

ENDEMIC PLANTS IN THE FLORA OF SHUTMAN (SHARRI MOUNTAIN), KOSOVO – AN ANALYSIS OF PHYTOGEOGRAPHICAL ELEMENTS AND LIFE FORMS

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This paper aims to present the diversity of endemic plants in the Shutman area and an analysis of chorological groups and life forms. The flora of Shutman comprises 31 endemic plant species. Among them, there are 20 Balkan endemics, 1 stenoendemic and 5 sub-endemic species. They belong to 20 genera and 13 families. The richest among the endemics are families Asteraceae and Caryophyllaceae, both with 4 species. All endemics are herbaceous perennials. Hemicryptophytes dominate among life forms, accounting for 58.06%. Most of the species are Balkan floristic elements (20 species or 64.52%), followed by Southeast European and South European floristic elements, both with 3 taxa (9.68%). A total of 27 species have national or international conservation status. Reporting of *Ranunculus degenii* Kümmerle & Jav. for the first time in Shutman makes this area the second distribution record of this plant in Kosovo.

Keywords: high-mountain flora, endemic vascular flora, floristic element, conservation status

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U radu se želi prezentirati raznolikost endemičnih biljaka područja Shutman te analiza horoloških skupina i životnih oblika. Flora Shutmana obuhvaća 31 endemičnu biljnu vrstu. Među njima je 20 balkanskih endema, 1 stenoendem i 5 subendemičkih vrsta. Pripadaju u 20 rodova i 13 porodica. Najzastupljenije među endemima su porodice Asteraceae i Caryophyllaceae, obje s četiri vrste. Svi endemi su zeljaste trajnice. Među životnim oblicima dominiraju hemikriptofiti s 58,06%. Većina vrsta pripada balkanskom florističkom elementu (20 vrsta ili 64,52%), slijede jugoistočni Europski i južni Europski floristički elementi, oba s 3 svojte (9,68%). Ukupno 27 vrsta ima nacionalni ili međunarodni status zaštite. Po prvi puta se za Shutman bilježi *Ranunculus degenii* Kümmerle & Jav., čime to područje postaje drugi lokalitet za tu biljku na Kosovu.

Ključne riječi: visokoplaninska flora, endemična vaskularna flora, floristički element, kategorija zaštite

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INTRODUCTION

In terms of nature values, i.e. geodiversity (geomorphological, hydrological, pedological and climatic conditions), Kosovo is unique and also very rich in terms of biodiversity (MUSTAFA *et al.*, 2016). It is estimated that there are in all between 2800 and 3000 vascular plants (MILLAKU *et al.*, 2017, 2018), comprising diverse floristic elements, but in particular Balkan endemics and paleo-endemics (MILLAKU *et al.*, 2018). The endemic taxa are the most attractive components in each flora. Knowledge of the endemic flora of a certain area may explain its biogeographical history, and the percentage of endemic species in a given flora determines the degree of isolation and the age of a given territory (ANAČKOV *et al.*, 2016). Endemic plants are important for understanding the florogenetic tendencies and phytogeographic characteristics of a region (RANĐELOVIĆ *et al.*, 2008; PAPOVIĆ, 2016).

There are many definitions of the term “endemism” attempting to explain this phenomenon. Endemism is a function of the spatial scale used to describe the restriction of certain taxa to an area of defined size (LAFFAN & CRISP, 2003). The term has quite different definitions according to different writers (MILLAKU *et al.*, 2017). Endemic species are plants that exist only in one geographical region or a particular area. The phenomenon of endemism characterizes those taxa whose distribution is restricted to a certain area and is smaller than that of other taxa of the same rank (VUKSANOVIĆ *et al.*, 2016). Species can be endemic to large or small areas: some are endemic to a part of a continent, and others within the borders of a given country or to a single mountain. Balkan endemic plants are those species whose distribution is restricted to the territory of the Balkan Peninsula (TOMOVIĆ *et al.*, 2014; ANAČKOV *et al.*, 2016; MILLAKU *et al.*, 2017). Species are termed sub-endemic if they are restricted to a narrow area that is marginally shared with only one or two neighbouring countries, e.g. Kosovo and Albania (GAVRILOVIĆ *et al.*, 2017; SHUKA *et al.*, 2018). Steno-endemics are plant taxa that are distributed to a narrow range completely within the borders of a given country or restricted geographical area such as a single mountain (GAVRILOVIĆ *et al.*, 2017; MILLAKU *et al.*, 2017).

