Distribution of medicinal plants in the beech forests of the Vitosha Nature Park

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Abstract. The biodiversity and distribution of medicinal plants in three types of beech forests in the Vitosha Nature Park have been studied: acidophilous, neutrophilous and beech forests on limestone. One hundred and eight medicinal plants belonging to 47 families have been identified. Their biological type has been specified, as well as their life form, relation to the humidity and environmental status of the identified medicinal species. The participation of each species in all three types of beech forests is reported. The state of the population of certain medicinal species and the anthropogenic impact on them is discussed.

Key words: beech forests, biodiversity, distribution, medicinal plants, Vitosha Nature Park

Introduction

The protected territories in Bulgaria and particularly the nature parks are extremely important for practical conservation of the genetic fund of the medicinal plants under natural conditions (Hardalova & al. 1994). The investigation and situating of their locations is an important precondition for such a protection. Situated in close proximity to the capital city, the Vitosha Nature Park is actively used for recreation and tourism. This puts under threat its biodiversity, with medicinal plants as an important constituent of that biodiversity.

The foretsts are a major component (60 %) of the ecological complex of the Vitosha Nature Park and they determine to a great extent its significance. *Fagus sylvatica* claims the greatest share (39 % of the total forest area) in them (Baev & Matev 1985). With their water conservational, antierosion and recreation functions, beech forests provide valuable habitats of considerable conservational import for the environment. This study is aimed at investigating the species diversity of medicinal plants in the beech forests of the Vitosha Nature Park, their distribution and the resource capacities of these habitats, allowing for the status of the populations of the rare and economically important species, and the anthropogenic impact on them.

An overview of literature related to the botanical investigation of Vitosha has shown an absence of any researches into the medicinal plants. Kitanov & Penev (1963) identified 1542 higher plant species in the mountain. They reported 151 forest community species, 52 of which were medicinal plants: *Hepatica nobilis*, *Arum maculatum*, *Actaea spicata*, *Corylus avellana*, *Corydalis solida*, *Oxalis acetosella*, *Vaccinium myrtillus*, etc. Chorological information based on herbarium vouchers deposited in SOM, SO and SOA has shown a number of medicinal species, including *Angelica pancicii*, *Asarum europaeum*, *Atropa belladonna*, *Galanthus nivalis*, *Galium odoratum*, *Daphne mezereum,* in the beech forests of Mt Vitosha.

Physical and geographical characteristics of the Vitosha Nature Park

Vitosha Nature Park (Fig. 1) covers the territory of Mt Vitosha, which lies in Southwest Bulgaria and belongs to the Plana-Zavala mountain sequence (Nikolov & Jordanova 1997). Vitosha is a dome-like mountain, with an area of 278 km², 18 km wide and 23 km long. Its average altitude is 1500 m, its lowest parts rising above Knyazhevo and Boyana residential districts (800 m), and its highest ones situated aroud peak Cherni Vruh (2290 m)

The mountain has a powerful syenite (monconite) plutonium core, enfolded in Upper Cretaceous vulcanites: andesites, andesite breccia, diorites, etc. On its northern and western periphery occasionnal Tertiary conglomerates and sandstones can be observed, while limestones and dolomites prevail in its southern and southeastern outskirts (Nikolov & Jordanova 1997).

Vitosha belongs to the Temperate Continental Climatic Zone (Velev 2002). The climate is distinctly determined by height. There are three climatic belts: a low mountain belt (up to 1400 m) with a short winter, undurable snow cover and prevalent rainfalls; a subalpine belt (1400–1900 m) with a considerable snow cover and ample precipitations; and an alpine belt (over 1900 m) with considerable precipitations, mostly of snow. The beech forests fall into the first two climatic belts (Nikolov & Jordanova 1997).

According to Jordanova (2002), Mt Vitohsa lies in an area with a snow-and-rain river regime and an explicit spring maximum. It belongs to the Mediterranean Soil Region of Bulgaria, its beech forests falling mainly into the Vitosha-Sredna Gora Soil Province (Ninov 2002). According to the author, acid brown mountain forest soils prevail in it, with some limited distribition of rankers, lithic leptosols and dark mountain forest soils.

The mountain is divided into four parts by the river valleys and the direction of their outflow (Jossifov 1983; Kroumov 1990). The northern divide is outlined by river Vladaiska, river Dulboka and the watershed of rivers Boyanska-Yanchovska and Dragalevska-Yanchovska. The eastern divide borders on river Dulboka, river Kourtova and the watershed of rivers Iskur-Palakariya and Iskur-Strouma. The southern divide lies between river Kourtova and river Matnitsa and is the furthermost from the capital city. The western divide stretches between river Matnitsa and river Vladaiska. This division is strongly conditional (Nikolov & Jordanova 1997).

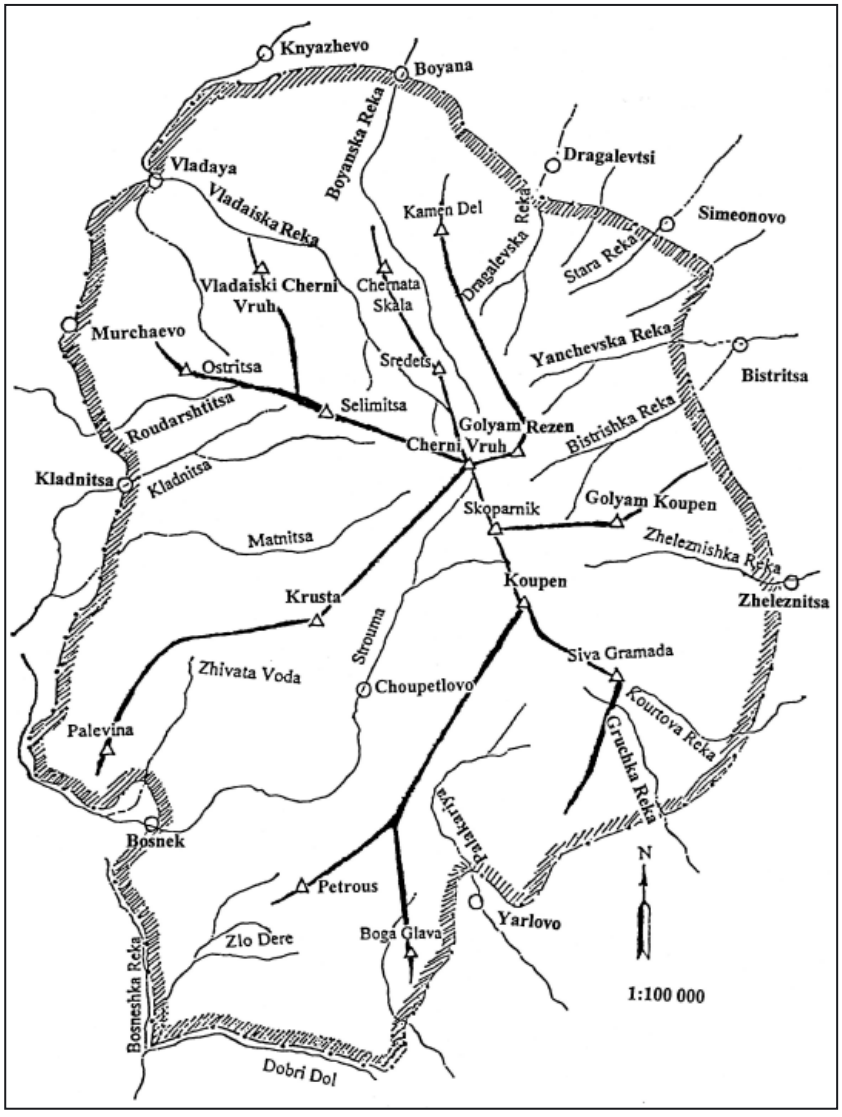

Fig. 1. Map of the Vitosha Mt (Jordanov, 1977)

According to the geobotanical regionalization of the country (Bondev 2002), Vitosha is differentiated as a separate Vitosha region of Vitosha district, which belongs to the Illyrian (Balkan) Phytogeographical Province of the European Broad-Leaved Forest Zone.

