopy was 0.7–0.8. The grass floor had 70 % projection cover.

*Description 2:* about 2 km above Surnitsa, at about 1400 a.s.l., on a southeastern slope with an inclination of 50°. The canopy was 0.6. The height of the tree stand was 20–22 m and tree diameter about 30–35 cm up to 40 cm. The grass floor had 85 % projection cover.

**Table 9.** Association *Pinus sylvestris* + *Picea abies* – *Calamagrostis arundinacea*

Species	Description	
	I	
<b>Trees</b>		
<i>Pinus sylvestris</i> L.	7	7
<i>Picea abies</i> (L.) H. Karst.	3	7
<i>Fagus sylvatica</i> L.	–	+
<b>Shrubs and bushes</b>		
<i>Juniperus communis</i> L.	5% projection cover	20% projection cover
<i>Vaccinium myrtillus</i> L.	20% projection cover	5% projection cover
<i>Vaccinium vitis-idaea</i> L.	–	5% projection cover
<b>Gramineous</b>		
<i>Calamagrostis arundinacea</i> (L.) Roth	4 .. V	3 .IV
<i>Poa nemoralis</i> L.	1 ... I	1 ..II
<b>Cyperaceous</b>		
<i>Luzula sylvatica</i> (Huds.) Gaudin	–	1-2 .III
<b>Leguminous</b>		
<i>Trifolium alpestre</i> L.	–	1 ... I
<b>Herbage</b>		
<i>Aremonia agrimonoides</i> (L.) DC.	1 ... I	1 ... I
<i>Campanula glomerata</i> L.	1 ... I	–
<i>Campanula sparsa</i> L.	–	1 ... I
<i>Cardamine bulbifera</i> (L.) Krantz.	1 ... I	–
<i>Cruciata glabra</i> (L.) Ehrend.	1 ..II	1 ... I
<i>Euphorbia amygdaloides</i> Friv.	1 ..II	1 ... I
<i>Fragaria vesca</i> L.	1 ... I	1 ..II
<i>Galium verum</i> L.	–	1 ..II
<i>Geranium macrorrhizum</i> L.	–	1 ..II
<i>Hypericum perforatum</i> L.	1 ... I	–
<i>Oxalis acetosella</i> L.	1 ... I	–
<i>Prenanthes purpurea</i> L.	1 ... I	–
<i>Primula veris</i> L.	1 ... I	1 ... I
<i>Prunella vulgaris</i> L.	1 ... I	–
<i>Sanicula europaea</i> L.	–	1 ... I

## B. Secondary vegetation

### I. FORMATION OF *AGROSTIS CAPILLARIS*

The coenoses of this formation occupy an extensive territory in the valley of river Dospat, from Kroushata hamlet to Pobit Kamuk hamlet.

#### I.1. Association *Agrostis capillaris* + *Poa pratensis* – *mixtoherbosa* (Table 10)

Two coenoses of this association are described. The first one at an altitude of 1400 m, on a flat terrain with southeastern exposition, in the vicinities of Pobit Kamuk hamlet, and the second between the Kroushata hamlet and Surnitsa village. It occupied an eastern slope with an inclination of 35°–40°, at 1350 m a.s.l. The grass stand in both coenoses had comparatively rich species composition (about 50 taxa) and 100 % projection cover.

**Table 10.** Association *Agrostis capillaris* + *Poa pratensis* – *mixtoherbosa*

Species	Description		
	I		
	1	2	3
<b>Gramineous</b>			
<i>Agrostis capillaris</i> L.	4 .... V	5 .... V	
<i>Anthoxanthum odoratum</i> L.	1 .... I	1 .... II	
<i>Bromus erectus</i> Huds.	–	1 .... II	
<i>Festuca nigrescens</i> L.	2 ...III	2 ...III	
<i>Calamagrostis arundinacea</i> (L.) Roth	1 .... I	1 .... I	
<i>Cynosurus cristatus</i> L.	–	1 .... II	
<i>Dactylis glomerata</i> L.	1 .... II	2 ...III	
<i>Holcus lanatus</i> L.	–	1 .... II	
<i>Poa pratensis</i> L.	2 ...III	3-4 .... V	
<b>Cyperaceous</b>			
<i>Carex spicata</i> Huds.	–	1 .... II	
<i>Luzula campestris</i> (L.) D.C.	1 .... II	–	
<b>Leguminous</b>			
<i>Lotus corniculatus</i> L.	1 .... I	–	
<i>Medicago falcata</i> L.	1 .... II	2 ...III	
<i>Trifolium alpestre</i> L.	1 .... II	–	
<i>Trifolium medium</i> L.	1-2 ...III	2 ...III	
<i>Trifolium pratense</i> L.	1 .... II	–	
<b>Herbage</b>			
<i>Achillea millefolium</i> L.	2 ...III	2 ...III	
<i>Campanula epigea</i> Janka	1 .... I	–	
<i>Campanula sparsa</i> Friv.	1 .... I	–	
<i>Centaurea rhenana</i> Boreau	1 .... I	1 .... I	
<i>Colchicum autumnale</i> L.	1 .... I	–	
<i>Cruciata glabra</i> (L.) Ehrend.	1 .... II	1 .... II	
<i>Dianthus deltooides</i> L.	1 .... I	–	
<i>Euphorbia amygdaloides</i> L.	1 .... I	1 .... I	
<i>Euphorbia cyparissias</i> L.	1 .... I	1 .... I	

Table 10. Continuation.