The flora of a certain area in Kosovo can include a number of taxa whose distribution is not only in the Balkan Peninsula, but also across some parts of the neighbouring geographical regions or territories (e.g. the Apennines, the Alps, the Carpathians, the Pannonian plain or Anatolia, etc.), classifying them as sub-endemics (RANĐELOVIĆ *et al.* (2008).

Sharri Mountain, part of Kosovo, provides an interesting site of plant richness and diversity, with an estimated 2,000 vascular plant species (BANK *et al.*, 2013; MUSTAFA *et al.*, 2015). A special characteristic of Sharri Mountain (Sharri National Park) is the presence of endemic, relict, and rare species and plant communities (MUSTAFA *et al.*, 2015). Endemic plant species of Sharri represent a unique contribution to the floristic richness of Kosovo, because 80 Balkan endemic taxa and 12 Kosovo endemic taxa have been reported for its territory (MESP, 2015). This area is one of the biodiversity hot-spots in Kosovo and the Balkan Peninsula.

Endemism of Kosovo and the Sharri Mountain flora cannot be assessed without the endemic flora of the Shutman Strict Nature Reserve flora, which is characterized by a high percentage of endemism. Preliminary research on the endemic flora of the Shutman Reserve showed a significant number of Balkan endemic and Balkan

sub-endemic species (HALILAJ *et al.*, 2019). Shutman endemic flora is nevertheless still largely unexplored and further investigation is called for. Some species so far considered Kosovo or Balkan endemics were discovered in other countries, or outside the territory of the Balkan Peninsula. An interesting case is *Crocus scardicus* Košanin, which was considered a Kosovo endemic for a long time, but subsequently was reported also for North Macedonia and Albania. However, some authors still consider it a Kosovo endemic. Knowledge of endemism is particularly important for the differentiation of floristic regions, as well as for determining or expressing the degree of specificity of a vascular flora (PAPOVIĆ, 2016).

In terms of biodiversity conservation, high-mountain regions (such as Shutman Reserve) are of special significance, since they are important regions of floristic diversity and endemism. These regions are usually also rich in species that are subjected to different categories of protection in national and international levels. The aim of this study is to provide a list of endemic vascular plants of Shutman and to present phytogeographical and ecological characteristics of this flora together with their conservation status.

MATERIALS AND METHODS

The present study is based on field investigations conducted during the vegetative period May – September 2018 and April 2019, in particular during each species' flowering time. Stationary methods and routes of research have been applied in this survey. The identification of plant material was made by using adequate literature sources such as: Atlas of Kosovo Plants (BERISHA *et al.*, 2012), Flora of Albania (PAPARISTO *et al.*, 1988; QOSJA *et al.*, 1992, 1996; VANGJELI *et al.*, 2000), Excursion Flora of Albania (DEMIRI, 1983; VANGJELI, 2015) and Flora Albanica Atlas (VANGJELI, 2017), as well as using other relevant books and keys (VANGJELI, 2003; MILLAKU *et al.*, 2013). The botanical nomenclature of the endemic plants follows the nomenclature used in BERISHA *et al.* (2012), MILAKU *et al.* (2013), BARINA *et al.* (2018) and in Euro+Med PlantBase (EURO+MED, 2006-2016).

Floristic elements, life forms and biological types are given for each taxon. Species classification in terms of life form was performed according to RAUNKIAER (1934). Taxa were classified as follows: chamaephytes (Ch), hemicryptophytes (H), geophytes (G), and therophytes (T). Biological types were defined according to the Flora of Albania (PAPARISTO *et al.* 1988; QOSJA *et al.* 1992, 1996; VANGJELI *et al.* 2000) and BERISHA *et al.* (2012). The floristic elements were defined after ASSYOV & PETROVA (2012), complemented with data from ASENOV (2015) and VANGJELI (2017).