Data on the vegetation of Mt Vitosha are available mainly in some early sources dedicated to this mountain (Georgiev 1928; Stefanov 1939; Stojanov 1939; Jordanov 1977), as well as in some more recent literary sources (Baev & Matev 1985; Nikolov & Jordanova 1997; Tsavkov & Dimova 2001; Apostolova & Meshinev 2002, etc.).

The plant cover has vertical belts. All vegetation belts of the Bulgarian mountains are present, with the exception of the alpine belt (Velchev 2002). According to the author, these are: a xerothermic oak belt, hornbeam-durmast belt, beech belt, coniferous forest belt, and subalpine belt.

The xerothermic oak and hornbeam-durmast belts (averagely up to 1300 m a.s.l.) are not divided by a distinct border, but are scattered in a fragmented way on limited areas. They have experienced the strongest anthropogenic impact. Of the root communities of *Quercus pubescens*, *Q. frainetto* and *Q. cerris* single individuals or groups of trees of sprout origin have been preserved. Contemporary vegetation within the boundaries of these belts is of secondary origin.

In the beech belt (at an average altitude between 1000 m and 1650 m), pure and mixed forests of *Fagus sylvatica* prevail. Generally, this is a homogeneously developed belt. In its lower parts *Carpinus betulus*, *Populus tremula*, *Acer campestre*, *Fraxinus ornus*, *F. excelsior*, *Tilia platyphyllos*, *Corylus avellana*, etc. showed increased secondary participation. In the middle and higher parts of the belt the beech forms monodominant communities, with the participation of *Acer pseudoplatanus*., *A. platanoides*, *Prunus avium*, *Abies alba*., etc. The most of the beech forests have sprout origin. Under the conditions of the Nature Park their environment detrermining role is of primary importance.

The coniferous belt (average altitude between 1500 m and 1900 m) is represented by communities of *Picea abies* which outline the upper forest boundary in the Vitosha Nature Park. *Pinus sylvestris* and *Pinus peuce* Griseb. have a more limited distribution here.

Most characteristic for the subalpine belt (over 1800 m a.s.l.) are the communities of *Juniperus sibirica* Burgsd. Patches of *Pinus mugo* occur occasionally.

There is no distinct alpine belt on the territory of Mt Vitosha, only in the highest parts (in the region of peaks Maluk Rezen, Golyam Rezen and Cherni Vruh) single alpine communities occur, chiefly of *Sesleria comosa* Vel.

Material and methods

The investigation was carried out in the period April 2003 – October 2004. Distribution of medicinal plants was established by the transect and semistationary methods. Terrains with altitudes between 850 m and 1750 m were subjected to inventory. During the transect fieldwork a topographic map and a map of plant habitats in the Vitosha Nature Park (1:25 000) were used.

In the course of our investigations, we have used the List of Medicinal Plants provided by the National Biological Diversity Conservation Strategy (Hardalova & al. 1994). Their taxonomic classification and biological type are given according to Kozhuharov (1992). The floristic elements are cited after Meusel & al. (1965, 1978), Meusel & Jager (1992). The life form of each species is given according to Raunkiaer (1934), and their relation to the humidity according to Bondev (1995). Antropophytes are cited after Stefanov & Kitanov (1962).

The environmental status of medicinal plants was deteremined according to the Law on Biological Diversity (2002) and the *Red Data Book of PR Bulgaria*. Table 1 shows two groups of plants according to Order No RD-173/03.02.2005 of the Ministry of Environment and Waters providing for a special regime of protection and use of medicinal plants: 1st Group – plants prohibited for collection; and 2nd Group – plants under a regime of restricted use for commercial and industrial purposes.

Three types of beech habitats have been investigated, covering 18 % of the territory of the Park, or 4841 ha. These are acidophilous beech forests, neutrophilous beech forests and beech forests on limestone. The first two types are distributed in all four mountain divides and cover respectively 3179 ha and 1277 ha. The third type occurs only in the southern divide of Mt Vitosha and covers 385 ha.

The status and regenerating potential of some populations of medicinal plants have been identified by establishing their acreage, spatial and age structure, and abundance of individuals. In each forest type sample plots covering an average 4% of the forest area have been set. The number of the sample plots totals 160. Their size depended on the relief and covered 1.5 ha on the average. In order to illustrate the abundance of certain species in the different forest types, a relative abundance range was used on the basis of estimation by sight. It comprises the following degrees: 1 – single specimens; 2 – scores; 3 – hundreds; 4 – thoudsands. The two latter degrees show good and very good biological resources. For plants forming clone populations, the number of the above-ground stems was assessed. Abundance and frequency within the respective forest type are given for each species in Table 1.

Table 1. List of the species

Taxa	Biologycal type	Life form	Relation to humidity	Floristic element	Conservation status and special regime of use	Mountain part	Acidophilous beech forests		Neutrophilous beech forests		Beech forests on limestone	
							Frequency, %	Abundance	Frequency, %	Abundance	Frequency, %	Abundance
1	2	3	4	5	6	7	8	9	10	11	12	13
Equisetophyta												
Equisetaceae												
Equisetum arvense L.*	p	Cr	hgm	subbor		N,E,S,W	11	2	5	2		
Polypodiophyta												
Aspidiaceae												
Dryopteris filix-mas (L.) Schott	p	H	m	subbor		N,E,S,W	46	4	42	4		
Aspleniaceae												
Asplenium trichomanes L.	p	H	m	cosm	I	N,E,S,W	8	2	11	2		
Athiriaceae												
Athirium filix-femina (L.) Roth	p	H	m	bor		N,E,W	14	3	5	3		
Hypolepidaceae												
Pteridium aquilinum (L.) Kuhn*	p	H	m	cosm		N,E,S,W	24	4	21	2	25	2
Polypodiaceae												
Polypodium vulgare L.	p	H	m	bor		N,E,S,W	32	2	53	3		
Pinophyta												
Cupressaceae												
Juniperus communis L.	sh	Ph	m	subbor		E,S	11	2	11	2	50	2
Pinaceae												
Pinus sylvestris L.	t	Ph	mx	subbor		S,W	11	2	5	2		
Taxaceae												
Taxus baccata L.	t	Ph	m	Eur	Rdb; Bdl	N			3	3		
Magnoliophyta												
Apiaceae												
Angelica pancicii Vand.	p	H	hgm	balc	I Rdb	N,E,W	16	3				
Heracleum sibiricum L.*	b	H	m	Euras		N,E,W	14	3	16	2		
Sanicula europaea L.	p	H	m	bor		N,E,S,W	35	3	32	4		
Araceae												
Arum maculatum L.	p	Cr	m	Eur		N,E	3	2	32	4		
Araliaceae												
Hedera helix L.*	sh	Ph	m	Eur		N,S			5	3	25	3
Aristolochiaceae												
Asarum europaeum L.	p	H	m	Eur	I	N,E,W	8	2	16	3		
Asclepiadaceae												
Vincetoxicum hirundinaria Medik.*	p	H	xm	subpont		E			5	2		
Asteraceae												
Achillea clypeolata Sibth. et Sm.	p	H	x	balc		S					100	3

