

RESEARCH ARTICLE

(Open Access)**Analyse of life forms and floristic elements of some medicinal plants in Bredhik Reserve, Sharr Mountain in Kosovo**AVDYL BAJRAMI^{1*}, ERTA DODONA², HAXHI HALILAJ¹, XHAVIT MALA³¹ PhD candidat, Department of Plant Production, Faculty of Agriculture and Environment, Agricultural University of Tirana, Albania² Faculty of Agriculture and Environment, Agricultural University of Tirana, Albania³ Ministry of Environment and Spatial Planning -DAPK "Sharr Mountain"*Corresponding author Email: bajramiavdyl@gmail.com**Abstract**

This study represents the results for inventory of medicinal plants on the territory of Bredhik Natural Strict Reserve (Sharr Mountain, Kosovo) during 2018. The inventory of medicinal flora, are made for the first time in this area. The study shows the presence of 92 taxa within 70 genera and 42 families. Their taxonomic structure, life forms and biological types are discussed. Detailed information on their phytogeographical structure by major floral types and conservation status of taxa is presented to. The species with any conservation status by the international legislation are 60 or 65.22% of the total taxa's number. The analysis of life forms has shown that medicinal flora in this area predominates by hemicryptophytes (43 species) and phanerophytes (32 species). The phytogeographical elements dominated by taxa of chorological types Euro Mediterranean-Sub Mediterranean, Boreal – Subboreal, Euro-Asian and Euro-Siberian. The relic species are 16 (17.4% of the total species number) and are represented mainly by tertiary relicts. The biological types are represented mainly by perennial herbaceous plants (53.26%), followed by trees (18.48%) and shrubs (15.22%). Presence of a high number of threatened species (listed in IUCN List and European Red List of Medicinal Plants), indicates the importance of this Reserve for biodiversity conservation.

Key words: Flora, conservation status, relict species, medicinal plants**Introduction**

Kosovo has the greatest diversity of plants and it is the habitat of over 2500 plant species, because of its geographical location and climatic diversity. The Sharr Mountain is located in the region of Kosovo and Macedonia and comprises an overall area of 1,600 km² (Pulaj, 2013). The territory of Sharr National Park lies in the south and expanding towards southeast of Kosovo and far beyond into North Macedonia and to some extent into Albania at southwest side. Sharr has significant natural and ecological value, scientific, cultural, educational and recreational tourism. Within their space a huge diversity of both species and habitats exists (Tillemann, 2012). Regarding the floristic aspect they fall into the range of richest mountains in Kosovo and the Balkan's Peninsula and represent a treasure of

plant species with a large number of endemic, relict, rare and endangered species (Pulaj, 2013). On this territory there are about 1500 species of vascular floras (Veselaj & Mustafa, 2015; Mustafa et al., 2018), which all belong to life forms and number of ecologic types, from the Mediterranean to the Arctic (Mejzini, 2007). Also, the area is rich in more than 250 medical plants species (Pulaj, 2013). Due to high values of biodiversity, Sharr National Park has been identified as Important Plant Area (IPA) (Veselaj & Mustafa 2015). IPAs are natural or semi-natural sites with exceptional botanical richness and/or supporting an outstanding assemblage of rare, threatened or endemic plant species and/or vegetation of high botanic value. They are unique places where the jewels of Europe's wild plants can be found (Anderson et al., 2005).

The climate is diverse, from mild continental climate to the alpine climate above 2000 m. The cold continental climate dominates the areas with an altitude between 550 and 1,000 meters, whereas in areas with altitude higher than 1,000 (1,000 – 1,700) meters there is a harsh alpine climate. The continental climate is characterized by cold and wet winters and dry and hot summers. The alpine climate is characterized by long and cold winters with heavy snowfalls and short and cool summers (Abdii et al., 2017).

On the Shar Mountain, part of Kosovo's territory, are located 16 strict protected areas, one of which is Bredhik Nature Reserve (GRK, 2016). The total area of the Bredhik is 126.16 hectares. Vertical amplitude of the study area is about 600 m (between 1200 and 1800 m a.s.l.). There is no specified information about the climate in the research area. The Bredhiku Reserve distinguished for Hellenic beech forests with *Abies borisii-regis*, an endemic species of Balkan (in Kosovo is found only in the Sharr Mountains, in Restelica), in a highness of 1500 m – 1580 m and a forest with firs (habitat *Abietum alba koritniensis*) with highness of 1100 m – 1600 m, important habitats that are classified in Annex 1 of the European Directive on Habitats 92/43/EEC (MMPH/AMMK, 2013).