The assessment of the conservation status was done according to the Red Book of Vascular Flora of the Republic of Kosovo (MILLAKU *et al.*, 2013), the IUCN Red List of Threatened Species (IUCN 2018) and the European Red List of Vascular Plants (BILZ *et al.*, 2011). We also consulted the Bern Convention, Habitat Directive and CITES Convention, but no species listed in this study are included in these three documents. The endemics were determined according to HAJREDINI *et al.* (2013), MAHMUTAJ (2015), MILLAKU *et al.* (2013), MILLAKU *et al.* (2017), PETROVA & VLADIMIROV (2010), TOMOVIĆ *et al.* (2014), VUKSANOVIĆ *et al.* (2016) and ZAHARIEV (2016). Additionally, surveyed natural habitats were classified according to EUNIS (EUNIS, 2007) (Tab. 1).

Tab. 1. List of main recorded EUNIS Habitat types

No.	EUNIS Code	Full EUNIS Habitat name
1	C3.55	Sparsely vegetated river gravel banks
2	D2.2	Poor fens and soft-water spring mires
3	D2.3	Transition mires and quaking bogs
4	D4.2	Basic mountain flushes and stream sides, with a rich arctic-montane flora
5	E1	Dry grasslands
6	E1.2	Perennial calcareous grassland and basic steppes
7	E1.7	Non-Mediterranean dry acid and neutral closed grassland
8	E1.92	Perennial open siliceous grassland
9	E2.2	Low and medium altitude hay meadows
10	E2.3	Mountain hay meadows
11	E4	Alpine and subalpine grasslands
12	E4.1	Vegetated snow-patch
13	E4.11	Boreo-alpine acidocline snow-patch grassland and herb habitats
14	E4.12	Boreo-alpine calcicline snow-patch grassland and herb habitats
15	E4.3	Acid alpine and subalpine grassland
16	E4.31	Alpic <i>Nardus stricta</i> swards and related communities
17	E4.39	Oro-Moesian acidophilous grassland
18	E4.4	Calcareous alpine and subalpine grassland
19	E4.5	Alpine and subalpine enriched grassland
20	E5.4	Moist or wet tall-herb and fern fringes and meadows
21	E5.5	Subalpine moist or wet tall-herb and fern stands
22	F2.2	Evergreen alpine and subalpine heath and scrub
23	F2.3	Subalpine deciduous scrub
24	F3.16	<i>Juniperus communis</i> scrub
25	F3.2	Submediterranean deciduous thickets and brushes
26	G1.1	Riparian and gallery woodland, with dominant <i>Alnus</i> , <i>Betula</i> , <i>Populus</i> or <i>Salix</i>
27	G1.6	<i>Fagus</i> woodland
28	G1.8	Acidophilous <i>Quercus</i> -dominated woodland
29	G1.A1	<i>Quercus</i> – <i>Fraxinus</i> – <i>Carpinus betulus</i> woodland on eutrophic and mesotrophic soils
30	H2	Screes
31	H2.1	Cold siliceous screes
32	H2.2	Cold limestone screes
33	H2.3	Temperate-montane acid siliceous screes
34	H2.4	Temperate-montane calcareous and ultra-basic screes
35	H3.1	Acid siliceous inland cliffs
36	H3.2	Basic and ultra-basic inland cliffs
37	X04	Raised bog complexes

General data about the area studied

Sharri Mountain is a separate branch of the Dinarides and is one of the largest and highest mountain ranges of the Balkan Peninsula, stretching in the border areas of Kosovo and Republic of North Macedonia. Sharri National Park in Kosovo is located in the south-eastern part of the country and it occupies 53,469 hectares (MUSTAFA *et al.*, 2015). It is one of the most important centres of the Balkan and European flora and one of the richest with respect to plant endemism (TOMOVIĆ *et al.*, 2014; HALILAJ *et al.*, 2019). The biodiversity includes the characteristics of both the Balkans and the Mediterranean, thus making it rich in flora in the sense of rare and endemic types. On the territory of the Sharri Mountain there are 16 strict natural protected areas, one of which is area of high mountains, Shutman, which was placed under strict protection on February 2016 (GRK, 2016).