Table 1. Continuation

1	2	3	4	5	6	7	8	9	10	11	12	13
*Achillea millefolim complex**	p	H	mx			N,E,S,W	19	2	16	2		
Arctium lappa L.*	b	H	xm	Euras		N,E	5	2	3	1		
Artemisia absinthium L.*	p	H	xm	pont-medit		S	1	1			50	2
Artemisia vulgaris L.*	p	H	m	bor		N,E	5	2				
Bellis perennis L.*	p	H	m	Eur-medit		W	8	2	5	2		
Carlina acanthifolia All.	b	H	x	Euras	II	S					50	2
Cichorium intybus L.*	p	H	m	Euras		E,S	8	2	5	2		
Hieracium pilosella L.	p	H	x	Eur-Sib		S,W	5	2	5	2	50	3
Petasites hybridus(L.) Gaertn.	p	H	hgm	Eur		N,E	8	2	11	3		
Solidago virga-aurea L.*	p	H	m	bor		N,W	5	2				
Taraxacum officinale Weber*	p	H	m	cosm		N,S,W	3	2	21	2	25	2
Telekia speciosa (Schreb.) Baumg.	p	H	hgm	Eur		N,W	14	3	11	1		
Tussilago farfara L.*	p	H	m	Euras		N,S,W	24	3			25	2
Betulaceae												
Alnus glutinosa (L.) Gaertn.	t	Ph	hgm	Eur		E,W	3	3	5	3		
Betula pendula Roth	t	Ph	m	Eur-Sib		N,E,S,W	49	4	37	3		
Corylus avellana L.	sh-t	Ph	m	Eur		N,E,S,W	59	4	68	4	50	3
Boraginaceae												
Pulmonaria officinalis L.	p	Cr	m	submedit		N,E,S,W	30	2	74	3	25	3
Caprifoliaceae												
Sambucus ebulus L.*	p	H	m	Eur-medit		E	3	3				
Sambucus nigra L.*	t-sh	Ph	m	Eur-medit		N,S,W	8	2				
Viburnum opulus L.*	sh	Ph	m	Eur-Sib		E	3	2				
Caryophyllaceae												
Stellaria media (L.) Vill.*	b	Th	m	cosm		W	3	2				
Chenopodiaceae												
Chenopodium bonus-henricus L.*	p	H	m	Eur		N,E	5	1				
Crassulaceae												
Sedum acre L.	p	H	x	Eur	II	N,S	5	2				
Sedum maximum (L.) Suter	p	H	xm	Eur		N,W	11	2	16	2		
Ericaceae												
Vaccinium myrtillus L.	sh	Ch	mx	Eur-Sib		N,E,S,W	30	4	16	2		
Vaccinium vitis-idaea L.	sh	Ch	xm	bor		S			5	2		
Fabaceae												
Astragalus glycyphyllos L.*	p	H	m	Eur		N,W	11	3				
Melilotus alba Medik.*	a	Th	m	Euras		N	1	1				
Ononis arvensis L.*	p	H	m	Euras		S	5	3	5	2		
Robinia pseudoacacia L.*	t	Ph	xm	Am		E			5	2		
Trifolium pratense L.*	p	H	m	subbor		S			5	3		
Gentianaceae												
Gentiana asclepiadea L.	p	H	m	Eur		N,E,S,W	11	3	11	2		
Geraniaceae												
Geranium macrorrhizum L.*	p	H	m	Eur		N,E,S,W	43	4	26	3		
Geranium robertianum L.*	a-b	Th	m	subbor		N,E,S	19	4	26	4		
Geranium sanguineum L.*	p	H	xm	Eur		N,E,W	14	3	11	2		
Hypericaceae												
Hypericum perforatum L.*	p	H	xm	Euras		N,E,S,W	30	3	5	2		
Amiaceae												
Betonica officinalis L.*	p	H	m	Eur-medit	II	S			3	1		
Clinopodium vulgare L.*	p	H	m	bor		N,S,W	24	3	5	2	50	3
Galeopsis tetrahit L.*	a	Th	m	Euras		S	2	1				
Glechoma hederacea L.*	p	H	m	Euras		E,W	3	2	11	3		
*Mentha spicata complex**	p	H	m			E,S,W	8	3	11	3		
Teucrium chamaedrys L.*	p	H	xm	Eur-medit		S,W	8	3			100	4
Thymus sp. diversa	p	H	x			N,S,W	11	3				

Table 1. Continuation

1	2	3	4	5	6	7	8	9	10	11	12	13
Liliaceae												
Allium ursinum L.	p	Cr	m	Eur		N			3	3		
Polygonatum odoratum (Mill.) Druce	p	Cr	mx	Euras		N			16	3		
Veratrum lobelianum Bernh.*	p	Cr	m	Euras		N,E	8	2	11	2		
Oleaceae												
Ligustrum vulgare L.*	sh	Ph	x	Eur-medit		S					75	3
Onagraceae												
Epilobium angustifolium L.*	p	H	m	bor		N,E,S,W	16	3				
Oxalidaceae												
Oxalis acetosella L.	p	H	hgm	subbor		N,E,S,W	38	4	26	3		
Papaveraceae												
Corydallis solida (L.) Clairv.	p	Cr	m	Euras		N,S			5	2	25	3
Plantaginaceae												
Plantago major L.*	p	H	m	bor		N,E,S,W	11	2	37	2		
Polygalaceae												
Polygala major Jacq.*	p	H	xm	subpont		S,W	3	2			50	2
Polygonaceae												
Persicaria hidropiper (L.) Spach*	a	Th	hg	Euras		S	1	2				
Rumex acetosa L.*	p	H	m	bor		N	3	2				
Rumex alpinus L.*	p	H	m	Eur		N	5	1				
Primulaceae												
Primula veris L.*	p	H	m	Eur-medit	II	S	2	3			50	4
Ranunculaceae												
Actaea spicata L.	p	H	m	subbor		N,E	8	2	32	3		
Caltha palustris L.	p	H	hgm	subbor		N,S	5	3	5	2		
Clematis vitalba L.*	sh	Ph	xm	Eur		E,S,W	5	3	5	3		
Helleborus odorus Waldst. et Kit.	p	Cr	m	submedit		N,E,S,W	22	4	47	3	75	3
Hepatica nobilis Mill.	p	Cr	m	Eur		E,S	8	3			75	4
Rosaceae												
Agrimonia eupatoria L.*	p	H	m	Eur-medit		E,S	8	3	5	2		
Alchemilla vulgaris complex	p	H	m		II	N,E,S,W	27	3	3	2		
Crataegus monogyna Jacq.*	sh-t	Ph	mx	Euras		N,E,S,W	16	2	26	2	25	2
Filipendula ulmaria (L.) Maxim.	p	H	hgm	subbor		N,E,S,W	11	2	11	2		
Filipendula vulgaris Moenh*	p	H	xm	subpont		N	1	1				
Fragaria vesca L.*	p	H	m	subbor		N,E,S,W	38	3	32	3		
Geum urbanum L.*	p	H	xm	Euras		N,E,S,W	22	3	26	4		
Potentilla argentea L.*	p	H	m	subpont		N,E,S,W	8	2	5	2		
Potentilla erecta (L.) Raeusch.*	p	H	m	subbor		N,S,W	11	3	5	3		
Potentilla reptans L.*	p	H	m	Euras		E,S,W	5	3	5	2		
*Rosa canina complex**	sh	Ph	x			N,E,S,W	35	2	11	2		
Rubus caesius L.*	sh	Ph	m	Euras		N,E,S,W	22	3	16	3		
Rubus idaeus L.*	sh	Ph	mx	subbor		N,E,S	35	4	21	3		
Sanguisorba officinalis L.	p	H	m	subbor		N,S	2	1				
Sorbus aucuparia L.	sh	Ph	m	subbor		N,E,W	27	3	16	2		
Rubiaceae												
Galium aparine L.*	a	Th	mx	Euras		E			5	3		
Galium odoratum (L.) Scop.	p	H	m	Eur	II	N,E,S,W	38	4	74	4		
Salicaceae												
Populus tremula L.	t	Ph	m	subbor		N,E,S,W	11	3	11	2		
Scrophulariaceae												
Digitalis grandiflora Mill.	p	H	m	Eur-Sib		N,S,W	16	3	5	2		
Digitalis lanata Ehrh.*	p	H	xm	balc-dac		S					50	2
Euphrasia sp. diversa	a	Th	xm			S	3	2				
Verbascum thapsiforme Schrad.*	b	H	x	Eur		E	3	2				
Veronica officinalis L.*	p	H	m	subbor		N,E,S,W	14	3	16	2		

