FLORISTIC DIVERSITY OF NEMERCKA MOUNTAIN IN ALBANIA

DHIMITER PECI[1], ALFRED MULLAJ[1], ARSEN PROKO[2]

[1]Research Center of Flora and Fauna, Faculty of Natural Sciences,

University of Tirana, Albania

[2]Faculty of Forestry, Agricultural University of Tirana, Albania

e-mail: dhimiter.peci@fshn.edu.al

Abstract

Nëmërçka Mountain is part of Trebeshinë–Dhëmbel-Nëmërçkë mountain range in Southern Albania, rich in endemic species and biodiversity. However, this ecosystem is increasingly affected by habitat degradation and climate change. Given the critical importance of high mountain regions as biodiversity hotspot and centers of endemism, a quantitative evaluation of Nëmërçka's flora is essential for informing conservation strategies and understanding its contribution to Balkan biodiversity. This study aims to comprehensively document the vascular flora of this area, evaluate biogeographical spectrum and assess the conservation status of endemic and threatened taxa. The study findings included 560 taxa belonging to 69 families, demonstrating the high richness of this mountain. The floristic spectrum analysis revealed a dominance of Mediterranean elements with 26.7% of total recorded species. This pattern highlights a strong biogeographical affinity of the vegetation with the Mediterranean region, is accordance with the prevailing Mediterranean climatic conditions is the area. Hemicriptophytes made up the highest percentage of all life forms (51.4%), suggesting a considerable degree of habitat degradation. This pattern is largely attributed to anthropogenic impact such as uncontrolled logging, recurrent fires, and overgrazing. In total, 20 endemic species were recorded including 4 strict endemics. Species were assessed using IUCN categories, the results showed that 6.25% of them were classified as threatened. The high floristic diversity observed suggested that Nëmërçka Mountain represent an important biodiversity hotspot in Albania and emphasizes the critical conservation value of the area and its significant potential for economic development through the sustainable utilization of biodiversity.

Key words: *Nëmërçka Mt., floristic diversity, phenology, chorology, Albania.*

Përmbledhje

Mali i Nëmërçkës,si pjesë e vargmalit Trebeshinë–Dhëmbel–Nëmërçkë në Shqipërinë Jugore, përfaqëson një zonë me biodiversitet të lartë dhe numër të konsiderueshëm speciesh endemike. Megjithatë, ky ekosistem po përballet me degradim të habitateve dhe ndikimet nga ndryshimet klimatike. Duke qenë se rajonet malore konsiderohen hotspot-e të biodiversitetit dhe qendra të endemizmit, vlerësimi sasior i florës së Malit të Nëmërçkës është i rëndësishëm për hartimin e strategjive të ruajtjes dhe për kuptimin e rolit të saj në biodiversitetin e Ballkanit. Ky studim synon dokumentimin e florës vaskulare të Malit të Nëmërçkës, analizën e spektrit biogjeografik dhe vlerësimin e statusit të ruajtjes së specieve endemike dhe të kërcënuara. Rezultatet evidentuan 560 specie që i përkasin 69 familjeve, duke treguar pasurinë floristike të zonës. Analiza floristike tregoi dominimin e elementeve mesdhetare (26.7%), çka reflekton ndikimin e kushteve klimatike mesdhetare. Hemikriptofitet përbënin formën jetësore mbizotëruese (51.4%), duke treguar një degradim të konsiderueshëm të habitatit si pasojë e prerjeve të pakontrolluara, zjarreve dhe mbikullotjes. Në total u regjistruan 20 specie endemike, prej të cilave 4 strikt endemike. Vlerësimi sipas kategorive të IUCN-së tregoi se 6.25% e tyre klasifikohen si të kërcënuara. Këto rezultate theksojnë rëndësinë e Malit të Nëmërçkës si një hotspot biodiversiteti dhe nevojën për masa të qëndrueshme ruajtjeje dhe menaxhimi.