Shutman Strict Nature Reserve has an area of 5057.39 hectares, and consists of a wide mountain belt from 1600 m to 2536 m above sea level. The combination of terrestrial and underwater ecosystems is well preserved, including mountain lakes, oligotrophic streams, marshes, areas of raised peat bogs, extensive pastures and meadows, shrubs and/or herbaceous vegetation and vegetation of rocks in the gorges and canyons, which support specialised and unique ecosystems (MMPH, 2013; MESP, 2015). The area is dominated by alpine and sub-alpine pastures, rocky grounds, cliffs and rocky screes, on the limestone or siliceous substrate. The subalpine zone extends above the upper forest belt from 1600 to 2100 m (rarely to 2200 m.) above sea level (ABDI & XHULAJ, 2016). At high altitudes the alpine zone is found, where environmental conditions become more extreme due to decreasing temperatures, increasing solar radiation, strong winds, etc. (HALILAJ *et al.*, 2019).

The study area is characterized by an alpine and continental climate, at times influenced by a moderate continental climate (MMPH, 2013). The average annual rainfall is 1370 mm, with snow cover for around 280 days per year. Approximately 50% of total annual rain falls from April to September, while the lowest level of rainfall is during the months of January-March and August. The annual average temperature is 8.6° C. Summers are short with an average temperature of 18.1° C, while winters are long and relatively cold with average annual temperature of -0.4° C (MMPH, 2013; VOIT *et al.*, 2013). The geographical position, climate, different soil types and geological substrata, hydrological characteristics, and specific orographic conditions in the area determine its peculiar mountain and high-mountain flora. Furthermore, those are factors contributing to a rich flora and vegetation and considerable number of endemic plant species on the Shutman Reserve.

RESULTS AND DISCUSSION

On the basis of the field observations carried out in the Shutman Strict Nature Reserve a list of 31 endemic taxa was prepared (Tab. 2). The list of identified taxa includes mostly Balkan endemics (20 endemic plant species). There are 5 sub-endemic plants in the number of plant endemic species enumerated in this study: *Crocus scardicus* Košanin, *Dianthus scardicus* Wettst., *Potentilla doerfleri* Wettst., *Ranunculus degenii* Kümmerle & Jav. and *Sempervivum macedonicum* Praeger. In addition, *Potentilla doerfleri* Wettst. should be considered simultaneously a stenoendemic species of Sharri Mountain, meaning it has restricted distribution only in Mt. Sharri, situated in