Table 1. Continuation

1	2	3	4	5	6	7	8	9	10	11	12	13
Solanaceae												
Atropa belladonna L.*	p	H	m	Eur	II Rdb	S	1	1				
Thymeleaceae												
Daphne mezereum L.	sh	Ph	m	Eur-Sib		N,E,W	5	2	11	2		
Tiliaceae												
Tilia tomentosa Moench	t	Ph	xm	submedit		W	3	2				
Urticaceae												
Urtica dioica L.*	p	H	m	cosm		N,E,S,W	30	4	21	3		
Valerianaceae												
Valeriana officinalis L.	p	H	xm	Euras	I	N,W	1	1	3	1		
Violaceae												
Viola odorata L.	p	H	xm	Eur		S	3	2				
Viola tricolor L.*	a-b	Th	m	Euras		E,W	3	2	5	2		

Legend:
Biological type: **t** – tree, **sh** – shrub, **p** – perennial, **b** – biennual, **a** – annual;
Life form: **H** – hemicryptophytes, **Ch** – chamaephytes, **Ph** – phanerophytes,**Th** – therophytes, **Cr** – cryptophytes;
Relation to humidity: **m** – mesophytes, **x** – xerophytes, **xm** – xeromesophytes, **Tmx** – mesoxerophytes, **hg** – hygrophytes, **hgm** – hygromesophytes;
Floristic ele ments: **Eur** – European, **Euras** – Eurasian, **Eur-medit** – European-mediterranean, **Eur-Sib** – European-Siberian, **Am** – American, **bor** – boreal, **subbor** – subboreal, **cosm** – cosmopolitan, **subpont** – subpontic, **pont-medit** – pontic-mediterranean, **submedit** – submediterranean, **balc** – balkan, **balc-dac** – balkan-dacian;
Conservation status and special regime of use: **Bdl** – Biodiversity Law, **Rdb** – Red Data Book of PR Bulgaria, **I** – prohibited for gathering, **II** – with restrictive regime of gathering;
Mountain part: **N** – northern, **E** – eastern, **S** – southern, **W** – western; * – anthropophytes

Results and discussion

The investigation showed a great diversity of medicinal plants in the beech forests of Mt Vitosha, comprising 108 species from 47 families (Table 1). Of these, three species (3 %) have been conservationally important and another 11 species (10 %) have been put under a special regime of protection and use.

Figures 2–5 show the distribution of medicinal plants according to their biological type, life form, relation to the humidity and belonging to one or another floristic element. According to these characteristics, perennial grassy species prevailed – 69 % (Fig. 2), followed by hemicryptophytes – 64 % (Fig. 3) and mesophytes – 62 % (Fig. 4). Priority had floristic elements of European and Eurasian origin – 44 % (Fig. 5), while those of Mediterranean distribution (Euro-Mediterranean, Submediterranean and Pontic-Mediterranean) amounted to 12 %. Florisitc elements of northern origin (boreal, subboreal and Euro-Siberian) also claimed a significant share: 33 %. This, as well as the prevalence of hemicryptophytes in the investigated area are explained with the moderate continental mountain climatic conditions in the region (Gruev & Kuzmanov 1994; Pavlov 1995). The predominance of mesophytes results from the ecological and phytocoenotic specificities of the beech communities.

Many of the medicinal plants are anthropophytes (57 %). The long years of intensive anthropogenic impact on the mountain, on the one hand, and the transitional character of the investigated territories, on the other (thinned out stretches, proximity to to other habitat types) explain the great number of untypical for the beech forests species shown in Table 1.

The various habitats determine the differences in the species composition of medicinal plants, as well as in their biological resources.

On the territory of the Vitosha Nature Park, **acidophilous beech forests** mingle with other broad-leaved and coniferous tree species, such as *Betula pendula*, *Populus tremula*, *Salix* spp., *Alnus glutinosa*, *Picea abies*, etc. These are the widest distributed beech coenoses in the Vitosha Nature Park, covering 3179 ha (11.6 % of the Park area). Acidophilous beech forests are present in all four geographic divides of the mountain, at altitudes between 850 m and 1750 m, but form larger massives in the lower part of the beech belt, in the sunnier places. Their soils are acid and with a thin humus layer, with the content of nutrients in them lower than in the neutrophilous beech forests (Marinov & al. 1961; Ninov 2002). This has conditioned the relatively species-poor shrub-and-herb layer in them. Besides the medicinal species shown in Table 1, other most frequently occurring species in the grass cov-

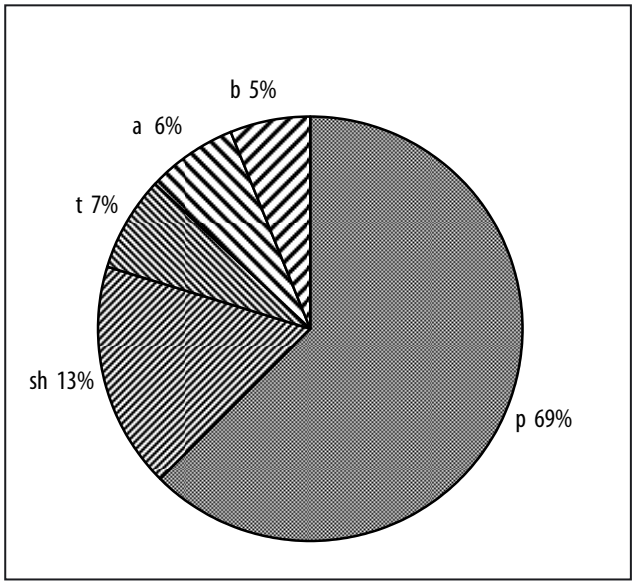

Fig. 2. Correlation of the biological types of medicinal plants: p – perennials; sh – shrubs; t – trees; a – annuals; b – biennials.