Fjalë kyçe: *Mali Nëmërçkës, flora, spektër korologjik, fenologjik, Shqipëri,*

Introduction

Nemercka Mountain is located in Albania's Southern Mountainous region. It is part of two parallel Mountain Ranges, the Trebeshine-Dhembel-Nemercke and the Shendelli-Lunxheri-Bureto. It is enclosed to Permeti municipality and shares a border with Greece, occupying an area of approximately 160 km^2. The terrain ranges from hilly to mountainous with the highest peak 'Drita' with an elevation of 2486 m a.s.l. The Mt Nëmërçka has a high diversity of ecosystems and habitats such as river ecosystems, Mediterranean shrubs, broad leaf, coniferous and mixed forests, subalpine and alpine meadows and pastures. The geological composition comprised greyish-brown, brown, brown-forest soils and mountain meadow type of soils. The calcareous rock dominates in 95 % of the area and in some regions there are sandy flysch rocks. It has a Mediterranean climate with dry summers and wet winters, with an average temperature of 14.8º C and the average rainfall of 1307 mm per year. This mountain is floristically under explored region, few studies provided

records of flora of the area (Baldacci, 1900; Sandwith & Alston, 1940; Peci et al., 2016; Mahmutaj et al, 2015), nevertheless the knowledge on the floral diversity of this mountain which is also considered a hotspot of biodiversity were not sufficient. The present study aimed at the investigation the floristic diversity of the Mt Nëmërçka by providing a checklist of vascular flora, their status and value as well as an analysis of the life and chorological forms.

Methodology

Study area

Nëmërçka Mountain is located in geographical coordinates N 40º 08’ 00’’ and E 20º 24’ 00’’, with elevation ranging from 230 m to 2486 m a.s.l. In the figure 1 is shown the study area.

Figure 1. The study area, Mt Nëmërçkë

Sampling and floristic evaluation

Floristic data were collected based on the phytosociological relevés, which were carried out during the periods of dense vegetation from April to October over three years. The relevés were performed on a surface of 25 m^2 in the cases of herbacous flora using a sampling plot of 5x5; on a surface of 100 m^2 in shrublands using a sampling plot of 10x10; and on a surface of 200 m^2 in the case of forests, using a sampling plot of 20x20. The plant species were

identified based on Flora of Albania, (Paparisto et al., 1988; Qosja et al., 1992, 1996; Vangjeli et al., 2000) and Excursion Flora (Vangjeli J., 2015). The following floristic elements were evaluated for the plant taxa collected during this survey: life form is assessed according to Raunkiaer (1934) system; the chorology analysis is carried out following the principles provided by Pignatti (1982) and Vangjeli J. (2015); phenology analysis was done based on Vangjeli J. (2021); species were classified according to IUCN criteria and the Red List of Albania.

Results and discussions

Flora of Nëmërcka Mountain comprises in total 560 taxa, belonging to 259 genera and 69 families. The highest number of species belongs to Asteraceae family with 11.43% of species, followed by Fabaceae and Poaceae with 8.04%, Lamiaceae with 7.86%, Caryophyllaceae with 6.61 % and Rosacae with 6.63% of total species. In the figure 2 is given the richness of each family recorded in Nëmërcka Mt.

