M. Delcheva, S. Bancheva & S. Tzoneva

Floristic diversity and conservation values in the Tchelkov Rid area (W Rhodopi Mts), Bulgaria

Abstract

Delcheva, M., Bancheva, S. & Tzoneva, S.: Floristic diversity and conservation values in the Tchelkov Rid area (W Rhodopi Mts), Bulgaria. — Bocconea 21: 175-182. 2007. — ISSN 1120-4060.

The biodiversity of higher plants in the Tchelkov Rid (W Rhodopi Mts) has been investigated. A total of 261 species belonging to 157 genera and 50 families have been found in an area of about 500 ha. The largest families are *Poaceae, Asteraceae, Fabaceae, Caryophyllaceae, Lamiaceae, Rosaceae, Scrophulariaceae*. The highest number of Sub-Mediterranean and Euro-Mediterranean geoelements in the studied region can be explained by its geographical position. The area is enclosed between two arms of Mesta River along which Mediterranean climatic influence penetrates into Bulgaria. Eighteen taxa of conservation concern are registered: 13 endemics (12 Balkan, 1 Bulgarian endemics), 6 species from the Red Data Book of Bulgaria, 2 species protected by the Law for Protection of Biodiversity, 1 from the IUCN Red List and 1 from the CITES. A new locality of the Bulgarian endemic species *Sedum stefco* Stef. is reported. That species is of a very restricted distribution, with small populations and weak reproductive potential.

Introduction

The main aim of the current study is to evaluate the diversity of the vascular plants and their importance for conservation in the area of Tchelkov Rid (W Rhodopi Mts) by determining the composition of the contemporary flora and the potentials for its preservation.

Studied area

The studied area of Tchelkov Rid runs NE-SW in the Southwestern part of the W Rhodopi Mts between the rivers Zhizhevska and Dalboky Dol. The Rhodopi Mts are part of the Rilo-Rhodopian sub region of W Bulgaria (Stojanov 1950). They are composed by Archaic and Proterozoic metamorphic rocks: gneiss, schist, marble and some serpentinite and granite. Quartzite occurs with gneiss and amphibolite in the Tchelkov Rid area. The studied area belongs to the Continental-Mediterranean climatic zone (Nikolova 2002).

Mean winter temperature is 1.5ºC, with an absolute minimum of -14 to -15ºC. The summer is relatively cool, with mean temperature of 17.5ºC and maximum up to 22.5ºC in the lowest areas. Tchelkov Rid is in the catchments of the Mesta river. The brown mountain-forest soils are characteristic for the W Rhodopi Mts region of the Mediterranean soil area (Ninov 2002). The area belongs to the Rhodopes geobotanical region of the Illyric (Balkan) province of the European broad-leaved forest area (Bondev 1997).

Material and methods

The transect method has been applied for the investigation of the flora of the studied area of 500 ha. The maps with scale 1:25000 have been used on the field during two vegetational periods between March and October in 2002 and 2004.

The following keys were used for identification of plant material: Guide to the vascular plants in Bulgaria (Kozhuharov 1992), Flora of RP Bulgaria (Jordanov 1963-1979; Velchev & Kozhuharov 1982; Velchev & Kuzmanov 1989), Flora of R Bulgaria (Kozhuharov & Kuzmanov 1995).

The determination of the floristic elements is according Dimitrov (2002).

The abbreviations of authors are according Brummitt & Powell (1992).

Results and discussion

The vascular flora of Tchelkov Rid area comprises 261 species from 157 genera and 50 families (Tab. 1). These values for the W Rhodopi Mts are 1878 species, 594 genera, 122 families (Dimitrov 2000).

The *Magnolyophyta* group is dominant with 252 species (96.9%), and the families with highest species diversity are:

Poaceae	32	*Lamiaceae*	16	*Boraginaceae*	9
Asteraceae	31	*Rosaceae*	14	*Brassicaceae*	8
Fabacea	25	*Scrophulariaceae*	14	*Crassulaceae*	7
Caryophyllaceae	21				

The families with highest genera diversity are:

Poaceae	21	*Boraginaceae*	7
Asteraceae	19	*Rosaceae*	7
Caryophyllaceae	12	*Brassicaceae*	6
Lamiaceae	12	*Scrophulariaceae*	5
Fabaceae	8		