Tab. 2. List of endemic species of the Shutman Strict Nature Reserve

Nr	Species	Family	Life forms	Floristic element	Biological type	Endemic type	Conservation status
1.	<i>Achillea abrotanoides</i> (Vis.) Vis.	Asteraceae	Ch	Bal	p	Bal	
2.	<i>Achillea chrysocoma</i> Friv.	Asteraceae	H	Bal	p	Bal	EN
3.	<i>Achillea pindicola</i> subsp. <i>corabensis</i> (Heimerl) Greuter	Asteraceae	Ch	Bal	p	Bal	EN
4.	<i>Barbarea balcana</i> Pančić	Brassicaceae	H	Bal	p	Bal	NT; EU- LC; IU-LC
5.	<i>Campanula foliosa</i> Ten.	Campanulaceae	H	SEEur	p	Ap-Bal	LC
6.	<i>Campanula spatulata</i> Sibth. et Sm.	Campanulaceae	G	Bal	p	Bal	LC
7.	<i>Campanula albatica</i> Witasek	Campanulaceae	H	Bal	p	Bal	EN
8.	<i>Cerastium decalvans</i> Schlosser & Vuk.	Caryophyllaceae	H	Bal	p	Bal	
9.	<i>Colchicum macedonicum</i> Košanin	Liliaceae	G	SEur	p	Bal	IU-VU; Me-VU
10.	<i>Crocus scardicus</i> Košanin	Iridaceae	G	Bal	p	SubE	NT; IU- LC
11.	<i>Crocus veluchensis</i> Herb.	Iridaceae	G	Bal	p	Bal	
12.	<i>Dianthus integer</i> Vis.	Caryophyllaceae	H	Bal	p	Bal	NT
13.	<i>Dianthus scardicus</i> Wettst.	Caryophyllaceae	H	Bal	p	SubE	NT
14.	<i>Geranium subcaulescens</i> L'Hér. ex DC.	Geraniaceae	G	Med	p	Ap-Bal-An	LC
15.	<i>Lilium albaticum</i> Griseb.	Liliaceae	G	Bal	p	Bal	LC; Me- LC
16.	<i>Linaria peloponnesiaca</i> Boiss. & Heldr.	Scrophulariaceae	H	Bal	p	Bal	NT
17.	<i>Lunaria telekiana</i> Jáv.	Brassicaceae	H	CEur	p	Bal	EN
18.	<i>Narthecium scardicum</i> Košanin	Liliaceae	G	SEur	p	Bal	NT
19.	<i>Onobrychis montana</i> subsp. <i>scardica</i> (Griseb.) P. W. Ball	Fabaceae	H	Eur-Med	p	Bal	
20.	<i>Potentilla calabra</i> Ten.	Rosaceae	H	SEur	p	Ap-Bal-An	EN
21.	<i>Potentilla doerfleri</i> Wettst.	Rosaceae	Ch	SEEur	p	SubE	EN
22.	<i>Potentilla speciosa</i> Willd. subsp. <i>illyrica</i> Soják	Rosaceae	Ch	SEEur	p	Bal	NT
23.	<i>Ranunculus degenii</i> Kümmerle & Jav.	Ranunculaceae	H	Bal	p	SubE	CR
24.	<i>Saxifraga scardica</i> Griseb.	Saxifragaceae	Ch	Bal	p	Bal	LC
25.	<i>Saxifraga sempervivum</i> K. Koch	Saxifragaceae	Ch	Bal-Anat	p	Bal-An	LC
26.	<i>Sempervivum heuffelii</i> Schott	Crassulaceae	H	Bal	p	Bal-Carp	LC
27.	<i>Sempervivum kosanini</i> Praeger	Crassulaceae	H	Bal	p	Bal	NT
28.	<i>Sempervivum macedonicum</i> Praeger	Crassulaceae	H	Bal	p	SubE	LC
29.	<i>Tephrosia papposa</i> subsp. <i>wagneri</i> (Degen) B. Nord.	Asteraceae	H	Bal	p	Bal	VU
30.	<i>Silene roemerii</i> Friv.	Caryophyllaceae	H	Bal-Ap	p	Ap-Bal	NT
31.	<i>Verbascum scardicola</i> Bornm.	Scrophulariaceae	H	Bal	p	Bal	CR

Legend:

Life cycle: p – perennial.

Life forms: Ch – Chamaephytes; H – Hemicryptophytes; G – Geophytes.

Endemic plants: Bal = Balkan endemic; SubE = Subendemic; SteE = stenoendemic of Sharri Mountain; Ap-Bal = Apennine-Balkan subendemic; Bal-Carp = Balkan-Carpathian; Bal-An = Balkan-Anatolian subendemic; Ap-Bal-An = Apennine-Balkan-Anatolian subendemic. **Conservation Status:** The Red Book of Vascular Flora of the Republic of Kosovo 1: EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern. The IUCN Red List of Threatened Species: Global IU – ; European: EU – ; Mediterranean Me – .

north-western part of North Macedonia and southern part of Kosovo. The occurrence of some Balkan endemic species, such as *Ranunculus degenii* Kümmerle & Jav. and *Sempervivum macedonicum* Praeger confirms the floristic connection of Shar Mountain with North Albania and other parts of the Balkans (e.g. Dinaric Alps and Scardo-Pindhic mountain systems). Therefore, this region is an important distribution corridor for orophytes from Sharri Mountain towards the Dinaric Alps, Albanids and Pindhos, as well as vice-versa, from the other side.

Ranunculus degenii Kümmerle & Jav. was recorded for the first time on Sharri Mountain. It had been reported for Kosovo in only one locality, in Dobrosh Mountain (Rup) in the Albanian Alps (MILLAKU *et al.*, 2013). The new discovered locality in the Shutman part of Sharri Mountain extends the known distribution range of *Ranunculus degenii* to Kosovo, making this area the second locality of this plant in Kosovo. It is mainly distributed in the mountains of the Western Balkans, in Korab Mountain (Albania) and Albanian Alps of Kosovo (MILLAKU *et al.*, 2013), as well as in the Mts Šarplanina part of North Macedonia (ABDII, 2017). The presence of this plant species in Shutman provides added value for the flora and vegetation of Kosovo.