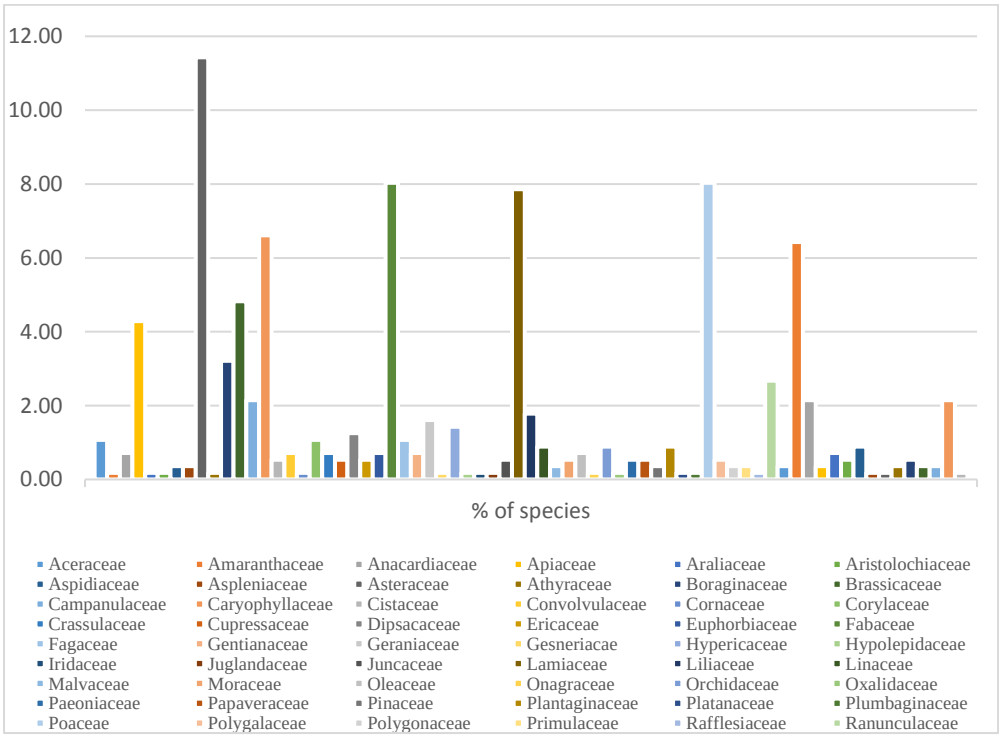

Figure 2. Family composition of flora of Nëmërcka Mountain

The spectrum of Life forms

Hemicriptophyte was the dominant life form with 51.43% of total species, followed by Therophytes and Phanerophytes with 18.04% and 12.32 %, respectively. Chamaephytes and Geophytes were represented by 4.68 % and 7.32% while the other forms such as nano-phanerophyte were represented by 2.68% of species, Therophyte to Hemicriptophyte was represented by two species (0.36%) *Arabis nova* and *Berteroa incana* and lianas were represented only by one species (0.18%), *Clematis vitabla*. The life form spectrum is given the table figure 3.

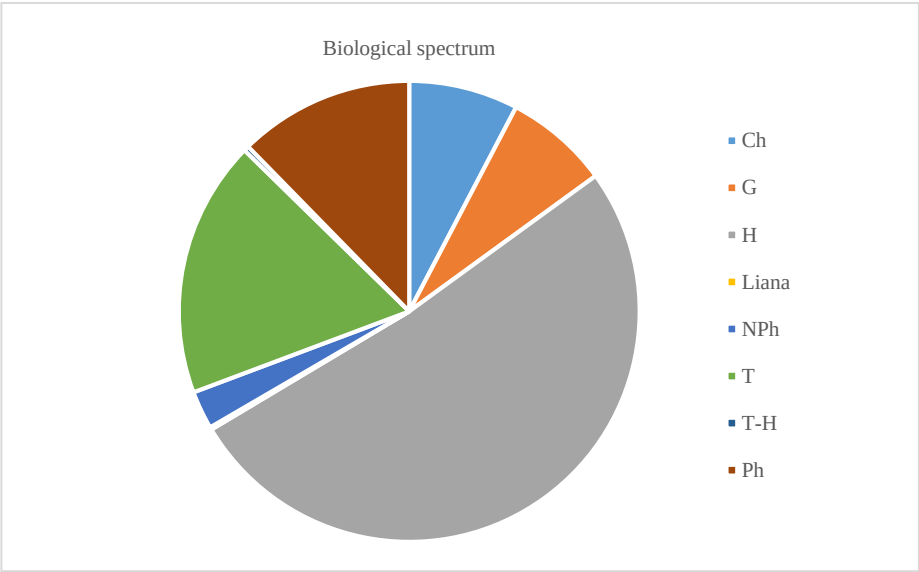

Figure 3. Life form composition of flora in Mt Nemercka

Cholorogical elements and endemisms

The plant species found in Mt Nemercka belong to 28 chorological forms, presented in the table 1. There was a dominance of Mediterranean species with 26.07 %, followed by Balcanic/SubBalcanic species (16.7 %), South European (10.36 %), Euro Asia (9.64 %). The Endemic/SubEndemic element was represented by 20 species that comprise 3.57% of total flora of the mountain.