Medicinal plants play an important role in the development of human cultures and these plants are consider as valuable bio resources with social and economic importance. Identification of medicinal plants is necessary in management of their use. It gets an even greater significance when a significant part of it in certain areas remains unknown. Until now, no study has been performed of the medicinal plants of Bredhik Reserve. The aim of this study was to inventory medicinal plants and to conduct floristic analysis of the data obtained. Also, their national and international conservation status was considered.

Materials and methods

This study for inventory medicinal plants on the territory of the Strict Nature Reserve of Bredhiku

was conducted during 2018. Identification of the collected plants is made according to

Atlas of Kosovo plants (Berisha et al., 2012), The red book of vascular flora of the Republic of Kosovo (Millaku et al., 2013), Flora of Albania (Paparisto et al. 1988, 2000; Qosja et al.. 1992, 1996), Excursion flora of Albania (Demiri, 1983). The names of the species are under the databases of the Plant List (2013). The abbreviations of the authors' names of the plants are according to the International Plant Names Index (IPNI). The medicinal plants are according to Allen et al. (2014) and Millaku (2010; 2015).

For the classification of taxa as particular life forms, the Raunkiaer system (1934) was followed. For their determination we used different literature sources (Millaku, 1999; Millaku et al., 2013; Tomovi et al., 2014; Vuksanovi et al., 2016). Taxa were classified as chamaephytes (Ch), geophytes (G), hemicryptophytes (H), d phanerophytes (Ph) and therophytes (Th).

For the floristic elements, the classifications of Assyov & Petrova (2012) were used. Biological types are defined by Paparisto et al. (1988, 2000), Qosja et al. (1992, 1996), Berisha et al. (2012) and Millaku et al. (2013). The relics are presented according to some botanical literature sources (Millaku et al. 2008; Zahariev, 2016; Hajredini et al., 2013).

The conservation statute is recognized using the following documents: The red book of vascular flora of the Republic of Kosovo (Millaku et al., 2013), the IUCN Red List of Threatened Species (IUCN, 2018), European Red List of Medicinal Plants (Allen et al., 2014), Annex II to EU Habitats Directive (Directive 92/43/EEC), Appendix I to Bern Convention (CE, 1979), and

EU Wildlife Trade Regulation (Council Regulation (EC) No 338/97 of 9 December 1996 on the protection of species of wild fauna and flora by regulating trade therein) (Council Regulation 338/97). The floristic list is arranged in alphabetical order of the taxa (Table 1).

Results and discussion

An inventory of medicinal plants on the territory of Bredhik Natural Strict Reserve on Sharr Mountain is made for the first time. The total number of the found medicinal plants on the study area of the Bredhiku Reserve comprised 92 medicinal species that have been classified into 42 families and 70 genera (Tab. 1). Asteraceae and Rosaceae were the most represented families in the study area (14 sp. each). These were followed by Lamiaceae and Primulaceae (5 sp.), Cupressaceae (4 sp.), Gentianaceae and Plantaginaceae (3 sp.). The remaining families were represented by one (25 family) or two (10 family) species each.

Most genera are found in the family Asteraceae (11) and Rosacea (7), others have 1–4 species. Only 4 genera (5.71%) have 3–5 species. Most of them have 1-2 species. Most species-rich genus were *Primula* (Primulaceae) with 5 taxa, *Prunus* (Rosaceae) with 4, *Juniperus* (Cupressaceae) and *Rubus* (Rosaceae) with 3 species each genus. The majority of genus, 44 (62.85%) are presented with one genera, and 11 (15.71%) have by 2 genus.

The individual species in a community can be grouped into various life forms classes on the basis of their growth performance. The life forms spectrum of the medicinal flora of Bredhiku Reserve can be divided into five main types (Gaf. 1). The conditions of the site reflected in the life form of species. The biological spectrum shows a pronounced hemicryptophyte character of this area. Hemicryptophytes represent 46.74 % (43 sp.) of the total number of medicinal plants. Phanerophytes was the next dominant with an overall representation with 32 species (34.78%). Geophytes and therophytes comprised 6 species (6.52%) each, and chamaephytes represented by 5 species (5.44%).