The genera with highest species diversity are:

Vicia	11	*Bromus*	6
Sedum	7	*Hypericum*	5
Trifolium	7	*Poa*	5

The life forms also show high diversity:

Form	Species	%
trees and shrubs	21	8
shrubs	12	57
low trees, shrubs	5	24
trees	4	19
herbs	240	92
perennial	133	55
annual	63	26
annual to biennial	21	9
biennial	13	5
biennial to perennial	5	2.5
annual to perennial	4	2
annual to semi-shrubs	1	0.5

The dominant flora elements are the Sub-Mediterranean with 43 taxa and Euro-Mediterranean with 33 species. This reflects the continental climate on the one hand and the sub-Mediterranean on the other (Stojanov 1950)

The taxa with conservation value comprise 18 species or 7% of the total flora in the studied area (Tab. 2). The endemic taxa are 12 Balkan and 1 Bulgarian species or 8% of the endemic flora of the Rhodopi Mts (Petrova 2001). In the Red Book of Bulgaria there are 6 species with category 'rare' (Velchev 1984). Two species are legally protected, 1 species is in the world list of endangered plants (Walter & Gillett 1998) and 1 species is on the list of the Convention for International Trade of Wild Plants and Animals (CITES).

About 40% of the investigated area is occupied by the habitat of *Chamaecytisus absinthioides*. It is in Anex I of Habitats Directive 92/43/EEC [4060 – Alpine and Boreal heaths; 31.4B2 – Balkano-Rhodopide Chamaecytisus absinthioides heaths] (Devillers & Devillers-Terschuren 1996). That habitat is of an European importance. In the same area there are fragments of habitat of *Juniperus oxycedrus*. It is in Directive as 5210, Arborescent matorral with *Juniperus* spp.; 32.1311, Inland *Juniperus oxycedrus* arborescent matoral. Those communities are typical for area with Sub-Mediterranean climate and they are very rare in Bulgaria.

Conclusions

The data show the high conservation value of the flora in the studied area.

The information about the diversity of flora in the Tchelkov Rid area makes possible to estimate its conservation value on the basis of the following indicators:

Taxonomic diversity:	14% of the species of the W Rhodopi Mts 26% of the genera of the W Rhodopi Mts 41% of the families of the W Rhodopi Mts
Endemism:	8% of the endemic taxa in the flora of the Rhodopi Mts: Balkan and Bulgarian endemics

Taxa and habitats conservation status:	6 species: national status (Red Book of Bulgaria and/or law protected) 2 species: international status (IUCN, CITES) 2 habitats: European importance

Table 1. List of vascular plants in the area of Tchelkov Rid, W Rhodopi Mts.

Amaranthaceae
Amaranthus albus L.
Apiaceae
Anthriscus sylvestris (L.) Hoffm.
Eryngium campestre L.
Orlaya grandiflora (L.) Hoffm.
Aspleniaceae
Asplenium adiantum-nigrum L.
Asplenium septentrionale (L.) Hoffm.
Asplenium trichomanes L.
Ceterach officinarum DC.
Asteraceae
Achillea clusiana Tausch
Achillea collina Becker ex Rchb.
Achillea setacea Waldst. & Kit.
Anthemis arvensis L.
Anthemis tinctoria L.
Artemisia vulgaris L.
Carduus acicularis Bertol.
Carduus candicans Waldst. & Kit.
Carlina vulgaris L.
Centaurea cuneifolia Sibth. & Sm.
Centaurea jacea L.
Centaurea rhenana Boreau
Chondrilla juncea L.
Cichorium intybus L.
Conyza canadensis (L.) Cronquist
Crepis biennis L.
Crepis foetida L.
Eupatorium cannabinum L.
Filago eriocephala Guss.
Galinsoga parviflora Cav.
Hieracium caespitosum Dumort.
Hieracium hoppeanum Schult.
Hieracium pilosella L.
Hieracium piloselloides Vill.
Lactuca viminea (L.) J. Presl & C. Presl
Leontodon crispus Vill.
Leontodon hispidus L.
Senecio rupestris Waldst. & Kit.
Senecio vernalis Waldst. & Kit.
Tragopogon dubius Scop.
Xeranthemum annuum L.
Athyriaceae
Cystopteris fragilis (L.) Bernh.
Betulaceae
Alnus glutinosa (L.) Gaertn.
Betula pendula Roth
Carpinus orientalis Mill
Corylus avellana L.
Boraginaceae
Anchusa barrelieri (All.) Vitman
Anchusa hybrida Ten.
Anchusa officinalis L.
Borago officinalis L.
Cynoglossum hungaricum Simonk.
Echium vulgare L.
Myosotis ramosissima Rochel
Onosma heterophylla Griseb.
Symphytum ottomanum Friv.
Brassicaceae
Alyssum murale Waldst. et Kit.
Berteroa incana (L.) DC.
Berteroa obliqua (Sm.) DC.
Capsella bursa-pastoris (L.) Medik.
Erysimum diffusum Ehrh.
Rorippa pyrenaica (L.) Rchb.
Sisymbrium altissimum L.
Sisymbrium officinale (L.) Scop.
Campanulaceae
Campanula lingulata Waldst. & Kit.
Campanula sparsa Friv.
Jasione heldreichii Boiss. & Orph.
Caryophillaceae
Arenaria leptoclados (Rchb.) Guss.
Arenaria serpyllifolia L.
Cerastium pumilum Curtis
Cerastium semidecandrum L.
Cucubalus baccifer. L.
Dianthus cruentus Griseb.
Dianthus tristis Velen.
Herniaria glabra L.
Herniaria hirsuta L.
Herniaria incana Lam.
Lychnis coronaria (L.) Desr.
Minuartia bulgarica (Velen.) Graebn.