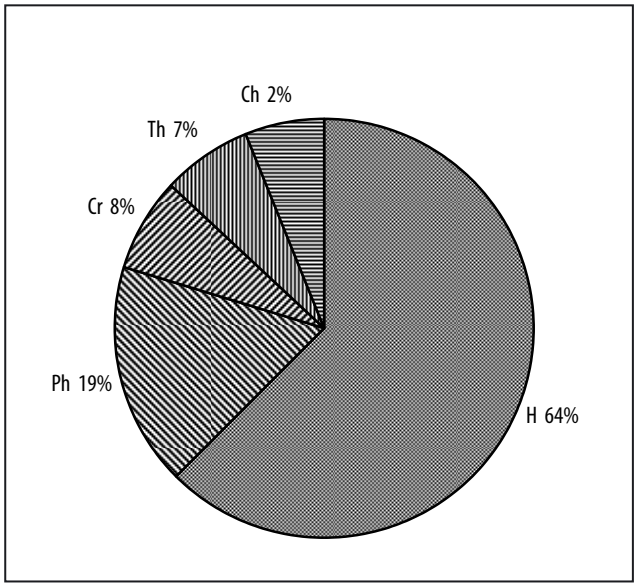

Fig. 3. Correlation of the life forms of medicinal plants: H – hemicryptophytes; Ph – phanerophytes; Cr – cryptophytes; Th – therophytes; Ch – chamaephytes.

er are: *Luzula luzuloides*, *Calamagrostis arundinacea*, *Polygonatum verticillatum*, *Prenanthes purpurea*, *Mycelis muralis* Dum., etc. During our investigation of 122 sample plots in the acidophilous beech forests, we have identified 93 medicinal species belonging to 42 families (86 % of all medicinal species discovered in the beech forests of Mt Vitosha). In respect to their biological type, life form, relation to the humidity and floristic elements, the distribution of species is identical with the distribution established for the beech forests of Mt Vitosha in general. More than half of the identified medicinal species were anthropophytes (59 %), testifying to an active human interference in those habitats: tourist infrastructure, afforestation.

Of the identified medicinal species, *Angelica pancicii* and *Atropa belladonna*, entered as rare in the *Red Data Book*, have conservational importance. Nine species are under a special regime of use, and of these *Angelica pancicii*, *Asplenium trichomanes* and *Asarum europaeum* are forbidden for gathering, while *Alchemilla vulgaris complex*, *Atropa belladonna*, *Galium odoratum*, *Primula veris*, *Sedum acre*, and *Valeriana officinalis* are under a restricted regime of use.

In terms of the distribution of medicinal plants in the acidophilous beech forests, four groups of species can be differentiated:

- 1st Group (occurring in over 50 % of the investigated sample plots): *Corylus avellana*
- 2nd Group (from 35 % to 50 %) – six species: *Betula pendula*, *Dryopteris filix-mas*, *Galium odoratum*, *Geranium macrorrhizum*, *Oxalis acetosella*, and *Fragaria vesca*
- 3rd Group (from 20 % to 35 %) – 16 species, including *Alchemilla vulgaris complex*, which is under a regime of restricted use
- 4th Group (up to 20 %) – 70 species.

Corylus avellana stands out with its greatest biological resources. It occurrs in 59 % of the investigated sample plots and typically accompanies *Fagus sylvatica* in the pure and mixed acidophilous beech forests. In the thinner phytocoenoses (as a result of human activities) undergrowth has formed: in Katounishte locality, along river Matnitsa (at altitudes between 1200 m and 1300 m), southwards of peak Golinata, westwards of Kikish shelter, etc. There was well developed undergrowth at the end of the forests and in the clearings: Bai Krustyo and Kapata localities, etc.

The species of 2nd Group have been distributed all over the acidophilous beech forests, but manifest the greatest resources in the northern divide of Mt Vitosha and the scantiest resources in the southern divide of the mountain. The explanation is in the local phytoclimatic conditions inherent for the various divides of the mountain.

Betula pendula occurres in thinned-out rocky places with high air humidity, at altitudes above 1000 m, as a codominant of *Fagus sylvatica*, or as assectator in the beech communities. It has been observed chiefly in the northern and western divide of Mt Vitosha. Economically important locations are found in the northern and northwest-

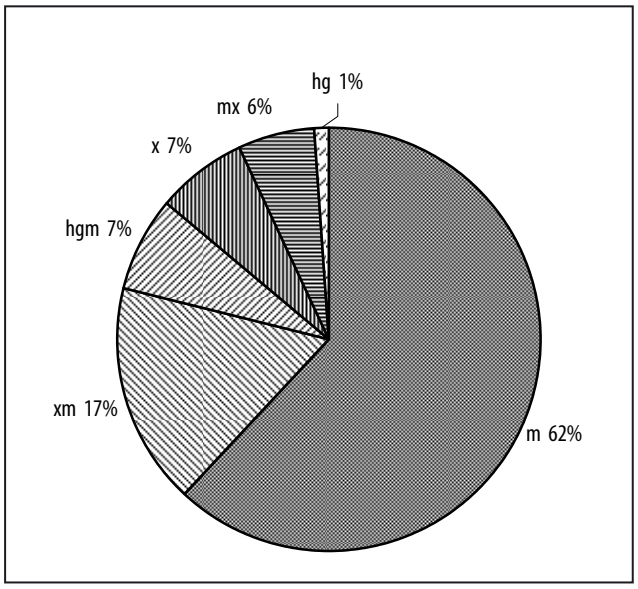

Fig. 4. Correlation of medicinal plants according to their hydrophylous character:
m – mesophytes; xm – xeromesophytes; hgm – hygromesophytes; x – xerophytes; mx – mesoxerophytes; hg – hygrophytes.

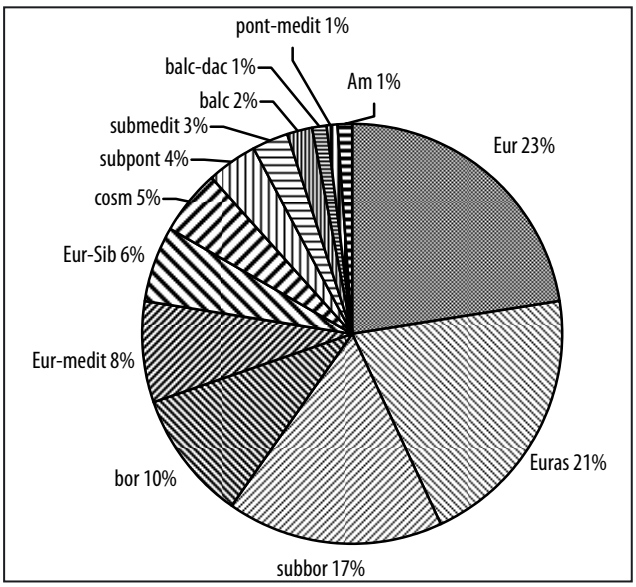

Fig. 5. Correlation of the floristic elements:
Eur – European; Euras – Erasian; subbor – subboreal; bor – boreal; Eur-medit – European-mediterranean; Eur-Sib – European-Siberian; cosm – cosmopolitan; subpont – subpontic; submedit – submediterranean; pont-medit – pontic-mediterranean; balc – balcan; balc-dac – balcan-dacian; Am – American.

ern foothills of peak Vladaiski Cherni Vruh, southwards of Planinets chalet, along rivers Dragalevska (1500–1550 m a.s.l.) and Vladaiska (1300–1350 m).