Climate determines the type of plants that exist in each ecosystem. The life form spectrum is the indicator of micro and macroclimate (Asmus, 1990). Biological range of the investigated flora has shown a variety of forest and grassland communities in the

mountain area with a mild continental climate to the alpine climate. Domination of hemicryptophytes and phanerophytes in the biological spectrum can be explained by the location of the study, which is in the temperate climatic zone and by the significant contribution of forest habitats on its territory. The phanerophytes are life forms that are at the lowest altitude of study area.

The specific physical and geographical conditions of Bredhiku Reserve determine considerable diversity of floristic elements. We have established 17 different floristic elements (Fig. 2). The phytogeographical elements structure of the flora shows that they are dominated by taxa of floristic elements Euro-Asiatic (17; 18.68%) and European (13; 14.28%). The studied flora have also high numbers of medicinal species from Euro-Siberian (10; 10.98%), Euro-Mediterranean (9; 9.89%), Sub-Boreal (9; 9.89%) and Sub-Mediterranean (8; 8.79%) chorological groups. Boreal and Cosmopolitan elements are represented by 6 taxa (6.59%) each. The percentage of adventive species is small, 3 species (3.29%). The remaining floristic elements (8 groups) are relatively underrepresented. They are presented with 1-2 species (1.10-2.19%).

An important group of medicinal plants present in the Bredhiku Reserve are the relict plant species. Relict species are often viewed as fascinating ‘living fossils’ or remnants of old times (Grandcolas et al., 2014). They provide a unique opportunity to understand past and recent biogeographical and evolutionary processes (Kozłowski et al., 2013). In total, 16 (17.4% of the total species number) relict species are recorded in this study. They are represented mainly by tertiary relicts. Of them, only 2 plants species are glacial relict (*Arctostaphylos uva-ursi* (L.) Spreng., *Gentiana asclepiadea* L.). The presence of an imposing number of relict taxa has a great significance from the aspect of conservation biology of the area, emphasizing the fact that the Bredhiku area represents an important center of the important plant species in Kosovo.

Table 1. List of the registered plants species in the study and some their floristic elements