Moenchia mantica (L.) Bartl.
Scleranthus perennis L.
Silene armeria L.
Silene frivaldskyana Hampe
Silene subconica Friv.
Stellaria holostea L.
Stellaria media (L.) Vill.
Stellaria nemorum L.
Viscaria vulgaris Röhl.
Chenopodiaceae
Chenopodium album L.
Chenopodium botrys L.
Cistaceae
Xolanthes guttatus (L.) Raf.
Convolvulaceae
Convolvulus arvensis L.
Crassulaceae
Sedum acre L.
Sedum album L.
Sedum annuum L.
Sedum caespitosum (Cav.) DC.
Sedum hispanicum L.
Sedum kostovii Stef.
Sedum stefco Stef.
Cupressaceae
Juniperus communis L.
Juniperus oxycedrus L.
Cuscutaceae
Cuscuta planiflora Ten.
Cyperaceae
Carex buekii Wimm.
Carex caryophyllea Latourr.
Carex echinata Murray
Holoschoenus vulgaris Link
Dioscoreaceae
Tamus communis L.
Dipsacaceae
Knautia integrifolia (L.) Bertol.
Scabiosa ochroleuca L.
Scabiosa triniifola Friv.
Euphorbiaceae
Euphorbia agraria M. Bieb.
Euphorbia cyparissias L.
Euphorbia myrsinites L.
Fabaceae
Chamaecytisus absinthioides (Janka) Kuzm.
Genista rumelica Velen.
Lotus angustissimus L.
Lotus corniculatus L.
Medicago minima (L.) Bartal.
Melilotus alba Medik.
Ononis spinosa L.
Trifolium alpestre L.
Trifolium arvense L.
Trifolium aureum Pollich
Trifolium hybridum L.
Trifolium incarnatum L.
Trifolium medium L.
Trifolium repens L.
Vicia angustifolia L.
Vicia cassubica L.
Vicia cordata Wulfen ex Hoppe
Vicia cracca L.
Vicia dalmatica A. Kern.
Vicia grandiflora Scop.
Vicia hirsuta (L.) Gray
Vicia sativa L.
Vicia sepium L.
Vicia tetrasperma (L.) Schreb.
Vicia varia Host
Fagaceae
Quercus pubescens Willd.
Gentianaceae
Centaurium erythraea Rafn
Geraniaceae
Erodium cicutarium (L.) L'Hér.
Erodium hoefftianum C. A. Mey.
Geranium dissectum L.
Geranium sanguineum L.
Hypericaceae
Hypericum cerastoides (Spach.) N. Robson
Hypericum montbretii Spach
Hypericum olympicum L.
Hypericum perforatum L.
Hypericum rumeliacum Boiss.
Hypolepidaceae
Pteridium aquilinum (L.) Kuhn
Juncaceae
Luzula campestris (L.) DC.
Lamiaceae
Acinos arvensis (Lam.) Dandy
Acinos suaveolens (Sibth. & Sm.) G. Don
Ajuga genevensis L.
Clinopodium vulgare L.
Lamium garganicum L.
Nepeta nuda L.
Prunella laciniata (L.) L.
Salvia amplexicaulis Lam.