Table 1. The chorological spectra of species

Chorological elements	No of species	% of species
Mediterranean- Med	146	26.07
Balcanic- Balc	58	10.36
South Europe- SEu	58	10.36
Euro Asia- EuAs	54	9.64
Paleotemperate- Paleotemp	32	5.71
SubBalcanic- SubBalc	32	5.71
Euro-Caucasian- EuCaucas	28	5.00
South East Europe- SEEu	25	4.46
Europe- Eu	22	3.93
Circumboreal- Circumbor	20	3.57
Euro Siberian- EuSiber	16	2.86
Subendemic- SubEnd	16	2.86
SubCosmopolite- SubCosmop	10	1.79
Pontic- Pont	11	1.96
Alpine-Alpine	7	1.25
Endemic- End	4	0.71
Central Europian- Ceu	4	0.71
Asia- Asia	3	0.54
EuroMediterranean- EuMed	2	0.36
Illyrice- Illyric	2	0.36
Cosmopolite- Cosmop	2	0.36
Subatlantic-SubAtl	2	0.36
Central Asia- C Asia	1	0.18
South West Europe- SWEu	1	0.18

East Europe- EEu	1	0.18
West Europe-Weu	1	0.18
EuroPontic- EuPont	1	0.18
West Mediterranean- Wmed	1	0.18

In total 6.25 % of total flora of Mt Nëmërçka are under protection and classified as endangered according to IUCN categories and Red List of Albania (2013). Considering the conservation status of the endangered species, 34.29 % were classified as endangered (EN), 28.57 as vulnerable (VU), 22.86% as less concern (LC), 11.43 critically endangered (CR) and 2.86% were classified as data deficient (DD)

The flowering period of plant species

The flowering period is an important indicator of climate, and it has been linked to the habitats of these plants at various elevations (Peci et al., 2021). The flowering period and state information are also considered important for plant identification and choice of time for the field trips (Meco et al., 2018). Analysis of the blooming period of species in Nëmërçka Mt showed the presence of a wide period of blooming, from January to December. In the figure 4 are given the number of species blooming by each month.

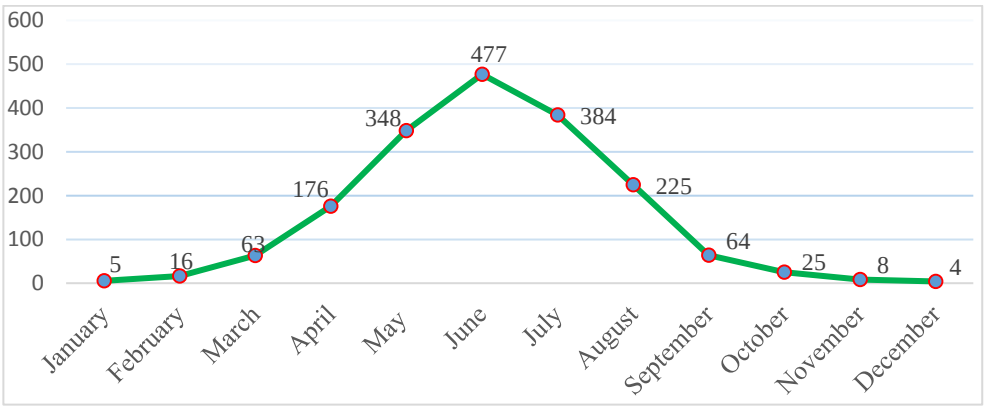

Figure 4. Species blooming period on Mt. Nëmërçka

The majority of species bloomed in June (477 species) followed by July (384 species), May (348 species) and August (225 species) while fewer species such as *Bellis perennis*, *Chamaemelum fuscatum*, *Scabiosa atropurpurea*, *Arbutus unedo*, *Helleborus odorus*, *Arbutus andrachne* bloomed in the period December to January.

Conclusions

The results suggested that Nëmërçka Mountain represents an important center of floristic diversity and endemism in Southern Albania, as evidenced by the presence of 560 taxa belonging to 69 families. The predominance of Mediterranean floristic elements reflects the strong phytogeographical affinity of the vegetation with the Mediterranean region, while the dominance of hemicryptophytes indicates a considerable degree of habitat disturbance associated with anthropogenic pressures such as uncontrolled logging, recurrent fires, and overgrazing. Furthermore, the identification of 20 endemic taxa, including four strict endemics, together with the high proportion of threatened species according to IUCN criteria, highlights the conservation importance and ecological vulnerability of the area. The study is fundamental as it contributes to the knowledge of the flora of Mt Nëmërçka, for which the data are limited.

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