Species	Family	Life forms	Floristic element	Biological type	Relict plants	Red Book Kosovo & EU Policy species	European Red List	IUCN Red List
1	2	3	4	5	6	7	8	9
<i>Achillea millefolium</i> L.	Asteraceae	H	Eur-Sib	p			LC	LC
<i>Aconitum napelus</i> L.	Ranunculaceae	H	Eur	p		b	LC	
<i>Agrimonia eupatoria</i> L.	Rosaceae	H	Eur- Med	p			LC	
<i>Allium ursinum</i> L.	Alliaceae	G	Eur	p			LC	
<i>Anthyllis vulneraria</i> L. subsp. <i>polyphylla</i> (De gand) Nym.	Fabaceae	Ch	Eur-Med	p				
<i>Arctostaphylos uva-ursi</i> L. (Spreng)	Ericaceae	Ph	Boreal	sh	gl	c	LC	
<i>Artemisia absinthium</i> L.	Asteraceae	H	Pont-Med	p			LC	
<i>Artemisia vulgaris</i> L.	Asteraceae	H	subBoreal	p			LC	
<i>Atropa bella-donna</i> L.	Solanaceae	H	Eur	p				
<i>Bellis perennis</i> L.	Asteraceae	H	Eur-As	p				
<i>Betula pendula</i> Roth	Betulaceae	Ph	Eur-Sib	t	te		LC	LC
<i>Carlina acaulis</i> L.	Asteraceae	H	Eur	p				
<i>Castanea sativa</i> Mill.	Fagaceae	Ph	Eur-subMed	t	te		LC	LC
<i>Centaurea jacea</i> L.	Asteraceae	H	Eur-Sib	p				
<i>Centaureum erythraea</i> Rafn	Gentianaceae	Th	subMed	a-b				LC
<i>Chenopodium album</i> L.	Chenopodiaceae	Th	Cos	a				
<i>Cichorium intybus</i> L.	Asteraceae	H	Eur-Sib	p			LC	
<i>Clematis vitalba</i> L.	Ranunculaceae	Ch	Eur	p	te			
<i>Colchicum autumnale</i> L.	Liliaceae	G	Eur	p			LC	LC
<i>Cornus mas</i> L.	Cornaceae	Ph	subMed	sh				LC
<i>Corylus avellana</i> L.	Corylaceae	Ph	Med-CAs	sh-t	te			LC
<i>Corylus colurna</i> L.	Corylaceae	Ph	Pont-CAs	t	te			LC
<i>Crataegus monogyna</i> Jacq.	Rosaceae	Ph	subBoreal	sh-t			LC	
<i>Digitalis lanata</i> Ehrh.	Scrophulariaceae	H	subMed	b-p			LC	
<i>Echium vulgare</i> L.	Braginaceae	H	Eur-As	b-p				
<i>Epilobium angustifolium</i> L.	Onagraceae	H	subBoreal	p				LC
<i>Equisetum arvense</i> L.	Equisetaceae	H	Boreal	p			LC	LC
<i>Euphorbia myrsinites</i> L.	Euphorbiaceae	G	subMed	p				
<i>Fragaria vesca</i> L.	Rosaceae	H	subBoreal	p			LC	
<i>Fraxinus ornus</i> L.	Oleaceae	Ph	subMed	t	te			LC
<i>Galium verum</i> L.	Rubiaceae	H	Eur-As	p			LC	
<i>Gentiana asclepiadea</i> L.	Gentianaceae	H	Eur	p	gl			
<i>Gentiana punctata</i> L.	Gentianaceae	H	Alp-Carp	p		LC	LC	LC
<i>Geranium macrorrhizum</i> L.	Geraniaceae	G	Eur-Med	p				
<i>Geranium robertianum</i> L.	Geraniaceae	Th	subBoreal	a-b				
<i>Humulus lupulus</i> L.	Cannabaceae	H	Eur-Sib	p	te		LC	
<i>Hypericum alpigenum</i> Kit.	Hypericaceae	H	Eur -Sib	p				
<i>Hypericum perforatum</i> L.	Hypericaceae	H	Cos	p			LC	
<i>Juglans regia</i> L.	Juglandaceae	Ph	Eur-As	t	te			LC
<i>Juniperus communis</i> L.	Cupressaceae	Ph	subBoreal	sh	te		LC	LC
<i>Juniperus nana</i> Willd.	Cupressaceae	Ph	Eur- As	sh				
<i>Juniperus oxycedrus</i> L. subsp. <i>oxycedrus</i>	Cupressaceae	Ph	Med	sh	te		LC	LC
<i>Leucanthemum vulgare</i> (Lam.) DC.	Asteraceae	H	Eur-Sib	p				
<i>Lilium martagon</i> L.	Liliaceae	G	Eur-As	p			LC	
<i>Malus domestica</i> Borkh	Rosaceae	Ph	Eur-As	t				
<i>Malus sylvestris</i> (L.) Mill.	Rosaceae	Ph	Eur	t			DD	DD
<i>Malva sylvestris</i> L.	Malvaceae	Th	Cos	a			LC	
<i>Matricaria chamomilla</i> L.	Asteraceae	Th	Eur-As	a			LC	