However, six of the listed taxa, *Campanula foliosa* Ten. and *Silene roemerii* Friv. (Apennine-Balkan subendemic plants), *Geranium subcaulescens* L'Hér. ex DC. and *Potentilla calabra* Ten. (Apennine-Balkan-Anatolian subendemic plants), *Saxifraga sempervivum* K. Koch (Balkan-Anatolian subendemic plant) and *Sempervivum heuffelii* Schott (Balkan-Carpathian subendemic plant), are not strictly Balkan endemics, but are also distributed in the territory near, or close to the Balkan Peninsula, and are considered sub-endemics in the article (Tab. 1). They belong to the group of rare taxa in Kosovo. According to RAKAJ (2009), the occurrence of sub-endemic taxa in the Balkans and Apennine Peninsula like *Campanula foliosa* Ten. and *Silene roemerii* Friv., point to ancient amphiadriatic floristic links.

The flora of Shutman shows a considerable floristic richness with a great number of Balkan endemics (20 species) and Balkan sub-endemic plants (5 species). According to MESP (2015), the number of endemics taxa of Sharri flora is 92. The considerable number of endemic species identified for Shutman Reserve, part of Sharri Mountain, indicates that the region of Shutman is a very important centre of the floristic endemism in Sharri Mountain, Kosovo and Balkan Peninsula. According to MORRONE (2008), an area of endemism must have at least two endemic species. Endemism is an important concept in conservation biology and it is one of the criteria used to set priorities for species conservation efforts (SHEVOCK, 1996). The presence of an imposing number of endemic taxa has a great significance from the aspect of biodiversity and conservation of the study area. Shutman Reserve represents an area with a noticeably richer flora than any other reserve in Sharri.

The endemic taxa in the investigated territory belong to 20 genera and 13 families. The most important contributors at family rank with the highest number of the endemic plant species are Asteraceae and Caryophyllaceae, each of them accounting for 4 or 12.91% of the total endemic plants listed in this study. Four families, Campanulaceae, Crassulaceae, Liliaceae and Rosaceae are represented with 3 species or 9.68% of the total plants, while 7 other families are represented with 1-2 species. *Achillea*, *Campanula*, *Potentilla* and *Sempervivum* are the genera with the highest number of species, all with 3 species; *Crocus*, *Dianthus* and *Saxifraga* genera are represented with 2 species and 13 other genera are represented only with one species.

The biological types are represented only with perennial herbaceous plants. In the endemic flora of the Shutman there are 8 floristic elements (Fig. 1). The dominance of Balkan floristic elements is decisive for the genesis of the endemic flora on Shutman Mountain. The Balkan floristic element and related area groups (Balkan-Apennine and Balkan-Anatolian) are the most dominant, comprising 22 taxa (70.97% of the species). The Mediterranean, European-Mediterranean and Central European elements are present in a very low percentage (1 taxon or 3.22% for each element), but taxa with South European and Southeast European Mountain floristic elements are significant, both accounting for three taxa or 9.68%.

The biological spectrum of the endemic flora of the Shutman presented in Fig. 2 shows the pronounced hemicryptophyte character of this area. Hemicryptophytes represent 58.06% of the total number of endemics (18 species), followed by geophytes