Salvia verticillata L.
Scutellaria galericulata L.
Stachys angustifolia M. Bieb.
Stachys recta L.
Stachys sylvatica L.
Teucrium chamaedrys L.
Thymus callieri Borbas ex Velen.
Thymus jankae Celak.
Liliaceae
Allium flavum L.
Muscari comosum (L.) Mill.
Muscari tenuiflorum Tausch
Ornithogalum pyrenaicum L.
Linaceae
Linum bienne Mill.
Linum hologynum Rchb.
Malvaceae
Malva sylvestris L.
Orchidaceae
Orchis morio L.
Orobanchaceae
Orobanche gracilis Sm.
Orobanche pubescens d'Urv.
Papaveraceae
Papaver rhoeas L.
Plantaginaceae
Plantago lanceolata L.
Plantago scabra Moench
Plantago subulata L.
Plumbaginaceae
Armeria rumelica Boiss.
Poaceae
Aegilops triuncialis L.
Aira elegantissima Schur
Anthoxanthum odoratum L.
Apera spica-venti (L.) P. Beauv.
Bromus mollis L.
Bromus racemosus L.
Bromus scoparius L.
Bromus squarrosus L.
Bromus sterilis L.
Bromus tectorum L.
Chrysopogon gryllus (L.) Trin.
Cynosurus cristatus L.
Cynosurus echinatus L.
Dactylis glomerata L.
Dichanthium ischaemum (L.) Roberty
Elymus repens (L.) Gould
Eragrostis pilosa (L.) P. Beauv.
Festuca nigrescens Lam.
Holcus lanatus L.
Hordeum murinum L.
Koeleria nitidula Velen.
Koeleria penzesii Ujhelyi
Lolium perenne L.
Phleum graecum Boiss. & Heldr.
Poa bulbosa L.
Poa compressa L.
Poa nemoralis L.
Poa pratensis L.
Poa sylvicola Guss.
Taeniatherum caput-medusae (L.) Nevski
Tragus racemosus (L.) All.
Vulpia myuros (L.) C.C. Gmel.
Polygonaceae
Polygonum aviculare L.
Rumex acetosa L.
Rumex acetosella L.
Rumex tenuifolius (Wallr.) A. Löve
Portulacaceae
Portulaca oleracea L.
Primulaceae
Anagallis arvensis L.
Lysimachia punctata L.
Ranunculaceae
Clematis vitalba L.
Nigella arvensis L.
Ranunculus polyanthemos L.
Thalictrum minus L.
Rosaceae
Agrimonia eupatoria L.
Crataegus monogyna Jacq.
Potentilla argentea L.
Potentilla neglecta Baumg.
Potentilla sulphurea Lam.
Prunus cerasifera Ehrh.
Prunus domestica L.
Prunus spinosa L.
Rosa canina L.
Rosa dumalis Bechst.
Rosa micrantha Borrer ex Sm.
Rosa myriacantha DC.
Rubus discolor Weihe & Nees
Sanguisorba minor Scop.
Rubiaceae
Asperula cynanchica L.
Cruciata laevipes Opiz
Cruciata pedemontana (Bellardi) Ehrend.

Galium verum L.
Salicaceae
Salix alba L.
Santalaceae
Thesium divaricatum Jan ex Mert. & W.D.J.Koch
Scrophulariaceae
Euphrasia liburnica Wettst.
Euphrasia pectinata Ten.
Euphrasia rostkoviana Hayne
Linaria arvensis (L.) Desf.
Linaria genistifolia (L.) Mill.
Linaria pelisseriana (L.) Mill.
Rhinanthus minor L.
Verbascum banaticum Schrad.
Verbascum rorripifolium (Halácsy) I.K. Ferguson
Veronica arvensis L.
Veronica austriaca ssp. *jacquinii* (Baumg.) Maly
Veronica beccabunga L.
Veronica cymbalaria Bodard
Veronica triphyllos L.
Selaginellaceae
Selaginella helvetica (L.) Spring
Ulmaceae
Ulmus minor Mill.
Valerianaceae
Valerianella coronata (L.) DC.
Violaceae
Viola arvensis Murray
Viola tricolor L.