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<i>Mentha longifolia</i> (L.) Huds.	Lamiaceae	H	Eur-Sib	p				LC
<i>Morus alba</i> L.	Moraceae	Ph	Adv	t				
<i>Morus nigra</i> L.	Moraceae	Ph	Adv	t				
<i>Orchis morio</i> L.	Orchidaceae	G	Eur-subMed	p				
<i>Origanum vulgare</i> L.	Lamiaceae	H	Eur-As	p				LC
<i>Petasites albus</i> (L.) Gaertn	Asteraceae	H	Eur-Pont	p				LC
<i>Petasites hybridus</i> (L.) G. Gaertn., B.Mey. & Scherb.	Asteraceae	H	Eur	p				LC
<i>Phyllitis scolopendrium</i> (L.) Newman	Aspleniaceae	H	subBoreal	p				
<i>Plantago lanceolata</i> L.	Plantaginaceae	H	Cos	p				LC
<i>Plantago major</i> L.	Plantaginaceae	H	Boreal	p				LC LC
<i>Primula acaulis</i> L.(Gruff)	Primulaceae	H	Eur	p				
<i>Primula elatior</i> (L.) Hill	Primulaceae	H	Eur	p				
<i>Primula veris</i> Huds. subsp. <i>columnae</i> (Ten.)	Primulaceae	H	Eur-Med	p				
<i>Primula veris</i> L.	Primulaceae	H	Eur-Med	p				LC
<i>Primula vulgaris</i> Huds.	Primulaceae	H	Eur-As	p				
<i>Prunus avium</i> L.	Rosaceae	Ph	subMed	t				LC
<i>Prunus cerasus</i> L.	Rosaceae	Ph	Eur	t				
<i>Prunus cocomilia</i> Ten.	Rosaceae	Ph	Eur-Med	t				LC
<i>Prunus spinosa</i> L.	Rosaceae	Ph	sPont	sh				LC
<i>Pteridium aquilinum</i> (L.) Kuhn	Dennstaedtiaceae	H	Cos	p				
<i>Pyrus communis</i> L.	Rosaceae	Ph	Eur-As	t				LC
<i>Robinia pseudoacacia</i> L.	Fabaceae	Ph	Adv	t				LC
<i>Rosa canina</i> L. subsp <i>lutetiana</i> (Lem.) Hay.	Rosaceae	Ph	subMed	sh				LC
<i>Rubus fruticosus</i> L.	Rosaceae	Ph	Eur-Med	sh				LC
<i>Rubus idaeus</i> L.	Rosaceae	Ph	subBoreal	sh				LC
<i>Rubus ulmifolius</i> L.	Rosaceae	Ph	Eur-Pont	sh				
<i>Salix alba</i> L.	Salicaceae	Ph	Eur-As	t	te			LC LC
<i>Salix caprrea</i> L.	Salicaceae	Ph	subBoreal	t	te			
<i>Sambucus nigra</i> L.	Caprifoliaceae	Ph	Eur-Med	sh		a; b		LC
<i>Solidago virgaurea</i> L.	Asteraceae	H	Boreal	p				
<i>Taraxacum officinale</i> (L) Web.	Asteraceae	H	Cos	p				LC
<i>Teucrium chamaedrys</i> L.	Lamiaceae	Ch	Eur-Med	p				LC
<i>Teucrium montanum</i> L.	Lamiaceae	H	subMed	p				LC
<i>Thymus</i> sp.	Lamiaceae	Ch		p				
<i>Tilia cordata</i> Mill.	Tiliaceae	Ph	Eur	t				LC LC
<i>Tussilago farfara</i> L.	Asteraceae	H	Eur-As	p				LC
<i>Urtica dioica</i> L.	Urticaceae	H	Boreal	p				LC LC
<i>Vaccinium myrtillus</i> L.	Ericaceae	Ph	Boreal	sh	te			LC
<i>Veratrum album</i> L.	Melanthiaceae	H	Eur-As	p				LC
<i>Verbascum thapsus</i> L.	Scrophylariaceae	H	Eur-As	b				LC
<i>Veronica officinalis</i> L.	Plantaginaceae	H	Eur-Sib	p				
<i>Viburnum opulus</i> L.	Adoxaceae	Ph	Eur-Sib	sh				
<i>Viola tricolor</i> L.	Violaceae	Th	Eur-As	a				LC
<i>Viscum album</i> L.	Loranthaceae	Ch	Eur-As	sh	te			LC

Legend

- **Life forms:** Ch - Chamaephytes; H - Hemicryptophytes; G - Geophytes; Ph - Phanerophytes, Th - Therophytes;
- **Life cycle:** – annual; a-b – annual to biennial; b – biennial; b-p – biennial to perennial; – perennial; ssh - semi-shrub; sh – shrub; sh-t – shrub to tree; t – tree.
- **Relict specie:** Tertiary relict: te; Quaternary glacial relicts: gl

Conservation Status:

* *EU Policy species* - The plants that are listed under European policy instruments:

- a - EU Habitats Directive (Council Directive 92/43/ EEC of 21 May 1992)
- b - Bern Convention - EU Convention on the Conservation of European Wildlife and Natural Habitats
- c - EU Wildlife Trade Regulation (Council Regulation (EC) No 338/97 of 9 December 1996)
- *The Red Book of Vascular Flora of the Republic of Kosovo 1:* LC - Least Concern.
- *European Red List of Medicinal Plants:* LC-Least Concern, DD- Data deficient.
- *The IUCN Red List of Threatened Species:* LC-Least Concern, DD- Data deficient.