Thanks to the suitable edaphic and climatic conditions, *Dryopteris filix-mas* has found good development conditions in the acidophilous beech forests. This species participates as assectator in the herbaceous synusium and on the average maintaines a 25 % coverage. *Dryopteris filix-mas* formes a population with good resource characteristics at the upper bondary of the beech belt of the mountain, along the northeastern slope of peak Belcheva Skala. It covers an area of one hectare and its projection cover amounts to 40 %. The beech forest has a high canopy, with ample air and soil humidity. The anthropogenic impact in the area is insignificant.

Galium odoratum, a species put under a regime of restricted use, manifests a good resource potential in the acidophilous beech forests of Mt Vitosha. Its ecological specificities of sciophilous mesophyte explain this species occurrence in 38 % of the sample plots in the acidophilous beech forests of Mt Vitosha. Its poorest occurrence has been registered the sourthern divide of the mountain. Its average projection cover in the sample plots amounts to 15 %. It takes part as assectator in the herbaceous cover of the investigated phytocoenoses. *Galium odoratum* is found on terrains of western to northeastern exposition, with slope gradient 5° to 20°, and altitudes from 1000 m to 1750 m.

Geranium macrorrhizum stands out as a dominant or subdominant component in the herbaceous cover of the acidophilous beech forests of Mt Vitosha. It grows on rocky terrains and steep slopes of northern to northeastern exposition and with high air humidity. This species is most abundant (up to 40 %) in the northern and western divide of the mountain: Pasha Bounar locality, along the trail from peak Kikish to river Dragalevska, at the northwestern foothills of peak Vladaiski Cherni Vruch, along rivers Tanchovitsa, Vladaiska and Dragalevska (at altitudes between 1200 m and 1550 m).

In the observed type of forests there are good conditions for the development of *Oxalis acetosella*. This species has formed stretches with projection cover up to 20 % in shady, moderately humid places, with northern expositions and average to slightly steep slopes. Locations with good biological resources are found in the localities Pasha Bounar and Zlatni Mostove, along river Yanchovska (1450 m), etc.

Despite its frequent occurrence in the acidophilous beech forests, *Fragaria vesca* forms patches of lower abundance as compared to other species of the 2nd Group of distribution, mainly in thinned-out places and forest clearings.

Of the species from the 3rd Group of distribution in the acidophilous beech forests, *Rubus idaeus* and *Urtica dioica* have shown relatively good resource potential. Being a strongly competitive species, *Rubus idaeus* occupies the thinner forest stretches, occasionally developing as undergrowth, especially in the southern divide of the mountain. Economically important massives have been found in Ostro Burdo locality and westwards of Marochki Koshari locality.

A number of anthropophytes and pioneer species, closely related to active human presence – roads, chalets, shelters, etc. – have shown significant presence in the acidophilous beech forests. Such medicinal species are *Urtica dioica*, *Tussilago farfara*, *Geum urbanum,* etc. They have a good resource potential considering the conditions suitable for quick regeneration.

Polypodium vulgare and *Sanicula europaea* have also shown good biological resources. They occurr in moist gullies of the mountain folds or along streams and riverbeds, with or without running water. These habitats are widely spread in the investigated area.

In shady and moderately humid places *Pulmonaria officinalis* forms locations with unhomogeneous mosaic distribution of the specimens and projection cover from 5 % to 25 %.

Rosa canina complex manifests greatest resource potential along river terraces and streams, and at the outskirts of the investigated beech coenoses.

Analysing the species falling into the 3rd Group of distribution in the acidophilous beech forests of Mt Vitosha, we have determined some as dominants and subdominants in the herbaceous cover and others as assectators. *Vaccinium myrtillus* and *Pteridium aquilinum*, as characteristic elements of the herbaceous floor of the acidophilous beech forests, belong to the former. *Pteridium aquilinum* occasionally forms dense groups with 80 %–90 % projection cover, especially in the thinned-out parts of the forests and at their outskirts. Economically important locations have been found at Foukalitsa locality and eastwards of peak Nakev Kamuk.

Vaccinium myrtillus has been registered in the acidophilous beech coenoses at altitudes above 1200 m, but occupies larger areas at the upper boundary of the beech belt. The average projection cover of *Vaccinium myrtillus* in the investigated forests is 40 % and even higher in the mixed beech forests with *Betula pendula*, where the canopy is smaller: at the northern foothills of peak Vladaiski Cherni Vruh, southwards of Kamen chalet, etc. Generally, *Vaccinium myrtillus* shows poor to insignificant fructification in these habitats.

Alchemilla vulgaris complex falls into the same group, with the most exntesive locations on the northeastern slope of peak Belcheva Skala and at the foothills of peak Ostro Burdo, along river Klisoura, where the projection cover of the species is reaching 10 %.

The 4th Group comprises medicinal plants of lowest frequency (up to 20 %). They claim the greatest share (75 %) of the discovered species. Most of the medicinal plants under special regime of use also fall in there. Of these, *Angelica pancicii* – a species prohibited for collection and entered in the *Red Data Book of PR Bulgaria* – occurrs most frequently there. In the beech forests of Mt Vitosha it is encountered only in the acidophilous forests and is registered in 20 sample plots totaling 3 ha, with 0.03 generative specimens per 1 m2 on the average. They are predominantly in the eastern divide of the mountain, where the so far largest found locations are situated: in Yanchev Zaslon location and on the right of the trail from Vedra chalet to the Start-Final locality. Both locations are situated along river Yanchovska, on an area of about 2 ha and with 0.03 generative specimens per 1 m2 on the average. In the other locations this species is represented by single specimens or by small groups, all situated in acidophilous beech coenoses along rivers or streams, in the western and northern divide of Mt Vitosha, mostly close to tourist trails.

Sciophilous mesophytes, *Asarum europaeum* and *Asplenium trichomanes*, occurr in lesser numbers. Generally, the biological resources of both species are limited: their locations are represented by single specimens or groups and small patches. For *Asplenium trichomanes* this is explained by the specific ecological niches occupied by it: moist rock crevises and rocky places.

At that stage of investigation of the acidophilous beech forests of Mt Vitosha for, single locations of *Valeriana officinalis*, *Primula veris*, *Sedum acre*, and *Atropa belladonna* have been registered, represented by single specimens and mainly in the sourthern divide of the mountain.

We have found a location of *Atropa belladonna* in a community of *Fagus sylvatica* and *Populus tremula*, with the participation of *Acer campestre* and *Quercus frainetto* at the northwestern foothills of peak Aslanov Rid in the southern divide of Mt Vitosha. There are herbarium materials of *Atropa belladonna*

from Vitosha: from Byalata Voda and Malinazha localities and the northwestern slopes of the mountain. The location discovered by us has not been reported. The species is represented here by eight specimens on an area of 0.0025 ha, most of them fruiting. They grew in a thinned out spot to the right of the road to Bosnek village, at 1250 a.s.l., at a slope gradient of 5°, with northwestern exposition and diffused light. The anthropogenic impact is small in that region. Other medicinal plants accompanying *Atropa belladonna* are: *Tussilago farfara*, *Helleborus odorus*, *Rubus idaeus*, *Digitalis grandiflora*, *Corylus avellana*, *Hepatica nobilis*, *Sanicula europaea*, *Clinopodium vulgare*, and *Pteridium aquilinum*. We think that the strongly competitive *Rubus idaeus* and *Pteridium aquilinum* species would suppress the further development of *Atropa belladonna* in that specific location.