Table 2. List of the taxa of conservation importance in the area of Tchelkov Rid: Bg - Bulgarian endemit, Bk - Balkan endemit, RB - Red Data Book of PR Bulgaria (R rare), LBB - Law for Bulgarian biodiversity, IUCN - List of the world-wide threatened plant species (R rare), CITES - Convention on international trade in endangered species of wild fauna and flora.

No	Taxa	Conservation value
1	*Anchusa hybrida* Ten.	RB (R)
2	*Armeria rumelica* Boiss.	Bk
3	*Campanula sparsa* Friv.	Bk
4	*Centaurea cuneifolia* Sibth. & Sm.	Bk
5	*Chamaecytisus absinthioides* (Janka) Kuzm.	Bk
6	*Dianthus cruentus* Griseb.	Bk
7	*Dianthus tristis* Velen.	Bk
8	*Erodium hoefftianum* C.A. Mey.	RB (R)
9	*Genista rumelica* Velen.	Bk
10	*Hypericum rumeliacum* Boiss.	Bk
11	*Minuartia bulgarica* (Velen.) Graebn.	Bk
12	*Onosma heterophylla* Griseb.	RB (R)
13	*Orchis morio* L.	CITES
14	*Scabiosa triniifola* Friv.	Bk; RB (R); LBB
15	*Sedum kostovii* Stef.	Bg; RB (R); LBB; IUCN(R)
16	*Sedum stefco* Stef.	Bk
17	*Silene frivaldskyana* Hampe	Bk
18	*Verbascum roripifolium* (Halacsy) I.K. Fergus.	RB (R)

Acknowledgements

The authors are grateful to the National Grassland Inventory Project, Bulgaria (PINMATRA 2002/020) for the financial support extended to this study.

References

Bondev, I. 1997: Geobotanical zoning. – Pp. 283-305 in: Jordanova, M. & Donchev, D. (eds), Geography of Bulgaria. – Sofia.

Brummitt, R. K. & Powell, C. E. 1992: Authors of plant names. – Kew.

Devillers, P. & Devillers-Terschuren, J. 1996: Classification of Palearctic Habitats. Nature and environment **78:** 7-35.

Dimitrov, D. (ed.) 2002: Conspectus of the Bulgarian Vascular Flora. – Sofja.

Jordanov, D. (ed.) 1963-1979. Flora na Narodna Republika Bălgarja, **1-7.** – Sofia.

Nikolova, M. 2002: Climate. Air and soil temperature. – Pp. 146-148 in: Kopralev, I. (ed.), Geography of Bulgaria. – Sofia.

Kozhuharov, S. (ed.) 1992: A guide to the Bulgarian vascular flora. – Sofia.

Kožuharov, I. S., Kuzmanov, A. B. (eds) 1995: Flora na Republika Bălgarja, **10.** – Sofja.

Ninov, N. 2002: Soils. – Pp. 277-303 in: Kopralev, I. (ed.), Geography of Bulgaria. – Sofia.

Petrova, A. 2001. The flora of Bulgaria, past, present and future. – Pp. 47-52 in: Özhatay, N. (ed.), Proceedings of the 2nd Balkan Botanical Congress: Plants of the Balkan Peninsula into the next Millenium, **1.** – Istambul.

Stoyanov, N. 1950: Plant Geography. – Sofia.

Velčev, V., Kožuharov, S. (eds) 1982: Flora na Narodna Republika Bălgarja, **8.** – Sofja.

— & Kuzmanov, B. (eds) 1989: Flora na Narodna Republika Bălgarja, **9.** – Sofja.

— 1984: Red data book of PR Bulgaria, **1.** Plants. – Sofia.

Walter, K. & Gillett, H. 1998: IUCN Red List of Threatened Plants. – Cambridge.

Address of the authors:
Malina Delcheva, Svetlana Bancheva & Sonya Tzoneva, Institute of Botany, BAS, Acad. G. Bonchev Str., Bl. 23, 1113 Sofia, Bulgaria. E-mail: malinad@bio.bas.bg.