1	2	
<i>Euphrasia rostkoviana</i> Hayne	1 ....II	1-2 ...III
<i>Galium verum</i> L.	1 ....II	1 ....II
<i>Hieracium villosum</i> L.	1 ....I	1 ....I
<i>Hypericum perforatum</i> L.	1 ....II	1 ....II
<i>Knautia arvensis</i> (L.) Coult.	1 ....I	–
<i>Leucanthemum vulgare</i> Lam.	1 ....I	1 ....II
<i>Myosotis arvensis</i> Lam.	1 ....I	1 ....II
<i>Plantago lanceolata</i> L.	1 ....II	–
<i>Polygala major</i> Jacq.	1 ....I	–
<i>Primula veris</i> L.	1 ....II	–
<i>Prunella vulgaris</i> L.	1 ....II	–
<i>Ranunculus montanus</i> Willd.	1 ....I	–
<i>Ranunculus acris</i> L.	1 ....I	–
<i>Rhinanthus rumelicus</i> Velen.	1 ....II	1-2 ...III
<i>Rumex acetosa</i> L.	–	1 ....I
<i>Stellaria graminea</i> L.	1 ....II	2-3 ...IV
<i>Stellaria holostea</i> L.	1 ....II	–
<i>Taraxacum officinale</i> L.	1 ....II	–
<i>Teucrium chamaedrys</i> L.	1 ....I	–
<i>Thymus pannonicus</i> All.	1 ....I	–
<i>Veronica chamaedrys</i> L.	1 ....II	1 ....II
<i>Viola tricolor</i> L.	1 ....I	1 ....II

## Conclusion

The plant cover in the area of study was characteristically uniform. Forest communities dominate, with an element of primary vegetation, and cover the most extensive area. Plant formations of *Picea abies* (with five plant associations) and *Pinus sylvestris* (with four plant associations) have been established. The herbaceous communities, chiefly dominated by *Agrostis capillaries* (one primary association) were of secondary origin and have emerged to replace the destroyed forests of *Picea abies* and *Pinus sylvestris*.

## References

- Alexiev, G. 2002. Geomorphological regionalization. – In: **Koprlev, I. & al.**, (eds), Geography of Bulgaria. Pp. 104-105. ForCom, Sofia (in Bulgarian).
- Bondev, I. 2002. Geobotanic regioning. – In: **Koprlev, I. & al.** (eds), Geography of Bulgaria. Pp. 336-352. ForCom, Sofia (in Bulgarian).
- Bondev, I., Meshinev, T. & Andreev, N. 1983. Botanical characteristics of the Bistrishko Branishte Reserve. – In: **Velchev, V.** 1981. (ed.), Third Natl. Conf. Bot., Sofia 26-30.10.1981. Pp. 935-948. Publishing House Bulg. Acad. Sci., Sofia (in Bulgarian).
- Bondev, I., Lazarov, I. & Lyjubenova, M. 1985. The vegetation of the V. Kolarov Reserve in the Rodopi Mts. – In: **Nedyalkov, S.** (ed.), Int. Symp. Proj. 8-MAB. Conservation Nat. Areas & Genet. Material they Contain, Blagoevgrad, September 23-28, 1985. Vol. 2, pp. 133-141. Publishing House Bulg. Acad. Sci., Sofia (in Bulgarian).
- Bondev, I., Ljubenova, M. & Ljubenov, M. 1995. The vegetation of the Chouprene Biosphere Reserve. – In: **Tsankov, G.** (ed.), Proc. Jubil. Symp. on the Centenary of Acad. B. Stephanov, Sofia, June 2-3, 1994. Vol. 2, pp. 19-26. Publishing House Bulg. Acad. Sci., Sofia (in Bulgarian).
- Gorunova, D. & Kochev, H. 1991. Vegetation cover in the basin of Chepelarska river (West Rhodopes). II – *Fitologiya*: **41**: 3-27 (in Bulgarian).
- Kozuharov, S. 1961. The vegetation of part of the meadows and pastures in the Alpine area of the village of Batak, Western Rhodope. – *Izv. Bot. Inst. (Sofia)*, **3**: 89-112 (in Bulgarian).
- Meshinev, T. 1973. The effect of light on the germination of *Potentilla fruticosa* L. – *Dokl. Bulg. Akad. Nauk.*, **26**(5): 691-693.
- Meshinev, T. 1975. Germination of *Potentilla fruticosa* L. seeds under natural and experimental conditions. – In: **Velchev, V., Kuzmanov, B. & Palamarev, E.** 1975. (eds), In Honour of Acad. Daki Jordanov. Pp. 185-191. Publishing House Bulg. Acad. Sci., Sofia.
- Meshinev, T. & Apostolova, I. 1985. Minimum area of *Piceetum myrtillosum* in the V. Kolarov Reserve (West Rhodopes). – *Ecology (Sofia)*, **17**: 11-24 (in Bulgarian).
- Nikolov, V. & Vulchev, V. 2001. Vegetation of the coniferous belt in the Maljovitsa Divide of the Rila Mountains. – *Phytol. Balcan.*, **7**(1): 39-64.
- Ninov, N. 2002. Soil geographical regioning. – In: **Koprlev, I. & al.** (eds), Geography of Bulgaria. Pp. 300-303. ForCom, Sofia (in Bulgarian).
- Penev, I. 1953. Die grasdecke einiger weiden im Rhodopen-gebirge. – *Izv. Bot. Inst. (Sofia)*, **3**: 91-150 (in Bulgarian).
- Velchev, V. & Indjeian, A. 1987. Phytocoenological characteristics of the ground synusium in the association *Picea abies* – *Vaccinium myrtillus* – *Calamagrostis arundinacea*. – In: **Kuzmanov, B.** (ed.), Proc. Fourth Natl. Conf. Bot., Sofia 1987. Vol. 3: 3-39. Sofia (in Bulgarian).
- Velev, St. 2002. Climatic regioning. – In: **Koprlev, I. & al.** (eds), Geography of Bulgaria. Pp. 155-156. ForCom, Sofia (in Bulgarian).

