

## RARE PLANTS GROWING ON SERPENTINES IN THE CENTRAL RHODOPES MTS. (BULGARIA)

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**ABSTRACT.** The investigation was conducted on the serpentine areas near the villages Parvenetz, Hrabrino, Markovo and Cherven in the Central Rhodopes Mountains. The study area is assigned to the transitional-mediterranean vegetation zone with dominance of mesophilous montane-balkan vegetation. The primary plant cover is highly disturbed, transformed into degraded “shibljak” communities. The analysis of the serpentine flora of the Central Rhodopes Mountains revealed the presence of 14 taxa of conservation importance. Amongst them 12 are endemics: 9 Balkan and 3 Bulgarian endemics. The species *Anthemis rumelica* (DC) Ferdinand is included in the IUCN Red List of Threatened Plants. The distribution of the *Onosma thracica* Velen. in the central Rhodopes Mts. was confirmed. The serpentine terrains are highly influenced by the anthropogenic impact – reforestation, tourism, ploughing of the fertile alluvial soils, cattle-breeding. Despite these negative effects the serpentine flora demonstrates specific peculiarities.

**KEY WORDS:** rare plants, endemics, serpentine, Central Rhodopes, Bulgaria

### INTRODUCTION

The serpentine rocks in many parts of the world are connected with unusual flora, including rare and endemic plants, sparse vegetation and mosaic distribution of the populations. The serpentine bedrock plays an important role in the formation and development of endemic flora and survival of relict elements as well (Brooks, 1987).

The largest serpentine bodies in Bulgaria are located in the Rhodopes Mountains – southwards from Krumovgrad, Ivailovgrad, eastwards from Zlatograd (Eastern Rhodopes) and southwards from Asenovgrad (Central Rhodopes) (Kozhoukharova, 1984, 1985).

The purposeful investigations on the serpentine flora in Bulgaria began in 1997. In the course of several years a number of publications appeared related to the characteristics and species composition on the serpentine areas in the Eastern Rhodopes Mountains (Pavlova, at al. 1998; Pavlova, 2001; 2004; Pavlova, Dimitrov, 2001; Pavlova et al., 2002; Pavlova et al., 2003; Pavlova et al., 2004).

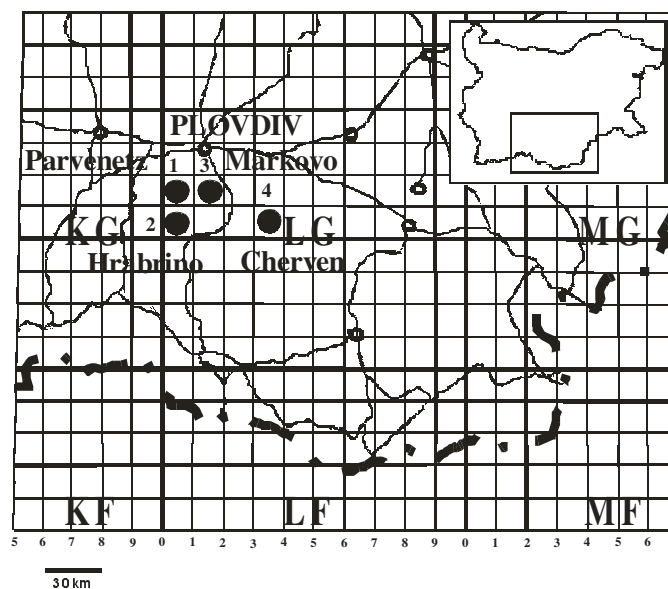
The growing interest in the serpentines in Bulgaria is caused by their variety and stage of ultrabase compared to similar areas in Albania, Greece and former Jugoslavia (Kozhoukharova, 1984).

Irrespective of these pioneer studies the serpentine flora of Bulgaria is still not comprehensively investigated from taxonomical and ecological point of view. For instance, little is known about the number of the endemic species. In addition, the study of the serpentines will allow defining the most appropriate measures necessary for the preservation of such ecosystems with unique flora and vegetation.

The aim of the present paper is to assess the biodiversity of vascular plants growing on the serpentines in the Central Rhodopes Mountains focusing on the endemic, relict and rare taxa.

## MATERIAL AND METHODS

The study area includes serpentines near to villages Parvenetz, Hrabrino, Cerven, and Markovo. (Fig. 1). These areas are among the largest ones in this part of the mountain.



**Fig. 1.** The study area shown on UTM Grid map of Bulgaria

The field observations were carried out for five successive years (2000–2004) in May-June. The plant material was determined using Bulgarian floras as well as Flora Europaea and Flora of Turkey. A list of species of conservation importance was prepared. Data from the chorological card-index kept in the Institute of Botany (Bulgarian Academy of Sciences) and from the main Bulgarian herbaria (SO, SOM,

SOA) is also presented. The basic literature sources are The Red Data Book of PR Bulgaria (Velchev, ed., 1984), Atlas of the Endemic Plants in Bulgaria (Velchev et al., eds. 1992), List of the Protected Plants in the Law of Biological Diversity (ДВ бр.77, 09.08.2002). Part of the herbar specimens is deposited in the Herbarium at Sofia University (SO). The taxonomic database summarized by Kozhuharov et al. (1992) is used.