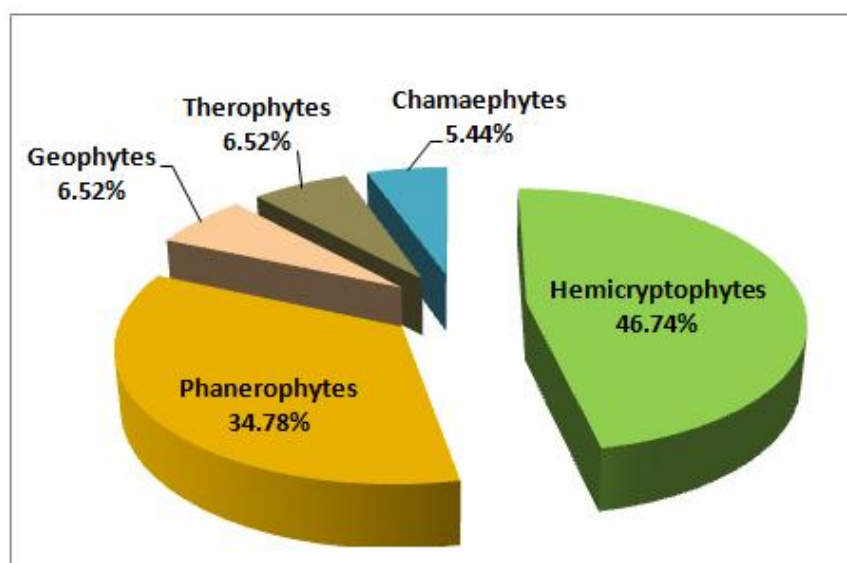


Fig. 1. Spectrum of life forms in the medicinal flora of Bredhiku Reserve.

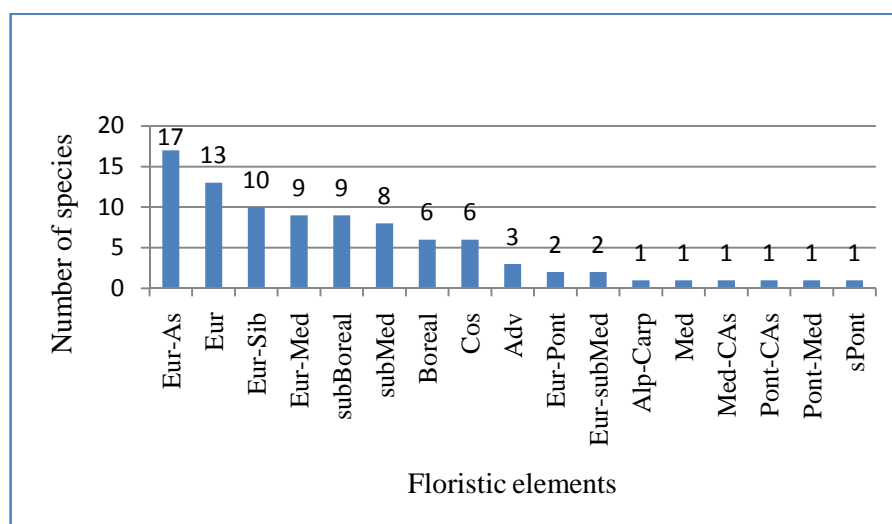


Fig. 2. Distribution of the medicinal plants by floristic elements.

Table 2. Distribution of the species by biological type

Biological type	Number of species	Percentage of all species
Annual (a)	4	4.35
Annual to biennial (a-b)	2	2.17
Biennial (b)	1	1.09
Biennial to perennial (b-p)	2	2.17
Perennial (p)	50	54.35
Shrub (sh)	14	15.22
Shrub to tree (sh-t)	2	2.17
Tree (t)	17	18.48

All biological types are represented among the medicinal plants of Bredhiku Reserve. Regarding the biological types (Table 2) the medicinal species dominated perennial herbaceous plants, 50 species (54.35%). Next are the groups of tree plants, 17

species (18.48%), and shrubs, 14 species (15.22%). With a lower number of species are represented annual herbaceous plants, biennial herbaceous plants and the transitional forms between the basic biological types, 1-2 species. The largest number of perennial

herbaceous plants can be explained by the wide variety of habitats and communities of subalpine plant species on study area. The relatively high number of shrubs and trees results from settlements and preserved forest habitats.