The neutrophilous beech forests are relatively less distributed in the Vitosha Nature Park. They occupy 1277 ha (4.6 % of the Park's area) and are present in all four geographic divides, at altitudes between 850 m and 1500 m, occupying larger areas in the upper part of the beech belt and in more shady places. This type of beech forests is characteristic with powerful and more humus-rich soils of neutral to slightly alkaline reaction (Marinov & al. 1961; Ninov 2002). This explains the more diversified herbaceous and shrub floor as compared to the previous type of forests and is corroborated by our results: during the investigation of 34 test plots we have identified 74 medicinal plants from 37 families (69 % of all medicinal species found out in the beech forests of Mt Vitosha). Besides them, in the investigated type of forests are often present: *Lamiastrum galeobdolon*, *Euphorbia amygdaloides*, *Paris quadrifolia*, *Cardamine bulbifera*, *Melica uniflora*, *Anemone nemorosa*, etc.

Similarly to the acidophilous beech forests, here again among the medicinal plants the perennial herbaceous species prevail (69 %), as well as hemicryptophytes (61 %) and mesophytes (65 %). The most frequently occurring floristic elements are of northern (subboreal 23 %, boreal 9 % and Euro-Siberian 7 %), Eurasian (23 %) and European (21 %) origin. Those of Mediterranean origin constitute only 7 %. Most of the identified medicinal species are anthropophytes (51 %), which is explained by long years of intensive anthropogenic impact on the mountain.

Taxus baccata, a species protected by the Law on Biologival Diversity and entered in the *Red Data Book of PR Bulgaria* as a threathened species, is conservationally important. Under a special regime of use are *Asarum europaeum*, *Valeriana officinalis* and *Asplenium trichomanes* (prohibited for collection), *Alchemilla vulgaris complex* and *Betonica officinalis* (under a regime of restricted use).

According to the distribution of medicinal plants in the neutrophilous beech forests, four groups of species can be designated:

– 1st Group (occurring in over 50 % of the investigated sample plots) – four species: *Galium odoratum*, *Pulmonaria officinalis*, *Corylus avellana* и *Polypodium vulgare*
– 2nd Group (from 35 % to 50 %) – four species: *Helleborus odorus*, *Dryopteris filix-mas*, *Betula pendula,* and *Plantago major*
– 3rd Group (from 20 % to 35 %) – 13 species
– 4th Group (up to 20 %) – 53 species.

Similarly to the preceding forest type, here again *Corylus avellana* shows the greatest biological resources, forming in many places an undergrowth in the neutrophilous beech forests of the mountain: in Karpouzov Valog, Yanchovsko Usoe and Drenska Glava localities, in the region of Baliyna Cheshma, etc.

Galium odoratum is the most characteristic medicinal species of the neutrophilous beech forests. Our investigations have confirmed this fact and have shown that this species occurs in 74 % of the investigated sample plots for that habitat. Its average projection cover there is 45 %. It often dominates in the herbaceous cover. In the investigated plots, *Galium odoratum* has northwestern to eastern exposition and slope gradient from 5° to 30°, while its altitude varies from 850 m to 1500 m. Mention deserves the fact that *Galium odoratum*, as well as the other three species from that group, have shown the best resources in the northern divide of the mountain. This could be explained by the local phytoclimatic conditions in that divide, which suit best the ecological requirements of these species.

In most investigated sample plots in these forests *Pulmonaria officinalis* and *Polypodium vulgare* participate as assectators in the ground floor. The average projection cover of the first species in these plots is 25 % and of the second 8 %.

Of the species registered in the 2nd Group of distribution in the neutrophilous beech forests of Mt Vitosha, *Helleborus odorus* occurs most often, but

Dryopteris filix-mas, registered as assectator in the studied communities, has shown the best resources.

In comparison to the acidophilous beech forests, where *Dryopteris filix-mas* and *Betula pendula* also fell into the second group of distribution, their abundance significantly changes there: the first species shows greater, and the second species shows smaller resources. Single specimens or small groups of *Betula pendula* have been identified in the neutrophilous beech coenoses of the mountain. Its assectator role there is established mainly at the foothills of the eastern divide, at altitudes between 1000 m and 1100 m.

Plantago major does not form dense populations in the studied regions, but its increased presence in those habitats can be explained by the anthropogenic impact on them: roads, buildings, clearings, etc.

The 3rd Group of distribution in the neutrophilous beech forests comprises 13 species. Among these occurr some species that fall into the same group of distribution in the acidophilous beech forests. These are: *Geum urbanum*, *Pteridium aquilinum*, *Urtica dioica*, *Sanicula europaea,* and *Rubus idaeus*. While in the case of *Sanicula europaea* and *Geum urbanum* greater abundance and biological resources have been observed, there is an opposite trend in the case of *Urtica dioica*, *Rubus idaeus* and *Pteridium aquilinum*.

Most of species in that group are sciophilous elements which are characteristis for the beech communities: *Actaea spicata*, *Arum maculatum*, *Oxalis acetosella*, *Sanicula europaea*, *Geranium macrorrhizum*, and *Geranium robertianum*. Despite the fact that they are registered mainly in the northern divide of the mountain, *Arum maculatum* and *Geranium robertianum* show the greatest resource potential among them. That is due to their relatively great abundance in the investigated sample plots.

Arum maculatum shows preference for moist and humus-rich brown mountain forest soils. This explains the fact that in such localities as Yanchovsko Usoe, Karpouzov Valog, Rakovets gully, etc. this species covers vast areas with a projection cover up to 40 % and highly vital individuals.

Along the right-hand bank of river Boyanska, *Geranium macrorrhizum* has found suitable development conditions among rock blocks, on terrains 1300 m a.s.l., with gradient of 40° and northern exposition. The location covers an area of 1.2 ha and the species maintains a projection cover of 60 %. In the same habitat, *Polypodium vulgare* manifests great abundance. An intensive tourist spate has been observed in the region.

Similarly to the acidophilous beech forests, here again the 4th Group of distribution includes most of the identified medicinal species (72 %). All medicinal species under a special regime of use identified for the neutrophilous beech forests fall into it, as well as the conservationally important *Taxus baccata*.

The two types of beech forests have 35 (73 %) common species from the 4th Group. Among these are *Valeriana officinalis*, *Asarum europaeum* and *Asplenium trichomanes*. For the neutrophilous beech forests the two latter species are the most frequently occurring ones under a special regime of use. Both have been established as assectators in the riverine beech coenoses (along rivers Yanchovska, Boyanska, Murchaevska, and Rakovets). They are represented mostly by single specimens or small patches. The only exception has made the population of *Asarum europaeum* in Yanchovsko Usoe locality, which is the largest (2 ha) population of that species established so far in the beech forests of Mt Vitosha. The species projection cover is 10 % there. The reproductive potential of the population is good. It is situated in close proximity to a major tourist trail, which calls for monitoring of its status.

Single locations of *Valeriana officinalis*, *Alchemilla vulgaris complex* and *Betonica officinalis* have been found, in which they are represented by single specimens.

Special mention deserves the fact that within the neutrophilous beech forests of Mt Vitosha lies the only location of *Taxus baccata* for that mountain: above the Boyana residential district, under Boyana waterfall. It was studied by Arnaudov (1920) and Penev (1940). Presently, the yew trees number about 120, scattered mosaically on both sides of the Boyana-Boyana waterfall trail, on an area of 2.2. ha. They grow at an altitude of 1240 m, with northern exposition, an average slope gradient of 25°, and on andesite base rock. This is an sprout plantation (Jordanov 1977), but a good seedling regeneration has been observed.