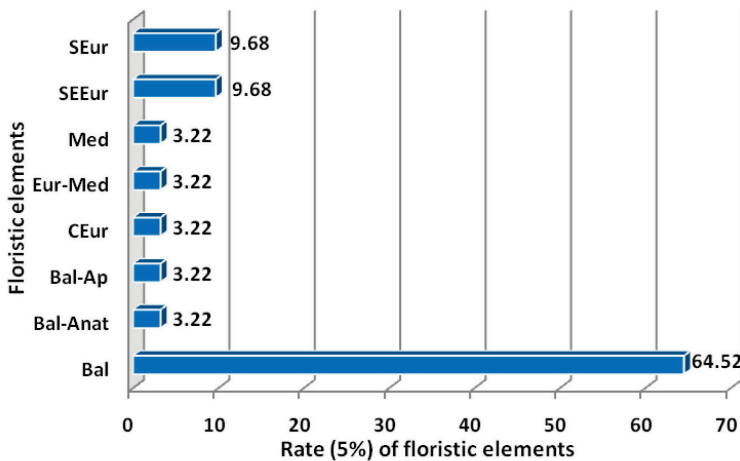


Fig. 1. Chorological spectrum of endemic flora of the Shutman Mountain

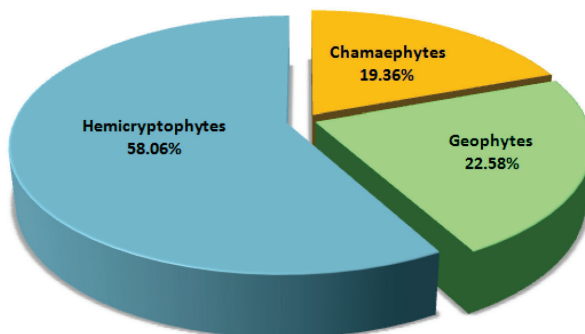


Fig. 2. Life-form spectrum of the endemic flora of the Shutman Strict Nature Reserve: H – hemicryptophytes; G – geophytes; Ch – chamaephytes.

(22.58% or 7 species) and chamaephytes (19.36% or 6 species). The high proportion of hemicryptophytes reflects Balkan flora in general being dominated by hemicryptophytes (GORANOVA *et al.*, 2013; MEÇO *et al.*, 2018). Also, domination of hemicryptophytes in the biological spectrum shows the influences of the cold mountain climate. The significant number of geophytes is related to the extreme conditions of cold winters and summer drought, and is influenced by pastoral activities (MEÇO *et al.*, 2018).

Of the 31 endemic taxa listed in present study, 27 taxa (87.10%) have a conservation status as classified in national or international levels. Of these, only *Colchicum macedonicum* Košanin) was not mentioned in the Red Book of Vascular Flora of Kosovo (MILAKU *et al.*, 2013). Four species have been assigned a national and international IUCN threat category. According to national conservation status, nine species (34.61%) are near threatened (NT), eight species (30.77%) are least concern (LC), six species (23.08%) are endangered (EN), two species (7.69%) are critically endangered (CR) and one species (3.85%) is vulnerable (VU). Four species are categorized according to the IUCN Red List criteria, which represent 12.90% of the entire vascular flora of the study area. Out of them, three species are listed as least concern (LC) and one as vulnerable (VU).

Achillea abrotanoides (Vis.) Vis., *Cerastium decalvans* Schlosser & Vuk., *Crocus veluchensis* Herb. And *Onobrychis scardica* subsp. *scardica* (Griseb.) P.W.Ball are not listed in the Kosovo Red List of vascular plants. The above mentioned species are known from very few localities, and their categorization is difficult due to insufficient information about their life history and local populations.

Endemic plant species are usually more vulnerable to anthropogenic threats, and therefore the Shutman Reserve territory should be more carefully monitored and managed.

CONCLUSIONS

The flora of the Shutman Strict Nature Reserve is one of the richest in the region, even though it is poorly known. Until recently the flora of endangered endemic species was not studied by anyone. As the result of our study, we have discovered 31 endemic species represented by 20 genera and 13 families. The occurrence of a high number of Balkan endemic and sub-endemic species establish this area as a one of the most important centres of diversity of endemic flora in Kosovo and SE Europe. The largest number of endemics (20 taxa) belongs to the Balkan floristic element. The influence of the cold mountain climate is expressed in the dominance of hemicryptophytes in the biological spectrum, which are represented by 58.06% of the total number of endemic species. The new locality of *Ranunculus degenii* in Shutman Strict Nature Reserve substantially extends the distribution limits of this taxon in Kosovo. The obtained results on the endemic plants of Shutman can increase the interest in further field research. Also, the data of this work can encourage the implementation of biodiversity conservation strategies in this important area of biodiversity and plant endemism, contributing to reducing the loss of these unique species.

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