The transect method was selected for observations in the study area where the outlet of the basic rock was confirmed. The displacement was between 150 and 400 m a.s.l.

The climate is characterized by a well-pronounced mediterranean influence (Tishkov, 1982).

Following the botanical-geographical division (Bondev, 2002), the study area is assigned to the transitional-mediterranean vegetation zone with dominance of mesophilous montane-balkan vegetation. The primary plant cover is highly disturbed, transformed into degraded “shibljak” communities. The tree vegetation is represented by *Quercus pubescens* Willd., *Fraxinus ornus* L., *Pistacia terrebinthus* L., *Carpinus orientalis* Mill., etc. Parts of the north- and east-facing slopes are covered by artificial plantations of *Ailanthus altissima* (Mill.) Swingle and *Robinia pseudoacacia* L.

## RESULTS AND DISCUSSION

The analysis of the serpentine flora of the Central Rhodopes Mountains revealed the presence of 14 taxa of conservation importance (Table 1). They constitute 8.52% of the number of all vascular plants distributed in the following categories: 12 endemics, amongst them 9 Balkan (9.43% of the Balkan endemics of conservation importance, distributed in the Rhodopes Mountains) and 3 Bulgarian (4.17% of the Bulgarian endemics of conservation importance, distributed in the Rhodopes Mountains).

1. Four taxa are included in the Red Data Book of the PR Bulgaria – two with category “endangered” and two with category “rare”.
2. Two taxa are included as “threatened” in the Law of the Biological Diversity.
3. The species *Anthemis rumelica* (DC) Ferdinand is included in the IUCN Red List of Threatened Plants.

The populations of the rare species *Anthemis rumelica* are sparse. They grow on the right bank of the Parvenetza river together with the endemics *Delphinium balcanicum* Pawl., *Koeleria mactantha* (Ledeb.) Schult. et Schult., *Crucianella graeca* Boiss., *Inula aschersoniana* Janka.

The populations of *Iris reichenbachii* Heuff. and *Verbascum nobile* Velen. are small and mosaic, occupying an east-facing slope at the highest elevation compared to other species.

The find of *Onosma thracica* Velen. on serpentine terrains confirms the data of Delipavlov, ed. (1992) for its distribution in the Central Rhodopes Mountains and presents new localities for this Bulgarian endemic.

The serpentine terrains near the village of Parvenetz are of greatest importance because all mentioned plant taxa of conservation importance are found there. The

running local river disturbs the entirety of the massif. Single trees of *Platanus orientalis* L. are found on the left serpentine river bank.

The serpentine terrains of all four sites are located in close proximity to the villages and are highly influenced by the anthropogenic impact – reforestation, tourism, ploughing of the fertile alluvial soils, cattle-breeding. Despite these negative effects the serpentine flora demonstrates specific peculiarities.

Taking into consideration the results from the present and previous investigations we propose to set apart the serpentine areas as separate habitats of the classification scheme for Bulgaria. They are related to the Mediterranean basic and ultrabasic rocks (code H3.2.H5) following the classification of EUNIS and the Eastern Mediterranean screes (code 61.4) according to the CORINE biotopes. Unfortunately, such habitats are not included in Supplement 1 and Supplement 2 of the List of Habitats in Bulgaria (NATURA 2000) that is under preparation.

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**Table 1** Taxa of conservation importance found on serpentine terrains in the Central Rhodopes Mts.

Taxa	Sites	Ч.к.н.	IUCN	Atlas EP	Low Biodiversity	Endemics according to:
<i>Anthemis rumelica</i> (DC)Ferdinand		+ (R)	+ (R)	+	+	<b>Bu E</b> Velchev et al. 1992
<i>Campanula sparsa</i> Friv. ssp. <i>sphaerothrix</i> (Griseb.) Hayek						<b>Balk E</b> Dimitrov (ed.) 2000
<i>Crepis stojanovii</i> T. Georg.		+ (E)				
<i>Crucianella graeca</i> Velen.						<b>Balk E</b> Anchev 1989
<i>Delphinium balcanicum</i> Pawl.		+ (R)				<b>Balk E</b> Velchev et al. 1992
<i>Digitalis viridiflora</i> Lindl.						<b>Balk E</b> Assenov 1995
<i>Goniolimon collinum</i> (Griseb.)Boiss.					+	
<i>Hypericum rumeliacum</i> Boiss.						<b>Balk E</b> Anchev 1989
<i>Inula aschersoniana</i> Janka						<b>Balk E</b> Dimitrov, ed., 2000
<i>Iris reichenbachii</i> Heuff.				+		<b>Balk E</b> Velchev et al. 1992
<i>Koeleria macrantha</i> (Ledeb.) Schult. et Schult.						<b>Balk E</b> Dimitrov, ed., 2000
<i>Onosma thracica</i> Velen.				+		<b>Bu E</b> Velchev et al. 1992
<i>Scabiosa triniifolia</i> Friv.						<b>Balk E</b> Dimitrov, ed., 2000
<i>Verbascum nobile</i> Velen.		+ (E)				<b>Bu E</b> Velchev et al. 1992