The beech forests on limestone are least distributed in the Vitosha Nature Park. They occupy only 385 ha (1.41 % of the Park's area). These are thermophilous forests growing only in the southern divide of Mt Vitosha. The reason for this is the

surfacing carst in sediment carbonate rocks situated in the southwestern part of the mountain and known as Bosnek Karst. In the investigated territory, the beech forests on limestone grow at altitudes between 1000 m and 1400 m, on steep slopes with sunny (predominantly southern) exposition and humus-carbonate soils (rendzinas). Besides the medicinal plants given in Table 1, in these forests frequently occur *Cornus sanguinea*, *Galium pseudaristatum*, *Neottia nidus-avis*, *Cephalanthera rubra*, *Epipactis helleborine*, *Campanula persicifolia*, etc.

Four sample plots (6 ha) have been investigated and 21 medicinal plants belonging to 14 families have been identified there (19 % of all medicinal species identified in the beech forests of Mt Vitosha). According to their biological type, life form and relation to the humidity, here, like in two previous beech forest types, the perennial grassy species prevail (75 %), as well as hemicryptophytes (57 %) and mesophytes (60 %). Owing to the xerothermic charcter of the beech forests on limestone, the relative share of xerophytic and xeromesophytic medicinal plant species is the greatest: 38 % (in the acidophilous beech forests it is 21 % and 16 % in the neutrophilous). Also, floristic elements with Mediterranean distribution claim a larger share (29 %), as compared to the two pervious beech forest types (11 % and 7 % respectively), exceeding that of the elements of northern origin (15 %) in the analysed forest types.

Primula veris and *Carlina acanthifolia* are subject to a special regime of use.

Similarly to the other analysed beech habitats, more than half of the identified medicinal species are anthropophytes (60 %). The region is under strong anthropogenic impact, which explains their presence.

According to the distribution of medicinal plants in the beech forests on carst terrains, three groups of species could be differentiated:

– 1st group (occurring in more than 50 % of the investigated sample plots) – 5 species: *Achillea clypeolata*, *Teucrium chamaedrys*, *Helleborus odorus*, *Hepatica nobilis*, and *Ligustrum vulgare*
– 2nd Group (from 25 % to 50 %) – 9 species: *Artemisia absinthium*, *Clinopodium vulgare*, *Corylus avellana*, *Digitalis lanata*, *Hieracium pilosella*, *Juniperus communis*, *Polygala major*, *Pteridium aquilinum Primula veris*, and *Carlina acanthifolia*
– 3rd Group (up to 25 %) – 7 species: *Corydalis solida*, *Crataegus monogyna*, *Hedera helix*, *Pteridium aquilinum*, *Pulmonaria officinalis*, *Taraxacum officinale*, and *Tussilago farfara*

The composition of the widest mass occurring species in that type of habitat conspicuously differs completely from the previous two. Most species are xerophitic elements. The reason for their wide distribution are probably the specific phytoclimatic contditions in the basiphilous beech forests: a vast number of sunny expositions, dry, shallow and humus-poor soils, relatively lower tree canopy, etc.

Teucrium chamaedrys, *Helleborus odorus* and *Hepatica nobilis* have shown the highest resourse potential in the beech forests on limestone in the southwestern part of Mt Vitosha. The first species occurrs in smaller or larger groups, with a projection cover of 20–30 %. The flowering period *Helleborus odorus* lends a characteristic touch to the vegetation in the investigated regions: peak Golyamata Mogila, peak Krousha and Aslanov Rid. In the same localities has been established high abundance of *Hepatica nobilis*. The populations of all three species manifest strong vitality and a good potential for natural regeneration.

The calciphilous Balkan endemic *Achillea clypeolata* has been identified. Being a photophilous species, it occupies small patches in the thinned-out parts of the forest or at its outskirts.

The steep, rocky and dry slopes, on which the basiphilous beech forests grow, offer good preconditions for the development of other xerothermic medicinal species, such as *Ligustrum vulgare*, *Juniperus communis*, *Digitalis lanata*, and *Carlina acanthifolia* under regime of restricted use. *Artemisia absinthium* develops well under these conditions as adventive assectator.

It is well known that the numbers and density of the populations of *Primula veris* increase in better lighted habitats. Our investigation has shown greater abundance of this species on the forest periphery and in thinned-out parts of the forest. In the two locations established by us on the slopes of Golyamata Mogila, on an area of 1ha, *Primula veris* amounts on the average to 0.9 juvenile specimens/m^2 and to 0.4 generative specimens /m^2.

Of the species belonging to the 3rd Group of distribution, best represented are *Corydalis solida* and *Pulmonaria officinalis*, which participate in the bulding of the spring synusium of the beech coenoses. In the investigated sample plots the projection cover of the two species does not exceed 10 %.

Conclusion

A great variety of medicinal plants has been established in the beech forests of Mt Vitosha: 108 species from 47 families. Of these, three species (3 %) are conservationally important and 11 species (10 %) are under a special regime of protection and use. The families Rosaceae (15 species), Asteraceae (13) and Lamiaceae (7) are represented by the greatest number of species.

A comparison of the acidophilous and neutrophilous beech forests showed a greater species diversity in the latter. Fifty-eight per cent of the identified species are common for both forest types. The most widespread medicinal species are: *Corylus avellana*, *Galium odoratum*, *Pulmonaria officinalis*, *Dryopteris filix-mas*, *Betula pendula*, *Polypodium vulgare*, *Geranium macrorrhizum*, *Fragaria vesca*, and *Helleborus odorus*. *Corylus avellana*, *Galium odoratum*, *Dryopteris filix-mas*, and *Helleborus odorus* have shown the greatest resourse potential.

A considerable number (79 %) of the identified medicinal plants occurr comparatively seldom: in up to 20 % of the investigated sample plots in the acidophilous and neutrophilous beech forests. Participation of most of them is not great. The conservationally important medicinal species, as well as those placed under a special regime of use (with the exception of *Galium odoratum* and *Alchemilla vulgaris complex*) fall into that group of distribution. The two abovementioned species, as well as the less frequently encountered *Valeriana officinalis*, *Asarum europaeum* and *Asplenium trichomanes* have been registered in both types of beech forests. Only in the acidophilous beech forests there are favourable conditions for the development of *Angelica pancicii*, *Sedum acre* and *Atropa belladonna*. *Betonica officinalis* and *Taxus baccata* have been identified only in the neutrophilous beech forests.

The beech forests on limestone are characteristically xerothermic. *Teucrium chamaedrys*, *Helleborus odorus*, *Achillea clypeolata*, *Hepatica nobilis*, and *Ligustrum vulgare* are the widest mass encountered in these forests, the first two species showing the best resource potential. *Carlina acanthifolia*, *Achillea clypeolata*, *Digitalis lanata,* and *Ligustrum vulgare* have been identified only in that type of beech forests. Of the species with environmental status, only *Primula veris* and *Carlina acanthifolia* are found.

An analysis of the four geographic divides of Mt Vitosha has shown the greatest number of medicinal plants in the southern divide (65 %). The reason is in the greater diversity of beech habitats there.

The great diversity of medicinal species and the good resource potential of some of them determine the great importance of the beech forests of the Vitosha Nature Park for the protection of the genetic fund of medicinal plants, offering along with this some good opportunities for sustainable use of their resources.

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