The species described in the studied area with conservation status by the international and national legislation are 60 or 65.22% of the total taxa's number. From them, 48 species (52.17 %) are protected under the European Red List of Medicinal Plants, and 25 are included in the Red List of Threatened Plants of the International Union for Conservation of Nature (IUCN, 2018). In the Red Book of Kosovo is included only one species, *Gentiana punctata* L. All species with conservation status are under the category of Least Concern (LC), except of *Malus sylvestris* (L.) Mill., which included in category Data deficient (DD).

There are 3 protected species listed in the *EU Policy species* (the plants that are listed under European policy instruments). One of them is *Sambucus nigra* L.. It is included in Annex II of Directive 92/43/EEC (Plant and animal species of Community interest whose conservation requires the designation of special areas of conservation) and in Appendix I In Appendix I of Convention on the Conservation of European Wildlife and Natural Habitats (Berne Convention). In the Bern Convention is included also *Aconitum napelus* L., whereas species *Arctostaphylos uva-ursi* L. (Spreng) is listed in Council Regulation (EC) No 338/97 (EU Wildlife Trade Regulation).

The number of the relicts species with conservation status identified in this study is significant (13 species), despite how small the territory of the study is.

Conclusion

The medicinal flora of Bredhiku Strict Nature Reserve (Sharr Mountain in Kosovo) includes 92 taxa. Inventory of medicinal showed significant taxonomic diversity. The phytogeographical elements dominated by taxa of chorological types Euro-Asiatic and

European. Euro-Siberian, Euro-Mediterranean, Sub-Mediterranean and Sub-Boreal chorological groups have also a high percent of species. The results of the analyses of the biological spectrum have shown a pronounced hemicryptophyte character of this area. They represent 46.74 % of the total number of medicinal species. The list of medicinal plants includes 60 species with conservation importance. The medicinal relic species in Bredhik mountain are describe for the first time. The obtained results can be used for comparison with the data on the flora of different Strict Nature Reserve in Sharr National Park, as well as in the whole country. This inventory is only the first step in a series of studies required for mapping of the distribution, conservation status, threats of the species, as well as identify conservation measures within the protected strict area.

References

1. Abdii, N., Xhulaj, Xh., Rushiti, A. (2017). Medicinal herbs in the Sharr Mountains (Macedonian part). International Journal of Current Advanced Research Vol 6, Issue 02, pp 1989-1998.
2. Allen, D., Bilz, M., Leaman, D.J., Miller, R.M., Timoshyna, A. and Window, J. 2014. European Red List of Medicinal Plants. Luxembourg: Publications Office of the European Union.
3. Anderson, S., Kušik, T., & Radford, E. (Eds), 2005, Important Plant Areas in Central and Eastern Europe. Plantlife International.
4. Asmus, U. (1990). Floristic and phytosociological study in Gropiusstadt (Berlin) Gernamy. Verh. brel. Bot. Vor. 8(0): 97-140.
5. Assyov, B., Petrova, A. (Ed). (2012). Conspectus of the Bulgarian vascular flora. Distribution maps and floristic elements. Fourth revised and enlarged edition. Sofia, Bulgarian Biodiversity Foundation.
6. Berisha, B., Mala, XH., Rexhepi, F., Millaku, F. (2012): Atlasi i Bimëve të Kosovës –I.

7. CE (Council of Europe) 1979: Convention on the Conservation of European Wildlife and Natural Heritage. Bern, Switzerland.
8. Council Regulation 338/97, EU Wildlife Trade Regulation - Council Regulation (EC) No 338/97 of 9 December 1996 on the protection of species of wild fauna and flora by regulating trade therein.
9. Demiri, M. (1983). Flora Ekskursioniste e Shqipërisë. Shtëpia Botuese e Librit Shkollor (ShBLSH), Tiranë. 985 f.
10. Directive 92/43/EEC, Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora, Appendix II, OJ L 206, 22.07.1992.
11. Grandcolas, P., Nattier, R., Trewick, S. (2014). Trends in Ecology & Evolution, Vol. 29, No. 12.
12. GRK- Government of the Republic of Kosovo (2016). First Input of Institutions of the Republic of Kosovo to the European Commission 2016 Kosovo Report. Prishtina.
13. Hajredini, E., Bank, P., Bemmerlein-Lux, F., Gagica, I., Ibrahim, H. (2013). Sustainable Development Atlas for Sharr National Park – Kosovo, Vol. 1-5-Draft.
14. International Plant Names Index (IPNI). Available at: <http://www.ipni.org/> [accessed 3 Mars 2019].
15. IUCN 2018. The IUCN Red List of Threatened Species. Version 2018-1. Available at: [iucnredlist.org].
16. Kozłowski, G., Frey, D., Fazan, L. Egli, B., Bétrisey, B., Gratzfeld, J., Garfi, G., Pirintsos, S., (2013). The Tertiary relict tree *Zelkova abelicea* (Ulmaceae): distribution, population structure and conservation status on Crete. 2013 Fauna & Flora International, Oryx, pp 1-8.
17. Mejzini, I. (2007). The Sharr Mountains: Spatial Development based on Cross-border Cooperation. Master Thesis, Blekinge Institute of Technology.
18. Millaku, F. (1999). Subalpine and alpine flora of the Albanian Alps of Kosovo. PhD Thesis. FNSM – University of Prishtina, Kosovo. (Flora subalpike dhe alpikë e Alpeve Shqiptare (Kosovë). Disertacion i doktoratës. UP-FSHMN. Prishtinë) 93 pp.
19. Millaku, F. (2010): Inventory of Medicinal and Aromatic plants and Wild Berries in Kosovo. SAD Kosovo
20. Millaku, F. (2015). Atlas i bimëve mjekësore aromatike dhe i kërpudhave, Prishtinë, 2015.
21. Millaku, F., Heiselmayer, P., Rexhepi, F., Krasniqi, E., Eichberger, Ch. & Haziri, A. (2008). Endemic, steno-endemic and relict plants in serpentine of Kosova. Sauteria 16: 149–162.
22. Millaku, F., Rexhepi, F., Krasniqi, E., Pajazitaj, Q., Mala, Xh., Berisha, N. (2013). Libri i Kuq i Florës Vaskulare të Republikës së Kosovës. Prishtinë.
23. MMPH/AMMK (2013). Spatial Plan - National Park “Sharri”, Prishtina
24. Mustafa, B., Hajdari, A., Mustafa, V., Pulaj, B. (2018). Natural heritage in the Republic of Kosovo: Looking for potential UNESCO sites. Landscape Online 63:1-16.
25. Papparisto, K., Demiri, M., Mitrushi, I., Qosja, Xh. (1988). Flora e Shqipërisë, Volumi I, Akademia e Shkencave, Tiranë.
26. Papparisto, K., Vangjeli, J., Ruci, B., Mullaj, F. (2000). Flora e Shqipërisë, Volumi IV, Akademia e Shkencave, Tiranë,
27. Pulaj, B., (2013). Report on the situation of the beech forests in Kosovo- Ancient beech forests in Kosovo.
28. Qosja, Xh., Papparisto, K., Demiri, M., Vangjeli, J. (1992). Flora e Shqipërisë, Volumi II, Akademia e Shkencave, Tiranë, 1992.
29. Qosja, Xh., Papparisto, K., Vangjeli, J., Ruci, B. (1996). Flora e Shqipërisë, Volumi III, Akademia e Shkencave, Tiranë, 1996.
30. Raunkiaer, C. (1934). The Life forms of plants and statistical plant geography, Oxford, Clarendon Press.

31. The Plant List. 2013. Version 1.1 (September 2013). Available at: [www.theplantlist.org] (accessed 20th of March).
32. Tillemann, K., (2012). Strategic Environmental Assessment Report for Municipal Development Plan Municipality of Prizren.
33. Tomovi , G., Niketi , M., Lakuši , D., Randelovi , V., Stevanovi , V. (2014). Balkan endemic plants in Central Serbia and Kosovo regions: distribution patterns, ecological characteristics, and centres of diversity. *Botanical Journal of the Linnean Society*, 2014, 176, 173–202.
34. Veselaj, Z., Mustafa, M. (2015). Overview of Nature Protection Progress in Kosovo. *Landscape Online* 45:1-10.
35. Vuksanovi S., Tomovi G., Niketi M. & Stevanovi V. (2016). Electronic supplement to: Balkan endemic vascular plants of Montenegro – critical inventory with chorological and life-form analyses. *Willdenowia* 46: 387 – 397.
36. Zahariev, D. (2016). Biodiversity of Relict Vascular Plants in Bulgaria. *International Journal of Research Studies in Biosciences (IJRSB)* Volume 4, Issue 1, PP 38-51.